

Osoyoos Airport Master Plan and Financial Analysis

Osoyoos Airport Development Society



ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

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List of Acronyms

AAI	Average annual investment
AGN	Aircraft Group Number
ASRP	Aerodrome Standards and Recommended Practices
ASSAF	Automated Sprinkler System Adjustment Factor
BCGATCA	BC Government Guide to the Amortization of Tangible Capital Assets
CC	Construction Coefficient
CERIP	Community Economic Recovery Infrastructure Program
ESL	Expected service life
FF	Fire flows
FUS	Fire Underwriters Survey
IHA	Interior Health Authority
LPM	Litres per minutes
MDD	Max day demand
MEAC	Maximum exposure adjustment charge
MOTI	Ministry of Transportation and Infrastructure
NBC	National Building Code
OADS	Osoyoos Airport Development Society
OCAF	Occupancy and Contents Adjustment Factor
OLS	Obstacle Limitation Surfaces
RFF	Required Fire Flows
RFQ	Request for Quotation
ROW	Right of way
SGL	Standard gear loading
TEA	Total Effective Area
TRUE	TRUE Consulting
DCG	Development Consulting Group Ltd.

Units of Measure

ft	feet
lgpm	Imperial gallons per minute
km	kilometre
L/d	Litres per day
L/m	Litres per minute
L/s	Litres per second
lpcd	Litres per capita per day
m	metre
mg/L	milligrams per Litre
mm	millimetre
NTU	Nephelometric Turbidity Units
psi	pounds per square inch
USgpm	US gallons per minute

1.0 Introduction

TRUE Consulting (TRUE) was retained by the Osoyoos Airport Development Society (OADS) to provide civil engineering services associated with the continued development and sustainability of the Osoyoos Airport. TRUE has been working with OADS on the Osoyoos Airport Extension project as funded by the Community Economic Recovery Infrastructure Program (CERIP) grant. Upgrades made to date include airstrip extension to 835 m total length, taxiway, fencing, and small aircraft tiedowns. The future phases of this airport will be discussed in the Airport Master Plan and Financial Analysis detailed in this report.

This report will first detail a seven-phase master plan that has been developed in collaboration with OADS. Each phase will describe the number of buildings and bays provided, number of aircraft that can be stored, airport upgrades, utility provision and design Aircraft Group Number (AGN). The design AGN is determined to characterize the critical aircraft for each phase in compliance with Transport Canada's Aerodrome Standards and Recommended Practices (ASRP). This will be discussed throughout the phases because it will drive upgrade requirements. These civil upgrades include the layout for future taxiways, aircraft hangers, on-site roads, water and sanitary servicing, site grading and clear zones, as well as building and parking area layout. Costing will also be provided for the recommended site upgrades.

A utilities assessment is provided to service the site. This includes a high-level analysis of offsite utility capacity for sanitary sewer and water supply. The key design consideration for site utilities is water supply for fire flows (FF). These requirements are defined by the Fire Underwriters Survey (FUS) which is industry standard. In general, the FUS determines the required fire flow rate based on building characteristics, occupancy and intended use. For this reason, it will inform on-site building requirements and or off-site water upgrades to ensure adequate fire flow can be provided by the Osoyoos water system.

FUS building requirements and recommendations will be used as the basis for development of a design guideline for hangers. Buildings and structural design will be in accordance with Transport Canada Airport Zoning regulations and meet the requirements of the BC Building Code. These requirements and aesthetic profile of the airport will be summarized in the Design Guidelines for Hangars.

Lastly, a financial analysis has been completed to assess the business viability of the Master Plan. The first component is an asset management profile. This assessed the current and proposed site upgrades to determine a sustainable annual investment for replacement reserves. The second component is a business case for these upgrades which include the following.

- Market information on airplane hangar ownership, rental rates and outdoor parking rates.
- A ten-year forecast of demand for indoor and outdoor plane storage at the Osoyoos airport.
- A ten-year forecast of operative revenues, operating expenses and net operating income before debt service for the project.
- A five-year forecast of net cash flow for the project.
- A business case for on-site aviation fuel sales will be developed.
- Net operating income before debt service and net cash flow projections will be prepared for two alternatives.

In conclusion, the revenue potential has been compared to the operating costs to determine financial viability of the Master Plan.

Of note, this plan has been updated based on confirmation from the Ministry of Transportation and Infrastructure (MOTI) that the road right of way (ROW) adjacent to the Airport will not be closed. For this reason, the original master plan has been updated to reflect a modified layout without permanent structures encroaching on the ROW. The modified Layout considers temporary structures on the ROW including parking lots and gravel tie-downs. It was confirmed that MOTI would allow temporary structures pending MOTI permitting.

1.1 Existing Airport Infrastructure

The existing airport layout is shown in Figure 1-1. Key aspects of this layout that are pertinent to discussion in this report include:

- Runway length of 850 m (2800 ft), including the recent extension to the SE,
- Runway width of 16 m (50ft),
- Taxi-way offset of 40 m (130 ft),
- Asphalt taxiway length of 235 m (770 ft),
- Asphalt taxi-way width of 10.5 m (35 ft),
- Two asphalt taxi-way run-way entrances,
- Asphalt pad, 900 m² (9,700 ft²),
- Gravel tie-down area, 4300 m² (46,300 ft²),
- Nine existing aircraft tie-down locations, and
- Standard Gear Loading Class 2.

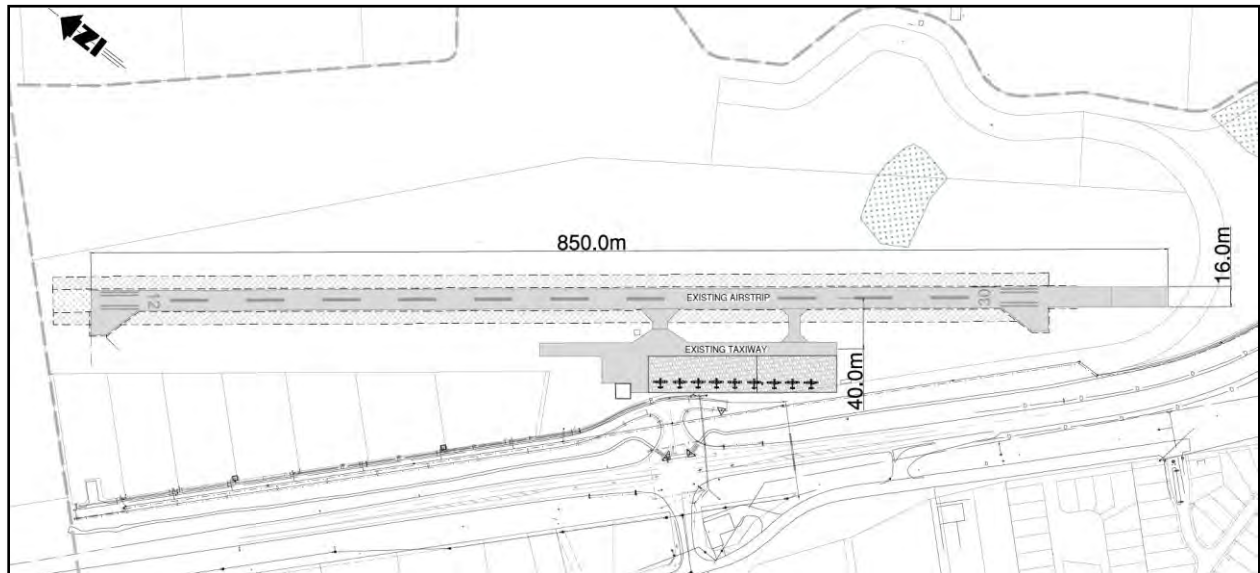


FIGURE 1-1: EXISTING OSOYOOS AIRPORT

2.0 Airport Master Plan

The Osoyoos Airport Master Plan is shown in the drawing package provided in Appendix A. This package includes eight drawings which correspond to the seven phases of the master plan and utility layout drawing. In general, the intent of the master plan is to maximize revenue potential by accommodating a variety of aircraft and maximizing occupancy. For this reason, hangar and tie-down layouts represent the maximum number of aircraft that could be accommodated based on each Phase and the corresponding critical aircraft (corresponding to the AGN). Initially, the existing and desired critical aircrafts are investigated to determine the existing airport capacity and upgrade requirements. These details inform the site layout based on AGN design criteria provided by Transport Canada in the ASRP.

2.1 Critical Aircraft

The existing critical aircraft was determined for comparison with the desired critical aircraft. The existing airport is considered an AGN I (lowest AGN) classification for Non-instrument/ Non-precision Runways because the runway is 16 m wide which is 2 meters less than the minimum requirement presented in Table 3.1.1.1 in the Transport Canada ASRP. Furthermore, the existing taxi-way offsets and widths correspond to the requirements of an AGN I taxi-way. Based on this classification, Transport Canada ASRP Table 1-1 and Table 1-2 defines the critical aircraft dimensions as shown in Table 2-1.

TABLE 2-1: AGN CRITICAL AIRCRAFT DIMENSIONS

AGN	WING SPAN	OUTER MAIN GEAR SPAN	TAIL HEIGHT
	(M)	(M)	(M)
I	14.94	4.5	6.10
II	14.94 – 24.10	4.5 - 6	6.10 – 9.15
III	24.10 – 36.00	6 - 9	6.10 – 9.15

Considering these dimensions the critical aircraft is considered to be a Beech Craft King Air C90. It is noted that the King Air C90-1 will exceed the AGN I critical aircraft dimensions (AGN II). Also, common Cessna aircraft within this classification range from the 100 series to the 400 series where larger models begin to be limited by the runway length at the Osoyoos airport.

2.1.1 Critical Aircraft Upgrades

Through discussion with OADS, interest in servicing larger aircraft was expressed. Critical aircraft that were discussed include the Beech Craft 1900D and De Havilland Dash 8. These aircraft correspond to higher AGN classifications that would require runway widening and extension, and standard gear loading (SGL) upgrades. The current SGL of the runway is class 2 with provision to be upgraded to class 5 with a 30 mm asphalt overlay. This recommendation was referenced

from the sealed geotechnical engineering report for the runway structure which can be viewed in Appendix B. In all upgrading scenarios, it is expected that this improvement would be required as a minimum with additional SGL increases being possible.

The Beech Craft 1900D is within the AGN II classification with a wingspan exceeding the maximum AGN I specification. To upgrade the airport to an AGN II for non-instrument/non-precision runways, the runway width would need to be increased by 7 m to 23 m. Also, extensive runway extensions would need to be completed to accommodate landing distance requirements of approximately 1,420 m.

Considering the De Havilland Dash 8 100 to 400 series, these aircraft correspond to an AGN III. This class would require the runway width to increase by 14 m to 30 m and runway extensions. The landing distance of a Dash 8 Q400 was investigated to determine extension upgrade requirements. It was determined that the required landing distance ranges from 200 m to 2,400 m. Thus, a runway extension of 1,420 m (as determined previously for the Beech Craft 1900) would provide a reasonable operating window, but it wouldn't allow for the full range of performance.

When considering a runway extension of this scale, it would extend through two adjacent lots to the North (restricted by the highway to the south) and require extensive grading works. This is shown in Figure 2-1. The cost associated with land acquisition and development was not considered feasible and were not investigated. For these reasons, the master plan does not consider this extension and will operate as an AGN I facility. However, the site is laid out to accommodate future upgrades to achieve an AGN III which will not limit potential future development of the Osoyoos Airport. This is discussed further in Section 2.2 with site layout design considerations.



FIGURE 2-1: APPROXIMATE RUNWAY EXTENSION

2.2 Site Design Consideration

Key design considerations for hangar layout are building height and runway offset criteria required by the airport Obstacle Limitation Surfaces (OLS). The OLS defines the obstacle free zone for each AGN classification and is defined by the inner transitional, transitional and approach surfaces. The transitional surface described in section 4.1.5 of Transport Canada ASRP is the controlling OLS for fixed objects such as buildings, parked aircraft, and vehicles. This surface begins at the edge of the airstrip required for each AGN class. Airstrip offsets and transitional surface grades for AGNs are summarized in Table 2-2. These surfaces are also shown on Figure 4-1(a) of the Transport Canada ASRP.

TABLE 2-2: AGN NON-INSTRUMENT TRANSITIONAL SURFACE DIMENSIONS

AGN	AIRSTRIPOFFSET FROM CENTERLINE ¹	TRANSITIONAL ² SURFACE GRADE	TRANSITIONAL SURFACE GRADE
	M	%	H:V
I	30	20	1:5
II	40	20	1:5
III	40	20	1:5

1. Reference Table 3.1.5.2 of Transport Canada ASRP.

2. Reference Table 4-1(a) of Transport Canada ASRP.

These dimensions define the airport hangar height and layout because the buildings need to be set back far enough to be below the transitional surface. Two hangar sizes with varying building heights were selected to house King Airs and Cessna aircraft. The King Air hangars are 5.5 m external height, and the Cessna hangars are 4.5 m external height. For this reason, King Air hangars are set back further than Cessna Hangars in the layout. Also, the layout shows all hangar buildings with one face parallel to the runway to be parallel with the transitional surface.

Runway setbacks are defined by the building heights and transitional surface location. The beginning of this surface depends on the AGN classification because of the required airstrip offset from the runway centerline. Currently, the runway offset and transitional surface for an AGN I can be accommodated by the existing airport layout.

When considering upgrades to an AGN II or III, challenges arise with a 10 m increased air strip offset because this places the transitional surface closer to the adjacent road leaving less space for Hangars. To mitigate this impact, the runway should only be widened on the NE to move the runway centerline away from the hangars. In the case of the AGN II, runway widening to the NE does not significantly change the beginning of the transitional surface because the required widening is not significant. However, the runway widening for AGN III is large enough to move the runway centerline to the NE by roughly 7 m which mostly eliminates the 10 m increase for runway strip offset. This provides sufficient area for the hangar layout and allows future upgrade to an AGN III airport. For this reason, hangars are set back to meet the AGN III transitional surface requirements considering runway widening on the NE side of the runway.

2.3 Master Plan Phases

The following phases have been developed in consideration of the following principals:

- Maximizing the usage of available lands,
- Minimize initial capital cost to allow funds to be raised prior to larger capital costs, and
- Anticipated market conditions (as discussed in the Financial Analysis completed by Development Consulting Group, in Appendix C).

A summary of the Master Plan is presented in Table 2-3. This table provides the proposed master plan schedule and estimated capital costs. Phases and the corresponding capital costs are detailed in the following sections.

TABLE 2-3: MASTER PLAN SUMMARY

PHASE	INSTALL YEAR	CAPITAL COST	30% E&C	GST	GRAND TOTAL
1	2026	\$102,680	\$30,804	\$6,674	\$140,158
2	2027	\$635,603	\$190,681	\$41,314	\$867,598
3	2028	\$357,513	\$107,254	\$23,238	\$488,005
4	2030	\$139,585	\$41,876	\$9,073	\$190,534
5	2032	\$277,438	\$83,231	\$18,033	\$378,702
6	2034	\$235,475	\$70,643	\$15,306	\$321,423
7	2035	\$231,880	\$69,564	\$15,072	\$316,516

2.3.1 Phase 1

The Phase 1 layout can be viewed in Figure 1, in Appendix A. This phase is intended to launch development at the Osoyoos Airport and improve site facilities. These facilities include an amenity space with washrooms, additional parking with paved site access, eleven additional tie-downs and a hangar building. The proposed layout was selected to minimize and defer airport upgrades to future phases. This will allow reserves to accumulate and grant funding to be secured for future works. Key features of this phase include the following.

- Building #1: Three (3) bay hangar building with two bays for small aircraft (Cessnas) and one bay for larger aircraft (King Air C90). This building was laid out to accommodate a maximum height of 14.5 m over the first small bay to be compliant with the OLS. Whereas the larger bay can be built higher as it is further set back from the OLS. For this report, it is assumed to be 15.5 m. Also, this building includes a 46 sq. m amenity space which includes washrooms. It will provide social facilities for all pilots and passengers to gather and prepare for flight.
 - Service connections are existing at the property line for sewer, water, electricity, Telus and cable.

- It is noted that the electrical service may require a transformer because it is unclear if the service voltage has been reduced from the existing 600 Volt, 3 Phase transmission line.
- An existing fire hydrant is located adjacent to Building #1.
 - o Five (5) stall parking lot for the hangar building with access from Empire Street.
 - o Asphalt driveways with access to the Taxi-way.
- Two lane site access road to Empire Street which includes a security gate.
- Retaining existing gravel tie-down area with re-organized tie-downs to maximize plane occupancy to 20 Cessna aircraft.

2.3.1.1 Phase 1 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-4. In general, this cost estimate largely represents costs associated with developing Building #1. Building costs are broken out in the cost estimates for ease of reference.

For this cost estimate, airport improvements are the site entrance road, security gate and gravel tie-down works which are considered in Parts 1.0 to 6.0. Part 1: General Requirements considers site survey and records. Part 2.0 Site and Earthworks considers clearing and grubbing, cut and fill earthworks, gravel works, road works, and parking lot works. Part 3.0 to 5.0 consider the water system, sanitary system and shallow utilities works required for service provision. Part 6.0: Miscellaneous describes tie-down works and security gate works. The sub-total for Parts 1.0 to 6.0 represents airport site improvements which total \$140,158.20, including contingency and GST.

Part 7.0: Building estimates the supply and installation of buildings on a square footage basis which represents installation of the foundation, utility connection and building structure. Part 8.0: Building Site and Earthworks consider clearing and grubbing, cut and fill earthworks, gravel works, road works, and parking lot works associated with the Part 7.0. The costs for Building # 2, associated earthworks, contingency and GST are \$1,941,358.13.

TABLE 2-4: PHASE 1 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$10,000.00
Part 2.0 - Site and Earthworks	\$46,180.00
Part 3.0 - Water System	\$5,000.00
Part 4.0 - Sanitary System	\$5,000.00
Part 5.0 - Shallow Utilities	\$10,500.00
Part 6.0 - Miscellaneous	\$26,000.00
Subtotal Parts 1.0 to 6.0	\$102,680.00
Part 7.0 - Building	\$1,364,000.00
Part 8.0 - Building Site and Earthworks	\$58,240.39
Subtotal Part 7.0 to 8.0 - Building	\$1,422,160.39
Subtotal Part 1.0 to 8.0	\$1,524,920.39
Contingency and Engineering Allowance (30%)	\$457,476.12
GST (5% of Subtotal and Contingency Allowance)	\$99,119.83
Total Sum	\$2,081,516.33

2.3.2 [Phase 2](#)

This phase implements a 14,000-litre aviation fuel station which will entice further buy-in to the Osoyoos Airport. It would provide a self-sufficient airport facility for resident pilots and attract transient pilots to use the facilities. This Phase also includes a 60 m asphalt run-way extension and apron for the Fuel Station, and shallow utilities installation for future buildings including the fuel station. It is noted that a latecomer's agreement for connection to the shallow utilities could be implemented to allow OADS to recuperate costs for utilities provision.

Shallow utilities including Fortis, Telus and Cable will need to be extended from the Empire Street intersection which will be adjacent to the future Building #5. For this reason, the shallow utilities are proposed to be installed with service connections for all future hangar buildings. It is anticipated that this will include 140 m of shallow utilities, including a 40 m extension for power and communications to the fuel station. However, final design will depend based on the utility providers in-house designs. Provision for two Fortis Conduits, one Telus and one Cable conduit are considered with each utility having a pull box within the parking lot footprint. Provision for a transformer to reduce transmission voltage is included.

TRUE consulting was retained by OADS in 2022 to design and administer construction of an avgas fuel dispensing station. The scope of this station included the supply and installation of a new 14,000 L (3698.4 US gallon) Avgas Fuel Tank and Cardlock Fuelling Cabinet. For detailed specifications, see the Osoyoos Airport Society - Request for Quotation (RFQ), included in Appendix E. This report considers the fuel station specification from the OADS Fuel Dispensing Station RFQ prepared by TRUE in 2022. The layout of the fuel station can be viewed in Figure 2 located in Appendix A. Design considerations for this location include:

- A paved location with an apron for increased maneuverability for ease of aircraft fueling,
- 30 m (100 ft) offset from buildings to limit fire exposure, and

- Future access via the future parking lot for ease of maintenance and refueling.

2.3.2.1 Phase 2 Costing

RFQ responses indicated that supply of the Avgas Fuel Station equipment would be approximately \$151,480. Whereas, supply and installation would be \$340,000 to \$429,303. Costing for the aviation fuel station is estimated to be in line with the high bid from the RFQ process to reflect current pricing. This represents a value of \$430,000 and should consider a 15% contingency which results in a recommended total budget of \$495,000. In addition to the capital cost, annual operating costs were estimated at \$10,056/year. This operations costing is considered in Section 5.1 from a cost benefit perspective with recommendations for implementation.

Detailed cost estimates for works associated with the asphalt taxi-way and apron, and shallow utilities are presented in Appendix D and summarized in Table 2-5. The sub-total for Parts 1.0 to 3.0 represents airport site improvements which total \$281,600.

TABLE 2-5: PHASE 2 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$10,000
Part 2.0 - Site and Earthworks	\$109,000
Part 3.0 - Shallow Utilities	\$87,300
Subtotal Parts 1.0 to 3.0	\$206,300
Contingency and Engineering Allowance (30%)	\$61,890
GST (5% of Subtotal and Contingency Allowance)	\$13,410
Total Sum	\$281,600

Combining the cost for the fuel station and site works results in the following costs:

- Subtotal: \$635,603
- Contingency and Engineering Allowance (30%): \$190,681
- GST (5% of Subtotal and Contingency Allowance): \$41,314
- Total Sum: \$867,598

2.3.3 Phase 3

The Phase 3 layout can be viewed in Figure 3, in Appendix A. This phase includes a gravel tie-down expansion, utilities servicing, site parking lot, access road and hammer head turn around (for fire truck manoeuvrability). These works are intended to allow additional hangar buildings to be installed while not reducing the available tie-downs. The Building #2 footprint is located over 4 existing gravel tie-downs which will be relocated to a new gravel tie-down area. In the case demand requires additional tie-downs, they can be installed as per the Phase 4 layout. Key features of this phase include the following.

- Hangar Building and Utility Servicing:

- Building #2: Two (2) bay hangar (14.5 m by 10.4 m) for Cessna aircraft with a maximum exterior height of 4.5 m.
- All bays feature asphalt driveways with access to the asphalt Taxi-way extension.
- Service connections are proposed as follows:
 - A 200 mm PVC water service will be connected to an existing water main to the South of Empire Street with an existing connection point. At the connection point an isolation valve and water meter chamber are included in compliance with the Osoyoos Subdivision Servicing Bylaw. From this point, the service will run for 24 m to a utility corridor between Building #2 and future Building # 3. At this location, an onsite hydrant is provided for fire protection and ease of access for the fire department. Past this connection, an isolation valve is included on a 100 mm PVC line which provides services to Building #2. This service main extends for 18 m and Tees to provide a service to Building #2 and a capped future connection point.

The water service was brought to the front of the buildings to reduce utility crossings and conflicts with other infrastructure and eliminate multiple service connection to the existing watermain (not compliant with the Osoyoos Subdivision Servicing Bylaw without subdivision). This also will allow for ease of repairs if the service needs to be excavated because it is not in the paved parking lot. Furthermore, the water and sanitary services are in a 5 m set back from the face of Building #2. It is noted that equipment under 3.5 m in height can work while not impact airport operations because they will be below the transitional surface. Excavator works will likely exceed the OLS, requiring breaks in service at the airport.

- A 150 mm SDR 35 PVC sanitary service is proposed to service the hangar buildings. This includes connecting to the existing system with a new manhole (which will act as an inspection chamber in compliance with the Osoyoos Subdivision Servicing Bylaw) adjacent to the utility corridor to minimize service length. From this manhole, the service will run for 30 m and connect to an on-site manhole. At this location, a service will be provided to Building #2 and provide a future connection stub for Building #3.
- A 34 m gravel taxi-way extension to allow access to the new gravel tie-down area. It is intended that this gravel taxi-way will be used as road base aggregates for the future asphalt taxi-way extensions.
- 20 Cessna aircraft tie-downs will be available which includes retaining 20 existing gravel tie-downs and relocating 4 tie-downs. The relocated tie-downs are budgeted to be constructed with a new gravel pad.

- 10 stall asphalt parking lot will be located behind the hangar buildings with access from Empire Street. The parking lot features a hammer head style turn around to allow fire truck access to site Buildings and the fuel station. This access point is equipped with a security gate to limit access to the airport.

2.3.3.1 Phase 3 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-6. The sub-total for Parts 1.0 to 5.0 represents airport site improvements which totals \$488,005, including contingency and GST. The subtotal for Part 7.0 to 8.0 represents building works. The costs for Building # 2, associated earthworks, contingency and GST is \$987,141.

TABLE 2-6: PHASE 3 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$25,000.00
Part 2.0 - Site and Earthworks	\$222,987.50
Part 3.0 - Water System	\$60,850.00
Part 4.0 - Sanitary System	\$31,675.00
Part 5.0 - Miscellaneous	\$25,000.00
Subtotal Parts 1.0 to 5.0	\$357,512.50
Part 6.0 – Building	\$704,000.00
Part 7.0 - Building Site and Earthworks	\$19,180.00
Subtotal Parts 6.0 to 7.0	\$723,180.00
Contingency and Engineering Allowance (30%)	\$1,080,692.50
Subtotal (Parts 1.0 to 8.0 and Contingency)	\$324,207.75
GST (5% of Subtotal and Contingency Allowance)	\$70,245.01
Total Sum	\$1,475,145.26

2.3.4 Phase 4

The Phase 4 layout can be viewed in Figure 4, in Appendix A. This phase includes capital costs for a gravel taxi-way extensions and gravel tie-down pad expansion for relocation of four tie-downs. Two tie-downs will be stored for future installation as the Building #3 footprint is located over 6 existing gravel tie-downs. In the case demand requires additional tie-downs, more tie-downs as per the Phase 5 layout can be installed. Key features of this phase include the following.

- Hangar Building and Utility Servicing:
 - Building #3: Three (3) bay hangar (14.5 m by 10.4 m) for Cessna aircraft with a maximum exterior height of 5.5 m.
 - All bays feature asphalt driveways with access to the asphalt Taxi-way extension.
 - Service connections will be constructed as follows:
 - The water service will be extended from the tie-in location from the previous phase and provide a capped end for future tie-ins. This work includes installing 40 m of 100 mm PVC water main which includes a service to Building #3.

- The sanitary service will be extended from the tie-in location from the previous phase and provide a capped end for future tie-ins. This work includes installing 42 m of 150 mm PVC sewer main which includes a service to Building #3.
- Shallow utilities were provided in the previous phase.
- A 34 m gravel taxi-way extension to allow access to the new gravel tie-down area. It is intended that this gravel taxi-way will be used as road base aggregates for the future asphalt taxi-way extension.
- 18 Cessna aircraft tie-downs will be available which includes retaining 14 existing gravel tie-downs, relocating four tie-downs to a new gravel tie-down area, and storing two.
 - This includes stockpiling 2 salvaged tie-downs for installation in Phase 5.
- 16 parking stalls will be added to the asphalt parking lot bringing the total parking stalls to 26.

2.3.4.1 Phase 4 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-7. The sub-total for Parts 1.0 to 5.0 represents airport site improvements which totals \$190,534, including contingency and GST. The subtotal for Part 6.0 to 7.0 represents building works. The costs for Building # 3, associated earthworks, contingency and GST is \$1,479,147.

TABLE 2-7: PHASE 4 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$25,000.00
Part 2.0 - Site and Earthworks	\$82,275.00
Part 3.0 - Water System	\$16,000.00
Part 4.0 - Sanitary System	\$13,810.00
Part 5.0 – Shallow Utilities	\$2,500.00
Part 6.0 - Miscellaneous	\$25,000.00
Subtotal Parts 1.0 to 6.0	\$139,585.00
Part 7.0 - Building	\$1,056,000.00
Part 8.0 - Building Site and Earthworks	\$27,624.00
Subtotal Parts 7.0 to 8.0	\$1,083,624.00
Contingency and Engineering Allowance (30%)	\$1,223,209.00
Subtotal (Parts 1.0 to 8.0 and Contingency)	\$366,962.70
GST (5% of Subtotal and Contingency Allowance)	\$79,508.59
Total Sum	\$1,669,680.29

2.3.5 Phase 5

The Phase 5 layout can be viewed in Figure 5, in Appendix A. This phase includes a gravel taxi-way extension, gravel tie-down expansion, site parking lot expansion and utilities service extensions. Like Phase 3, these works are intended to allow additional hangar buildings without reducing the available tie-downs. The Building #4 is located over 6 existing gravel tie-downs which

will be relocated to new gravel tie-down areas which will maintain tie-down capacity. Key features of this phase include the following.

- Hangar Building and Utility Servicing:
 - Building #4: Three (3) bay hangar building with two bays for small aircraft (Cessnas) and one bay for larger aircraft (King Air C90). The maximum building height is 5.5 m.
 - All bays feature asphalt driveways with access to the asphalt Taxi-way extension.
 - Service connections will be constructed as follows:
 - The water service will be extended from the tie-in location from the previous phase and provide a capped end for future tie-ins. This work includes installing 50 m of 100 mm PVC water main which includes a service to Building #4.
 - The sanitary service will be extended from the tie-in location from the previous phase and provide a capped end for future tie-ins. This work includes installing 50 m of 150 mm PVC sewer main which includes a service to Building #4.
- A 95 m gravel taxi-way extension at the SE end of the taxi-way will allow access to a gravel tie-down expansion and provide a runway access at the end of the runway.
 - It is intended that this gravel taxi-way will be partially used as road base aggregates for the future asphalt taxi-way extension in Phase 7.
- 20 Cessna aircraft tie-downs will be available which includes retaining 12 existing gravel tie-downs, relocating 6 tie-downs (from the Building #4 footprint) and installing 2 previously stored tie-downs.
 - The gravel tie-down area to the SE of the taxi-way will be expanded to full capacity with 8 additional tie-downs. It is likely that additional tie-downs could be accommodated in this area, but this would overlap with the existing municipal path.
- 26 parking stalls will be added to the asphalt parking lot bringing the total parking stalls to 52.

2.3.5.1 Phase 5 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-8. The sub-total for Parts 1.0 to 5.0 represents airport site improvements which totals \$378,702, including contingency and GST. The subtotal for Part 6.0 to 7.0 represents building works. The costs for Building # 3, associated earthworks, contingency and GST are \$1,768,494.

TABLE 2-8: PHASE 5 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$25,000.00
Part 2.0 - Site and Earthworks	\$213,687.50
Part 3.0 - Water System	\$18,500.00
Part 4.0 - Sanitary System	\$16,250.00
Part 5.0 - Miscellaneous	\$4,000.00
Subtotal Parts 1.0 to 5.0	\$277,437.50
Part 6.0 - Building	\$1,254,000.00
Part 7.0 - Building Site Earthworks	\$41,600.00
Subtotal Parts 6.0 to 7.0	\$1,295,600.00
Subtotal Parts 1.0 to 7.0	\$1,573,037.50
Contingency and Engineering Allowance (30%)	\$471,911.25
GST (5% of Subtotal and Contingency Allowance)	\$102,247.44
Total Sum	\$2,147,196.19

2.3.6 [Phase 6](#)

The Phase 6 layout can be viewed in Figure 6, in Appendix A. This phase includes a gravel taxi-way extensions to the NW and additional gravel tie-downs. These tie-downs are added to offset the tie-downs lost from the Building #5 footprint. Key features of this phase include the following.

- Hangar Building and Utility Servicing:
 - Building #5: Three (3) bay hangar building with two bays for small aircraft (Cessnas) and one bay for larger aircraft (King Air C90). The maximum building height is 5.5 m.
 - All bays feature asphalt driveways with access to the asphalt Taxi-way extension.
 - Service connections will be constructed as follows:
 - The water service will be extended from the tie-in location from the previous phase and terminate with a water service. This work includes installing 5 m of 100 mm PVC water main and the Building #5 water service.
 - The sanitary service will be extended from the tie-in location from the previous phase and terminate with a sanitary service. This work includes installing 10 m of 150 mm PVC sewer main and the Building #5 sanitary service.
 - Shallow utilities were provided in the previous phase.
- A 145 m gravel taxi-way extension at the NW end of the taxi-way will provide access to a new Cessna Tie-down area.
- 26 Cessna aircraft tie-downs will be available which includes retaining 16 existing gravel tie-downs, relocating 4 tie-downs (from the Building #5 footprint) and installing 6 new tie-downs.
 - If additional tie-downs are needed, this area can be expanding further NW with the same layout.

2.3.6.1 Phase 6 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-9. The sub-total for Parts 1.0 to 5.0 represents airport site improvements which totals \$321,423, including contingency and GST. The subtotal for Part 6.0 to 7.0 represents building works. The costs for Building # 3, associated earthworks, contingency and GST are \$1,747,712.

TABLE 2-9: PHASE 6 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$25,000.00
Part 2.0 - Site and Earthworks	\$188,975.00
Part 3.0 - Water System	\$8,500.00
Part 4.0 - Sanitary System	\$6,000.00
Part 5.0 - Miscellaneous	\$7,000.00
Subtotal Parts 1.0 to 5.0	\$235,475.00
Part 6.0 - Building	\$1,254,000.00
Part 7.0 - Building Site Earthworks	\$26,375.00
Subtotal Parts 6.0 to 7.0	\$1,280,375.00
Subtotal Parts 1.0 to 7.0	\$1,515,850.00
Contingency and Engineering Allowance (30%)	\$454,755.00
GST (5% of Subtotal and Contingency Allowance)	\$98,530.25
Total Sum	\$2,069,135.25

2.3.7 Phase 7

The Phase 7 layout can be viewed in Figure 7, in Appendix A. This phase focuses on site improvements to promote servicing of larger aircraft by extending the asphalt taxiway to the SE end of the runway and providing an asphalt tie-down pad. The asphalt tie-down pad was sized to accommodate four King Air C90 aircraft under the current AGN class. In the case airport upgrades are completed to an AGN III class, this area can serve as a tie-down for two Dash 8 100 series or one Dash 8 Q400. Key features of this phase include the following.

- A 110 m asphalt taxi-way extension to allow paved taxi-way access to the new asphalt tie-down area, existing gravel tie-down area, and runway access close the SE end of the runway. A large asphalt bulb is included at the connection to runway to allow ease of turning for aircraft.
 - This asphalt will overlay the existing gravel taxi-ways that are proposed to be designed to function as base aggregates for paving. A small section of the turn around area will not be gravelled which will require aggregate installation. This is considered in the costing.
- A 1400 m² asphalt tie-down area adjacent to the fuel station and connecting to the parking lot road extension is proposed. This would provide 4 spacious tie-downs for King Air C90 aircraft. These tie-downs replace 4 existing Cessna tie-downs but could also be

used for Cessnas if necessary. If demand requires additional Cessna tie-downs, expansion at the NW gravel tie-down area could be undertaken.

2.3.7.1 Phase 7 Costing

Detailed cost estimates for this work are presented in Appendix D and summarized in Table 2-10. Costing is limited to airport upgrades. Notably, paving cost will appear low because it considers usage of existing taxi-way aggregates for road base.

TABLE 2-10: PHASE 7 COST ESTIMATE SUMMARY

DESCRIPTION	TOTAL COST
Part 1.0 - General Requirements	\$25,000.00
Part 2.0 - Site and Earthworks	\$189,880.00
Part 3.0 - Miscellaneous	\$17,000.00
Subtotal Parts 1.0 to 3.0	\$231,880.00
Contingency and Engineering Allowance (30%)	\$69,564.00
GST (5% of Subtotal and Contingency Allowance)	\$15,072.20
Total Sum	\$316,516.20

2.3.8 Phase 8 Concept

In addition to the master plan, an additional hangar building can be accommodated now that the fuel station location has moved. A two-hangar building across from building one with a shared driveway could increase the number of hangars compared to the previous master plan concept. This building layout is shown on Figure 9 in Appendix A. It is anticipated that costing for this building would be similar to that in Phase 3.

3.0 Utility Capacity Assessment

The Site Utilities Layout can be viewed in Figure 8, located in Appendix A. This figure shows existing water, sanitary and shallow utility services to Building #1 with additional servicing works for Buildings #2 through Building #5. Sequential installation of these services is discussed in the Master Plan whereas this section will focus on the design and capacity of the services.

3.1 Shallow Utilities

The shallow utilities design is limited to the anticipated layout of the utility corridors. This will be confirmed by the utility provider during their detailed design. A tie-in location exists to the SE of the Empire Street intersection which corresponds to the highway utility crossing. From this location electrical, Telus and Cable are extended to the hangar buildings through a utility corridor. The corridor alignment was optimized to minimize conduit length with specific offsets and crossings for the existing and proposed utilities. Initially, the offset from the watermain was selected to match the existing configuration. This alignment then crosses over the water and sanitary mains. It then runs at an offset from the lot boundary to until the terminus at the fuel station service. Lastly, pull boxes are placed at the end of the utility corridor prior to the Building #2 service.

3.2 Sanitary Sewer Capacity

The sanitary sewer service was designed to comply with minimum requirements of the Osoyoos Subdivision Servicing Bylaw because it will provide ample capacity for the expected use. Expected usage is limited to infrequently used washrooms and hangar floor drains. In consideration of floor drains, an oil and grit chamber could be installed on the service outlet to protect the sewer from engine fluid leaks. Alternatively, an emergency spill response plan and spill kits could be required for each hangar to mitigate impacts from oil spills. This may be considered acceptable if the volume of potential spills is low and fluid storage is located on spill containment trays. This will be required in the building design guideline.

The existing sanitary sewer was modelled in PCSWMM to assess the existing sanitary sewer system capacity. It was determined that the existing sanitary sewer likely has capacity to accept flows at the proposed connection point.

3.3 Water Service Capacity

The water service layout was designed to comply with the requirements of the Osoyoos Subdivision and Servicing Bylaw, No. 1100. During the engineering detailed design, bylaw material specifications and standard details should be compliant. Other pertinent design criteria include the FUS and Interior Health Authority (IHA) requirements. The FUS specifies hydrant spacing criteria which required an on-site hydrant. IHA requirements include a minimum 3 m offset from sanitary or storm mains, and any unavoidable crossings to be wrapped in petrolatum tape. A 3 m offset is achieved, and water main crossings are avoided in the proposed configuration.

3.3.1 Water System and On-site Service Performance

Water system modelling was completed for the proposed water service layout in WaterCad for the previous master plan concept. This analysis was not updated based on the new layout because it will be very similar. Furthermore, field pressures should be confirmed with flow testing if a sprinkler system is to be designed. The water service layout is shown in Figure 3-1 with key junctions and the proposed on-site hydrant displayed. Junctions were placed at the watermain connection (J-1), proposed on-site hydrant (H-1) and each water service (S-1 to S-4). The pipes are color coded to show 200 mm and 100 mm pipes in blue and green, respectively.

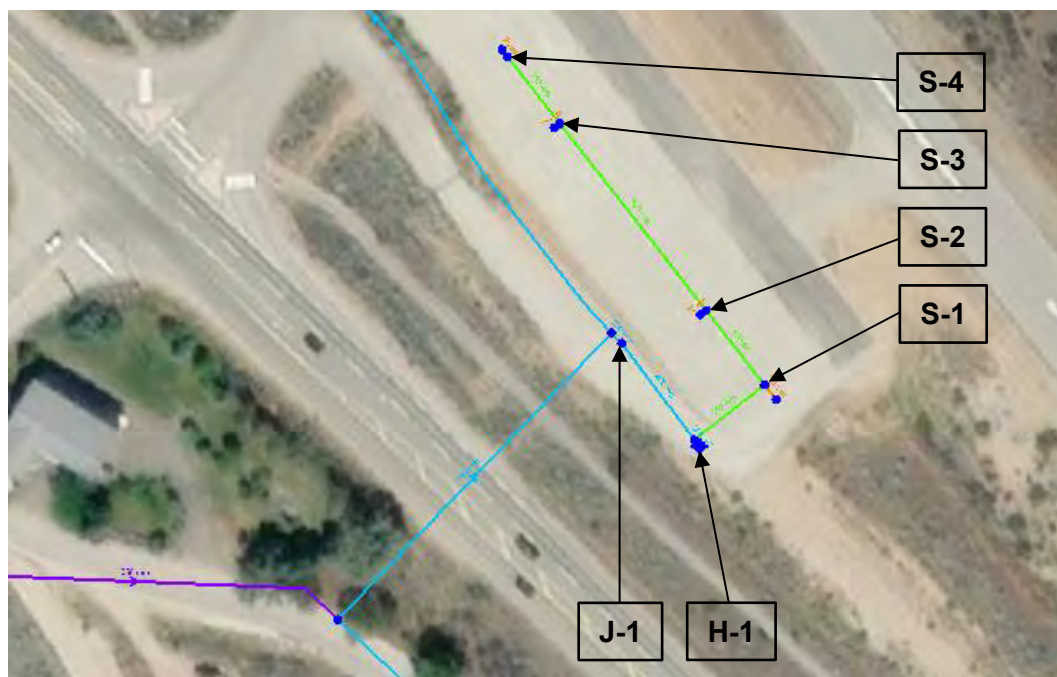


FIGURE 3-1: PROPOSED WATER SERVICE MODEL

Available fire flows during max day demand (MDD) were determined for the current year (2024) and 20-year (2044) projected MDD. Available fire flows and residual system pressure at key junctions are summarized in Table 3-1.

TABLE 3-1: AVAILABLE FIRE FLOW AND RESIDUAL PRESSURE AT CURRENT AND FUTURE MDD

JUNCTION	2024 AVAILABLE FIRE FLOW, L/S	2024 RESIDUAL PRESSURE, KPA (PSI)	2044 AVAILABLE FIRE FLOW, L/S	2044 RESIDUAL PRESSURE, KPA (PSI)
J-1	104	448 (65)	101	434 (63)
H-1	104	434 (63)	101	421 (61)
S-1	104	172 (25)	101	165 (24)
S-2	81	138 (20)	79	138 (20)
S-3	55	138 (20)	54	138 (20)
S-4	51	138 (20)	50	138 (20)

In consideration of sprinkler system design, Table 3-2 and Table 3-3 present the available flow for the current and future cases at no demand, ADD and PHD. The minimum residual pressure of 20 PSI was referenced from the Osoyoos Subdivision Servicing Bylaw No. 1100. Reported pressures above the minimum residual pressure were constrained by a maximum system velocity of 3.5 m/s in the supply main in the highway crossing. This is experienced up to the first service in all cases.

TABLE 3-2: 2024 AVAILABLE FLOW AT RESIDUAL PRESSURE OF 138 KPA

JUNCTION	NO DEMAND		ADD		PHD	
	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)
J-1	110	482 (70)	107	469 (68)	101	427 (62)
H-1	110	469 (68)	107	455 (66)	101	421 (61)
S-1	110	165 (24)	107	172 (25)	101	165 (24)
S-2	85	138 (20)	83	138 (20)	79	138 (20)
S-3	57	138 (20)	56	138 (20)	54	138 (20)
S-4	52	138 (20)	52	138 (20)	50	138 (20)

TABLE 3-3: 2044 AVAILABLE FLOW AT RESIDUAL PRESSURE OF 138 KPA

JUNCTION	NO DEMAND		ADD		PHD	
	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)	AVAILABLE FLOW L/S	RESIDUAL PRESSURE KPA (PSI)
J-1	110	482 (70)	106	462 (67)	97	407 (59)
H-1	110	469 (68)	106	448 (65)	97	393 (57)
S-1	110	165 (24)	106	172 (25)	97	159 (23)
S-2	85	138 (20)	83	138 (20)	76	138 (20)
S-3	57	138 (20)	56	138 (20)	52	138 (20)
S-4	52	138 (20)	51	138 (20)	48	138 (20)

3.3.1.1 Water System Upgrades

Water system upgrades were briefly investigated. It was determined that fire flows at the on-site hydrant could be increased by approximately 50 L/s by upsizing the watermain in the highway crossing from 200 mm to 250 mm. This would allow more capacity through the main while being constrained by a maximum velocity of 3.5 m/s during MDD.

This option was not investigated in detail because the existing available fire flow was deemed acceptable based on FUS requirements. Furthermore, the replacement cost would be far more costly than applying fire-resistant measures in the hangar buildings, reducing the required fire flow. Building features to reduce the required fire flow are discussed in detail in the following section.

3.3.2 Fire Flow Assessment

The FUS requires that building specific fire flows be determined based on level of occupancy, zoning and building construction. Consideration for airplane hangars is applied in the FUS and discussed in this section.

The following formula is provided by the FUS to determine Required Fire Flows (RFF).

$$RFF = 220C\sqrt{A}$$

Where:

RFF = the required Fire Flow in litres per minutes (LPM), C = the Construction Coefficient is related to the type of construction of the building, A = the Total Effective Floor Area (effective building area) in square metres of the building.

First steps in completing this calculation are to determine the type of construction (as C) and Total Effective Area (TEA). Subsequently, the RFF is adjusted in consideration for the following factors:

- Occupancy and Contents Adjustment Factor,
- Automatic Sprinkler Protection Adjustment Factor, and
- Exposure Adjustment Factor.

The following sections follow the steps specified in the FUS to complete this calculation. In some cases, alternate parameters are discussed based on the proposed hangar building characteristics. This will result in multiple RFF calculations that will be discussed for the purpose of informing building design.

A. Determine the Construction Coefficient (C)

Construction of the hangar buildings could be with prefabricated steel structures of wood frame with fire resistant siding. This could correspond to four construction classifications that are summarized in Table 3-4.

TABLE 3-4: CONSTRUCTION COEFFICIENT SUMMARY

CONSTRUCTION COEFFICIENT (C)	TYPE	DESCRIPTION
1.5	V	Wood Frame Construction is considered when structural elements, walls, arches, floors and roofs are constructed entirely or partially of wood or other material.
1.0	III	Ordinary Construction is considered when exterior walls are of masonry construction with a minimum 1-hr fire resistance where other structural elements have a fire resistance less than 1-hr.
0.8	II	Non-combustible Construction is considered when all structural elements are constructed with a minimum of 1-hr fire resistance and are constructed with non-combustible materials.
0.6	I	Fire-Resistive Construction is considered when all structural elements are constructed with a minimum of 2-hr fire resistance and are constructed with non-combustible materials.

The FUS notes that unprotected non-combustible steel construction should be considered in the following cases:

- As Ordinary Construction (Type III) if the fire resistance rating for external walls is 1-hr, or
- As Non-combustible Construction (Type II) if the fire resistance rating for all structural elements is 1-hr.

Based on this, the hangar building construction should be rated to comply with the FUS to confirm the required fire flows.

B. Determine Total Effective Floor Area (A)

For this section, Building #4 is considered because it has the largest common floor plan and it is adjacent to two other hangar buildings. It has a total floor area of 580 m². It is recommended that individual building Fire Flows be determined during detailed design.

The Total Effective Area (in square metres) in the FUS is based on the design fire which would impact a specific building section or floor area. This may not correspond to the total building floor area depending on construction and fire resistance features such as fire walls. The FUS allows subdivision of the floor area if a vertical firewall rated for a minimum of 2 hours of fire resistance is implemented in compliance with the National Building Code (NBC). In this case, additional charges (percentages of floor area) can be applied at the discretion of the design engineer or Authority having jurisdiction in two cases. Firstly, up to a 10% charge can be applied if there is a severe risk of fire on the exposed side of the firewall due to hazardous conditions. Secondly, the same charge can be applied if there are unprotected openings in the fire walls. These charges are not considered moving forward because hazardous conditions and unprotected openings will not be allowed in the hangars.

Also, high one-story buildings are given special consideration in the FUS. For the purpose of this report, the hangar buildings are considered as one-story buildings because the space in the extra

height is predominately used for plane motion opposed to piled or rack storage. Based on these considerations, two TEA scenarios for Building #4 are considered and presented in Table 3-5.

TABLE 3-5: TOTAL EFFECTIVE AREA CALCULATION

DESCRIPTION	TOTAL EFFECTIVE AREA
One Story Building are considered. Hangar buildings are considered as one story because the extra building height is for movement of objects opposed to storing of contents.	580 m ²
Subdividing Buildings: considers vertical fire walls with a fire resistance of or greater than 2 – hr and all openings are protected in compliance with NBC. In this case, the largest single floor area is considered without an exposure charge. This is for the one large hangar in Building #4.	238 m ²

C. Determine the Required Fire Flow

Based on the Construction Coefficients and Total Effective Areas described in Table 3-4 and Table 3-5, the Required Fire Flows are calculated in Table 3-6.

TABLE 3-6: REQUIRED FIRE FLOW SUMMARY

CONSTRUCTION COEFFICIENT (C)	TOTAL EFFECTIVE AREA (M ²)	
	580	238
1.5	8000 (133)	5000 (83)
1.0	5000 (83)	3000 (50)
0.8	4000 (67)	3000 (50)
0.6	3000 (50)	2000 (33)

Note: RFF units are shown as litres per minute (litres per second)

D. Determine Decrease or Increase for Occupancy Contents

The FUS requires the calculated RFF values to be adjusted by a percentage based on Occupancy and Contents. Corresponding adjustments factors were selected based on values provided in Table 3 (Page 24) of the FUS which are derived from examples of Major Occupancy from the NBC. The range of applicable factors are summarized in Table 3-7.

TABLE 3-7: OCCUPANCY AND CONTENTS ADJUSTMENT FACTOR SUMMARY

GROUP	DIVISION	DESCRIPTION OF MAJOR OCCUPANCY	OCCUPANCY AND CONTENTS	ADJUSTMENT FACTOR
F	2	Aircraft hangars (Medium Hazard)	Free to Rapid Burning	15% - 25%
F	3	Light-aircraft hangars (Low hazard – Storage only)	Combustible to Free burning	0% - 15%

It is important to note that these adjustment factors only recommend increasing the RFF. For discussion purposes, future calculations will consider Occupancy and Contents Adjustment Factors of 5%, 15%, and 25%.

E. Determine Decrease for Automatic Sprinkler Protection

The RFF can be reduced by up to 50% for complete Automatic Sprinkler Protection depending on the adequacy of the system. This adjustment depends on the sprinkler system, water supply and system supervision. Corresponding maximum adjustment factors are summarized in Table 3-8 assuming full building coverage as a building design requirement if sprinkler systems are implemented.

TABLE 3-8: SPRINKLER SYSTEM ADJUSTMENT FACTORS

AUTOMATIC SPRINKLER SYSTEM DESIGN	CREDIT
Automatic sprinkler protection designed and installed in compliance with NFPA 13.	- 30%
Water supply is standard for both the system and Fire Department hose lines.	-10%
Fully Supervised system.	-10%

Initially, a sprinkler system must be installed for the other reductions to be applicable. The FUS specifies that NFPA 13 must be applied for the building design. For this reason, the building design guidelines will require that NFPA 13 compliance be confirmed during detailed design (if a sprinkler system is determined to be necessary).

For water supply, it is confirmed that the Osoyoos water system and Fire Department hose requirements can be standardized. Requirements for this are listed and discussed as follows.

- a) At the time of this report, it is understood that the Osoyoos water system is designed and built with no major non-conformance issues with Part 1 of the Water Supply for Public Fire Protection (being the FUS).
- b) During detailed design of the Hangar building, the maximum sprinkler demand design area operation and hose stream requirements must be confirmed to be less than the available water supply curve including an appropriate safety margin. System performance criteria to complete this assessment is provided in Section 3.3.1.

- c) It should be confirmed during detailed design that the available water volume is adequate for the total flow rate which includes maximum sprinkler rate, required hose streams (system fire flows) and MDD for the duration of the design fire event.
- d) A residual system pressure of 150 kPa (20 PSI) at the flow rates in point c).

System supervision includes a signal to notify operators of system malfunction or activation of the automatic sprinkler system. This would allow prompt responses and repairs by operational staff.

It is noted that additional credits may be achieved for individual buildings located in a completely sprinkler protected community or subdivision. Credits could be achieved to a maximum of 25% in addition to the 50% for an Automatic Sprinkler Protection system. The Osoyoos airport could achieve this designation based on the FUS requirements. However, this was not investigated further because the operation, administration and cost of these requirements were deemed excessive considering the available fire flows. It is anticipated that the available fire flow will exceed the required fire flow based on other mechanisms to achieve credits. For more details for sprinkler protected communities, see the FUS.

F. Determine Exposure Adjustment Factor

Increased fire flows may be required based on the severity of exposure risk and the distance between buildings. The maximum exposure adjustment charge (MEAC) applied to a subject building is 75% when considering each side of the building. Regarding Building #4, two building faces are considered because of the adjacent hangar buildings. To determine the corresponding MEAC for each building face, values are referenced from FUS Table 6. Values in this table are selected based on exposure distance, exposed building face length-height factor, and type of construction. The resulting factors are summarized in Table 3-9 considering protected openings.

TABLE 3-9: EXPOSURE ADJUSTMENT FACTORS SUMMARY

	EXPOSURE DISTANCE (M)	LENGTH-HEIGHT FACTOR	CONSTRUCTION TYPE	EXPOSURE ADJUSTMENT CHARGE	TOTAL EXPOSURE ADJUSTMENT CHARGE
Side 1	2	19	V ¹	5%	10%
Side 2	2	17	V ¹	5%	
Side 1	2	19	III	5%	10%
Side 2	2	17	III	5%	
Side 1	2	19	II - I	0%	1%
Side 2	2	17	II - I	0%	

1. Type V building can be treated as type III-IV if the exposed building face has an exterior cladding assembly with a minimum 1 hour fire-resistance rating. Without unprotected openings was considered for this case.

In the case an automatic sprinkler system is implemented, the exposure charges can be reduced by a percentage in the following cases.

- i. Automatic sprinkler protection in exposed buildings: 50%
- ii. Automatic sprinkler protection in exposed and subject building: 100%
- iii. Automatic sprinkler protection in exposed building and area between the exposed and subject building: 100%

G. Adjust the Required Fire Flow

The required fire flow has been adjusted for multiple scenarios based on construction type and adjustment factors based on building features. Scenario hierarchy is sorted in the following order.

1. Automated Sprinkler System Adjustment Factor (ASSAF)
 - Two scenario categories were determined for considering automated sprinkler systems adjustment factors. These include:
 - 0% reduction for no sprinkler system,
 - 30% reduction for a NFPA 13 compliant sprinkler system.
2. Occupancy and Contents Adjustment Factor (OCAF)
 - Three scenario categories were determined for considering occupancy and contents adjustment factors. These include:
 - 25% increase for high fire risk,
 - 15% increase for moderate fire risk, and
 - 5% increase of a low fire risk.

In general, these cases decrease in percentage which imply that the fire hazard risk is decreasing. This would be implemented by limiting the allowable contents in the hangar buildings to low or non-combustible. It is anticipated that engine fluids which would be flammable would be likely to stored in the hangars. To mitigate fire risk, flammable items could be stored in fire/explosion proof cabinets.
3. Construction Coefficient (CC)
 - Four scenario categories correspond to the construction coefficients for Type V, III, II and I construction types. These show the impact of building materials on the RFF.
 - It is noted that the exposure adjustment factor is dependant on the construction coefficient. Thus, this factor is sorted in the scenarios based on the Construction Coefficient.
4. Total Effective Area (TEA)
 - Lastly, two scenarios for total effective area were considered based on the absence and presence of hangar fire walls. This results in two varying total effective areas for the RFF calculation.

These scenarios and adjusted required fire flows are presented in Table F3, located in Appendix F and shown in Figure 3-2, on the next page. This figure compares the adjusted required fire flows to the available fire flows. It shows that the existing fire flow of 6000 L/minute will not be sufficient considering the adjustment factor for Occupancy and Contents. To reduce the required fire flow, the following list of building requirements are recommended in order of priority with sub-points

discussing combinations with the primary point. Furthermore, a 1000 L/minute safety factor below the available fire flow is recommended to be conservative and is considered in the following recommendations.

1. Implement a sprinkler system that is compliant with NFPA 13 in combination with one or more of the following points.
 - a. Implement 2-hr fire resistant fire walls between each hangar bay with protected openings.
 - i. It is noted that this is the minimum requirement for wood frame construction (Type V) to be compliant with FUS.
 - b. Require prefabricated steel structures to achieve a maximum Type II Construction Coefficient.
2. Require 2-hr fire resistant fire walls between each hangar bay with protected openings for Type III buildings.
 - a. Require all structural elements of the prefabricated steel structures be rated for 1-hr fire resistance and are constructed with non-combustible materials to achieve a Type II Construction Coefficient.
3. Require all structural elements of prefabricated steel structures be rated for 2-hr fire resistance and are constructed with non-combustible materials to achieve a Type I Construction Coefficient.

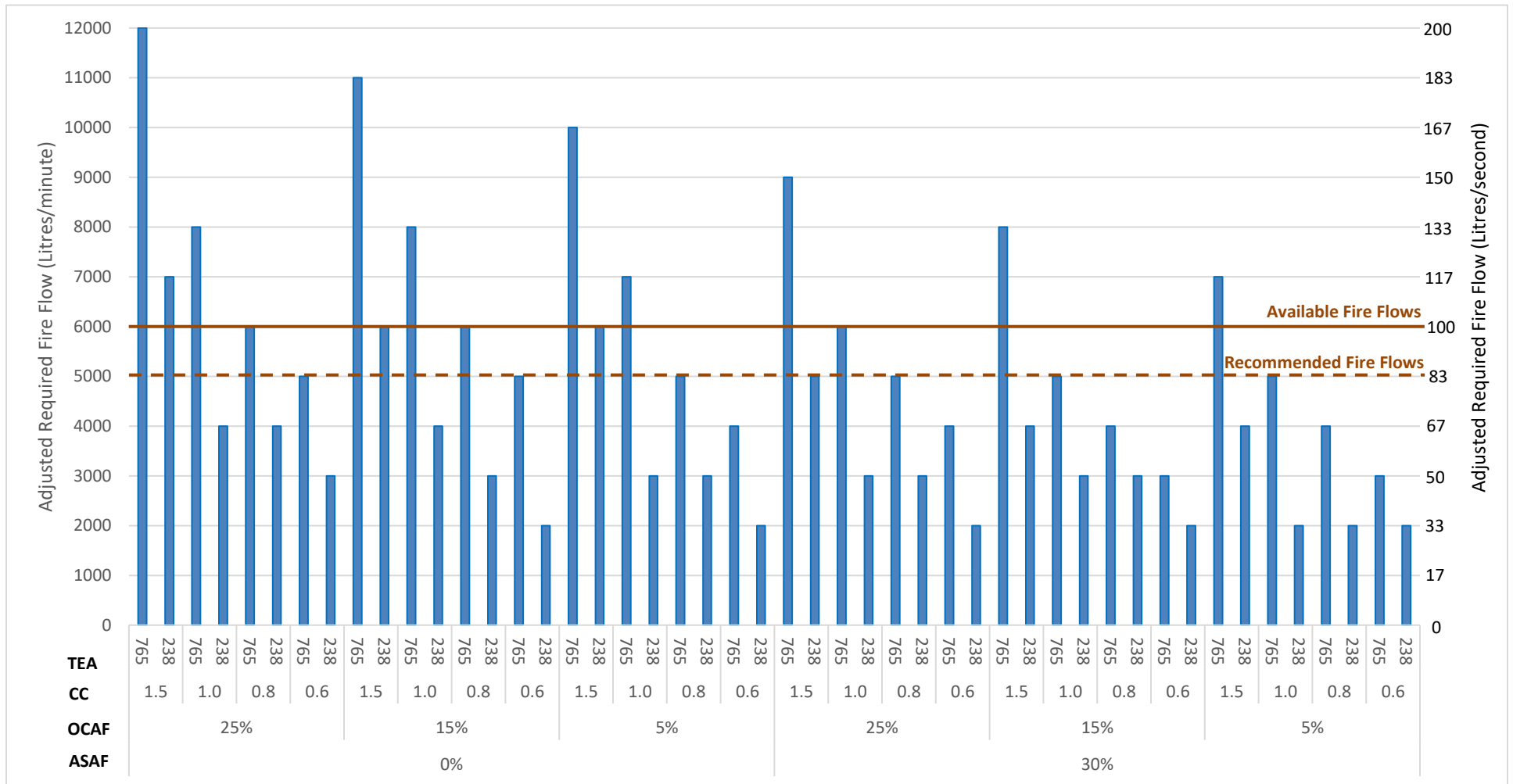


FIGURE 3-2: ADJUSTED REQUIRED FIRE FLOW

4.0 Development and Building Guidelines

This section details the objectives and requirements for hangar buildings at the Osoyoos Airport.

4.1 Airport Land Use Objectives

The Town of Osoyoos Official Community Plan outlines policies for the Osoyoos Airport which align with the objectives of this Master plan. These objectives are summarized and discussed as follows.

- Develop an airport management strategy to improve management of the airport.
 - The information in this master plan achieves this policy by planning future development, and considering operations, maintenance and management costs.
- Support development of the airport lands as a primary community, economic, development, and tourism driver.
 - By implementing the proposed facilities in the master plan, it will allow business opportunities, support local businesses, development of hangar facilities, and tourism opportunities. Furthermore, a communal parking lot and washroom facility will support public events at the airport.
- Use the airport as a civic, recreational and business hub.
 - Recreational events that currently take place at the airport include the Wine Country Racing Association event. Similar events could be hosted at the airport to promote community and business opportunities.
 - Business opportunities that will occur include fuel sales. Other business opportunities could include tourism fly over tours or courier services.
- Promote the Osoyoos Airport as a local and regional asset.
 - Maintenance of the airport would ensure a consistent and reliable service which could be used in emergency situations such as wildfires.
- Explore the feasibility of opening an aviation school at the airport.
 - With improved facilities, it may attract plane owners with entrepreneurial mind sets to facilitate flight lessons and allow junior pilots to fulfill flight experience requirements.
- Encourage the creation of multi-purpose gathering space at the airport for user groups and the general public.
 - The master plan provides a lounge area with a washroom facility that could facilitate additional events and support current public events.

4.2 Airport Location

The airport is situated in an ideal location which provides several advantages. It is located in the Industrial Park area, which is accessed via Highway 3, NW of the town. This area mainly includes industrial development and businesses with a small residential subdivision to the South and the airport on its NE boundary. As such, the airport is bordered by the Industrial Park to the SW, and crown and agricultural land to the North, South and East. Advantages of this location are as follows.

- It is located in an appropriately zoned area with similar land-uses reducing conflict with neighboring developments.
- Site access is from Highway 3 via Empire Street which provides direct access to the Towns core making it an ideal arrival and departure location.
- The obstacle limitation surface will not be encroached upon given that development to the SW is largely completed and the remaining airport is surrounded by environmentally sensitive crown land and agricultural land.

It is noted that development at the airport may increase noise and vehicular traffic, near businesses and some residential developments. For this reason, development must be cognizant of these impacts and take measures to mitigate them.

4.3 Building Guidelines

The following building guidelines have been developed in consideration of site-specific considerations and common practices. These guidelines are summarized as follows.

- All buildings will be located on a parcel of land leased from the Airport for a set term. The lease rate is expected to be “triple net”, meaning that the hangar user pays for all building maintenance costs, utilities, insurance as well as a land lease and property taxes in addition to the base rent.
 - Lease rates will include applicable cost recovery service fees for the airport to provide services including asphalt surface maintenance.
- Hangar buildings may be owned by one or more entities. Where multiple entities own a hangar building, a contractual agreement must be established with terms for co-ownership.
 - The owners of the hangar buildings will pay property taxes to the Town of Osoyoos, as determined by the Town.
- Hangar building construction must be compliant with all applicable statutory codes and regulations, including but not limited to the BC Building Code and Town of Osoyoos Bylaws. These regulation take precedence over requirements in this report.

- See section 3.3.2 for minimum construction requirements for fire protection. Deviation from these requirements may be contemplated for sealed FUS analyses at the discretion of the airport authority.
 - It is noted that cover all or tent style buildings are not acceptable based on these building guidelines.
- Dimensions of buildings are required to adhere to the requirements of the Obstacle limitations surface as defined by Transport Canada in the most recent addition of the Aerodrome Standards and Recommended Practices.
- Building layouts and footprints are strictly required to adhere to the hangar building layouts in the Master Plan.
 - Deviations from this layout may be contemplated at the discretion of the airport authority. A deviation request is required to be accompanied by a report demonstrating that the goals of the Master Plan layouts will not be adversely impacted. Requirements of this report will be at the discretion of the airport authority.
- Building aesthetics are required to comply with the following requirements.
 - Design guidelines should be compliant with the Town of Osoyoos Bylaw No. 1375. Considerations for the Industrial Development Permit Area are considered. In general, the guidelines the following.
 - A design theme which defines design elements including a color scheme and building exterior finishes.
 - Building and structures define basic urban design principles. It is noted that this section is not completely applicable to hangar buildings with recommendations to avoid boxy building with blank facades. This is not intended to apply to hangar buildings
 - Site design that ensures accessible, safe, and convenient access throughout the site. Exterior lighting requirements are mostly applicable to the hangar buildings.
 - Landscaping requirements are minimal but are intended to include xeriscape features if applicable.
 - Buildings and leased land visible to the public must be maintained and tidy to ensure positive public perception of the airport.
- Development along the Airport's perimeter adjacent to existing development should be compatible with these land uses.

5.0 Financial Assessment

This section includes a Financial Analysis to determine a business case and an Asset Management Plan for managing replacement costs for the proposed works in the Master Plan. The Financial Analysis was completed for a previous master plan concept that does not significantly deviate from the current plan which would not result in a significantly different conclusion. For this reason, the Financial Analysis was not updated. The Asset Management Plan was updated based on the new Master Plan layout. Following these two sections, a concluding discussion will address overlapping considerations for repairs and maintenance costs. In general, the financial analysis considers these costs on a high level, whereas the asset management plan details this extensively. As such, the concluding discussion will address any discrepancy between the assumption and costing of these two sections.

5.1 Financial Analysis

Development Consulting Group Ltd. (DCG) was retained by TRUE Consulting as a sub-consultant to complete the Financial Analysis scope. This analysis can be viewed in Appendix C and it includes the following scope.

- A description of the proposed development which is in-line with the proposed Master Plan.
- Background market information on airplane hangar ownership, rental rates and outdoor parking rates for the Oliver (the best/closest comparable), Penticton, Princeton and Pitt Meadows Airports. This background market information was based on internet research, site visits and follow-up telephone calls to the airport manager/town administrator.
- An estimate of development costs in-line with the master plan. Separate estimates are provided for all major items including aircraft hangars, paved taxiways/aprons, outdoor tie down pads and site services. The development cost estimates include an appropriate engineering and contingency allowance of 30%.
- A demand forecast for plane storage at the Osoyoos airport. This forecast reflects the background market information as well as a population projection for the Osoyoos area.
- A business case for on-site aviation fuel sales has been developed.
- A ten-year forecast of operative revenues, operating expenses and net operating income before debt service for the project. All major operating revenues and operating expenses (e.g. building and taxiway/apron maintenance).
- Net operating income before debt service and net cash flow projections were prepared for the most reasonable “ownership option”. This option considers the airport operator will

rent serviced building pads only and plane owners will build and maintain their own hangars.

5.2 Financial Analysis Summary

This section presents the executive summary as presented in the Financial Analysis completed by DCG.

Airport Master Plan

1. The following chart provides a summary description of the proposed master plan.

Component	Timing	Major Project Components
Phase 1	2026	site services and a 6,200 square foot hangar building for three planes and a pilot/passenger lounge/washroom facility
Phase 2	2027	card lock style fuel station
Phase 3	2028	4,800 square foot hangar building for three planes
Phase 4	2030	4,800 square foot hangar building for three planes
Phase 5	2032	5,700 square foot hangar building for three planes
Phase 6	2034	5,700 square foot hangar building for three planes
Phase 7	2035	airport infrastructure including paved taxiway extension

Development Costs

2. Total development costs for the airport master plan are estimated at \$2,031,000 for phase 1, \$493,000 for phase 2, \$2,054,000 for phase 3, \$1,634,000 for phase 4, \$2,128,000 for phase 5, \$2,017,000 for phase 6 and \$291,000 for phase 7. For all seven phases, the total development cost is estimated at \$10,648,000. All of these budget estimates include a 15% allowance for soft costs such as engineering and planning fees as well as a 15% contingency allowance.

Development Cost Sharing

3. The financial analysis assumes that total development costs as summarized above will be shared by three “stakeholder groups”: the Town of Osoyoos, private plane owners and OADS. The Town of Osoyoos is expected to contribute \$10,000 towards the cost of each phase. Private plane owners are expected to pay for 100% of the cost of hangar buildings and the site works related thereto. The remainder, consisting mostly of airport related infrastructure such as site services and taxi-way improvements, is expected to be paid by OADS.
4. Based on this cost sharing formula, stakeholder group contributions are projected to be as follows: \$70,000 from the Town of Osoyoos (1% of the total project cost), \$8,190,000 from plane owners (77% of the total project cost) and \$2,388,000 from OADS (22% of the total project cost).

Airport Operating Revenues & Operating Expenses

5. The Osoyoos airport is expected to generate operating revenue from a number of sources including plane tie-downs, hangar building land leases, fuel sales, annual contributions from the Town of Osoyoos and the Wine Country Racing Association as well as property taxes. Operating expenses are expected to include management fees (for service cost recovery) payable to OADS, repairs and maintenance and a variety of miscellaneous items including security, accounting and janitorial services for the pilot/passenger lounge facility.

Net Operating Income – Town Of Osoyoos

6. Net operating income for the Town of Osoyoos is defined as property tax revenues less the expense of annual contributions. Assuming that annual contributions increase from \$12,000 in 2025 to \$37,000 in 2035, cumulative net operating income for the Town of Osoyoos is projected at \$10,000 by 2035 as shown on line #7 of Table 3 in the financial analysis provided in Appendix C.

Net Operating Income - OADS

7. Net operating income for OADS includes all of the revenue and expense line items noted above with the exception of property taxes which will accrue to the Town of Osoyoos. Net operating income is projected to fluctuate from a loss of \$2,000 in 2025 to a profit of \$5,000 in 2035. Cumulative net operating income for OADS is projected at \$32,000 by 2035 as shown on line #21 of Table 3 in the financial analysis provided in Appendix C.

Capex Funding Requirement - OADS

8. The successful implementation of the seven phase Osoyoos airport expansion project as outlined in the financial analysis will depend to a large degree on the ability of OADS to secure the funding needed to pay for its portion of the project. Including a 2% inflation factor from 2024 going forward, funding requirements for OADS are projected to start at \$146,000 for phase 1 in 2026 and end at \$347,000 for phase 7 in 2035. Cumulative funding requirements total \$2,685,000 by the end of 2035.

Concluding Comments

9. Finding a small number of individuals who are prepared to pay for 100% of the capital and operating costs of hangar buildings at the Osoyoos airport will be key to moving the project forward. OADS has advised the consultant that it has been in contact with at least one such individual. Whether this person (or others) is prepared to make the financial commitment identified in this report remains to be determined.
10. For OADS, securing the funding required to pay for all of the airport infrastructure is the number one task. Whether OADS can secure a total of more than \$2.6 million within the timeline set out in this report also remains to be determined.

5.3 Asset Management Plan

The purpose of monitoring depreciating assets is to prepare for the replacement of aging infrastructure. The first step is to make a list of all owned system components, followed by gathering information about the infrastructure such as the construction materials, date installed, installation method, etc. These parameters can help determine the projected lifespan of system infrastructure and will provide an estimate as to when the infrastructure may require replacement. This approach allows service providers to begin allocating resources that will allow for the replacement or maintenance of their infrastructure once the useful life of their system is nearing an end.

The asset management principals of the BC Government Guide to the Amortization of Tangible Capital Assets (BCGATCA) 2008 was used in this report, unless specified. Based on these guidelines, the useful lives of water, sanitary sewer and road infrastructure components were determined unless specified. Component properties were determined based on existing infrastructure and proposed works in the Master Plan. This information was used to develop asset inventory tables based on the schedule of quantities from the Phase Cost estimated presented in Section 2.3.

Also, a brief discussion regarding asphalt maintenance is discussed in consideration of extending the service life of asphalt assets and budgeting maintenance costs. This is of special concern at the airport given that the primary assets are asphalt surfaces. The discussion will consider a high-level maintenance plan, although this should be updated based on actual condition and performance. The advantage of ongoing maintenance is mitigating the risk of large-scale repairs and maintaining a reasonable level of service. Furthermore, fuel station, water and sanitary maintenance and operations costs were not considered in this section because they are included in the Financial Analysis prepared by Development Consulting Group Ltd.

Lastly, a reserve balance model based on the asset inventories and projected maintenance costs is presented at the end of this section. The model calculates the net value in the reserve between the total expected annual replacement costs and recommended average annual investment to fund replacement costs. This model will be a helpful tool to project costs, replacement schedules and reserve funds.

5.3.1 Existing Infrastructure

Asset inventory tables provided in Appendix G: Osoyoos Airport System Asset Inventory. Inventory tables include information pertaining to the size, material and installation date of each asset. These tables are summarized as follows.

Proposed Water System:

Pipe Inventory:

- 143 m of PVC watermain (sizes including 100 mm and 200 mm) to service the on-site water services

Valve Inventory:

- One 200 mm isolation valve at the onsite hydrant and one 100 mm valve at the 200 mm to 100 mm Tee fitting.

Hydrant Inventory:

- One on-site hydrant located at the hammer head turn-around in the parking lot behind the hangar buildings.

Water Service Inventory:

- Four active services to hangar buildings 2 through 5.

Meter Inventory:

- One water meter at the system connection for all on-site services.

Proposed Sanitary Sewer System:

Pipe Inventory:

- 135 m of 150 mm PVC sewer main to service on-site sanitary services

Manhole Inventory

- One on-site 900 mm precast concrete manhole to redirect the on-site main Infront of Buildings 3 to 5.
 - It is noted that the inspection manhole at the connection to Osoyoos system was not considered as it will become the property of the Town.

Sanitary Service Inventory:

- Four sanitary services to hangars 2 through 5.

Road and Pavement Network

- Existing asphalt surfaces including the runway and taxiway: 19,636 m²
 - It is noted that the existing gravel tie-down area is not considered because it will be built over throughout the Master Plan
- Proposed asphalt surfaces include:
 - Taxi-way extensions, fuel station apron and South run-way entrance: 2,550 m²
 - Parking Lots and Access Roads: 2,765 m²
- Tie-down area for four planes: 1,400 m²
- Proposed gravel surfaces include:
 - Taxi-way: 3,375 m²
 - It is noted that gravel taxi-way extensions in Phases 3, 4 and 5 are not included in this figure because they become subgrade for the asphalt taxi-way extension in Phase 6.
 - Tie-down area for 20 planes: 5,400 m²
- Proposed lock block tie-downs in the gravel tie-down areas include 20 tie-downs once the master plan is completed. This item considers replacing or repairing the metal loops embedded in the concrete block, opposed to replacing the concrete blocks.

Fuel Station

- The 14,000 Liter aviation fuel station is considered as a lump sum item. This was recommended as per the value in the W.S.Nicholls Budget Proposal.

5.3.2 [Expected Service Life](#)

The system components as described in Section 5.3.1 of this report have been categorized for the purpose of assigning expected service life (ESL) values to determine anticipated replacement dates as per the BCGATCA. The useful life for the fuel station was taken from recommendations in the W.S.Nicholls Budget Proposal documents from the 2022 AvGas Fuel Tank and Cardlock Fuel Cabinet RFQ. These documents are included in Appendix E.

In practice, ESL estimates are based entirely on best practices, and it is common that assets outlast their expected service life. For this reason, some of the service lives have been adjusted due to the extensive experience TRUE has with these materials. The ESLs for categorized system components are summarized in Table 5-1.

TABLE 5-1: ASSET EXPECTED SERVICE LIFE

PROJECTS	EXPECT SERVICE LIFE
WATER SYSTEM	
PIPE NETWORK	80
VALVES	40
HYDRANTS	40
SERVICES	40
METERS	20
SANITARY SEWER SYSTEM	
PIPE NETWORK	80
MANHOLES	50
SERVICES	80
ROAD AND PAVEMENT NETWORK	
ASPHALT PARKING LOT	40
ASPHALT TAXI-WAY, AIRSTRIp, AND TIE-DOWN AREA	40
GRAVEL TAXI-WAY AND TIE-DOWN AREAS	15
LOCK BLOCK TIE-DOWNS	15
FUEL STATION	
14,000 LITER AVIATION FUEL STATION	20

It is noted that the ESL for water meters was selected to be 20 years opposed to 5 years as per the BCGATCA. This was chosen to reflect current flow meter specifications.

5.3.3 Estimated Replacement Costs

The following sections discuss the scope and assumptions for estimated replacement costs. To simplify the replacement cost analysis, the following assumptions have been applied.

- Current construction methods are assumed.
- Costing was compared to real costs for comparable projects within the Okanagan Region.
- Linear asset replacement costs include replacement of the existing surface. This was assumed to be a 3 m wide area along the length of linear assets. Three surface types were categorized including asphalt, gravel, or existing ground.
- Assumed asset properties were completed based on available information and professional judgement.
- Linear assets are assumed to be replaced with the equivalent PVC pipe.

5.3.3.1 Water Works

Watermains

Watermain costs have been taken from various recent projects completed in the Okanagan. These projects are similar in scope and include watermains being installed within road structures, gravel areas and existing areas. Restoration of these surfaces is considered as per costing in Section 5.3.3.3. It was assumed that all watermains will be replaced with PVC. The prices for various pipe sizes are inclusive of all appurtenances and are as follows:

TABLE 5-2: WATER LINEAR INFRASTRUCTURE COSTS (2024)

PIPE SIZE AND SPECIFICATION	AVERAGE COST (\$/M)
100 mm PVC	\$250
150 mm PVC	\$300
200 mm PVC	\$375

For a further break down of pipe costs, see the Water Unit Prices and Historical Cost Estimate Table and Table W1: Pipe Inventory in Appendix G.

Hydrants

Hydrant costs were determined based on a hydrant assembly which includes an isolation valve and lead pipe. For this reason, hydrant isolation valve costing was removed from the Valve Inventory Table. The following table breaks down the hydrant replacement costs.

TABLE 5-3: HYDRANT ASSEMBLY COSTS (2024)

COMPONENT	AVERAGE COST
Hydrant Cost	\$12,000
Isolation Valve Cost	\$3,000
Average Lead Cost	\$2,000
Total	\$17,000

For a further break down of surface restoration costs, see the Water Unit Prices and Historical Cost Estimate Table, and Table W3 in Appendix G.

Valves

Costing for system isolation valves is provided in the Water Unit Prices and Historical Cost Estimate Table and Valve Inventory Table W2 in Appendix G. Costs consider replacement in conjunction with watermain replacement projects.

TABLE 5-4: VALVE COSTS (2024)

VALVE	AVERAGE COST
100 mm Valve	\$2,250
200 mm Valve	\$4,500

Water Services

Water service prices include all appurtenances from the main line to 1 m in front of buildings. The estimate is included in the Water Unit Prices and Historical Cost Estimate Table and Service Inventory Table W4 in Appendix G. The value is summarized in Table 5-5.

TABLE 5-5: WATER SERVICE COSTS (2024)

METHOD OF MEASUREMENT	AVERAGE COST
Per Service*	\$5,000/Service

Water Meters

Water meter prices include all appurtenances for supply and installation within an above ground cabinet on the 200 mm supply main. The estimate is included in the Table W5 in Appendix G. This value is also summarized as follows.

TABLE 5-6: WATER SERVICE COSTS (2024)

METHOD OF MEASUREMENT	AVERAGE COST
Per Water Meter	\$20,000/meter

5.3.3.2 Sanitary Sewer Works

Sanitary Sewer Mains

Sanitary Sewer Main costs have been taken from various recent projects completed in the Okanagan. These projects are similar in scope and include sewer mains being installed within road structures, gravel areas and existing areas. Restoration of these surfaces is considered as per costing in Section 5.3.3.3. It was assumed that all sewer mains will be replaced with PVC. The price for 150 mm pipe is inclusive of all appurtenances is summarized in Table 5-7.

TABLE 5-7: SANITARY LINEAR INFRASTRUCTURE COSTS (2024)

PIPE SIZE AND SPECIFICATION	AVERAGE COST (\$/M)
150 mm PVC	\$250

For a further break down of pipe costs, see the Sanitary Unit Prices and Historical Cost Estimate Table and Table S1: Pipe Inventory in Appendix G.

Manholes

Sanitary manholes costs include supply and installation of precast manhole barrels, lids and bases, cast iron manhole cover and frame, and aggregate subbase. The estimate is included in the Table S2 in Appendix G. This value is summarized in Table 5-8.

TABLE 5-8: SANITARY MANHOLE COSTS (2024)

METHOD OF MEASUREMENT	AVERAGE COST
Each	\$12,000

Sanitary Sewer Services

Sanitary Sewer service prices include all appurtenances from the main line to 1 m in front of buildings. The estimate is included in the Sanitary Unit Prices and Historical Cost Estimate Table and Service Inventory Table S3 in Appendix G. This value is summarized in Table 5-9.

TABLE 5-9: WATER SERVICE COSTS (2024)

METHOD OF MEASUREMENT	AVERAGE COST
Per Service*	\$5,000/Service

5.3.3.3 Road And Pavement Network Works

Restoration costs for roads and pavement are broken down into three categories being asphalt, gravel and existing. The existing surface restoration is limited to regrading and seeding disturbed areas. Asphalt and gravel costing is further broken down into the different layers of these structures. Gravel layers include layers for a typical road base being 300 mm select granular sub-base and 150 mm 19 mm minus crushed gravel. It is noted that this is the base structure for gravel and asphalt roads. Whereas tie-down gravel pads are limited to a 150 mm 19 mm minus layer, unless they will become sub-base for asphalt surfaces.

Asphalt structures include the two previous aggregate layers and a 50 mm Hot Mix asphalt layer. Repairs of asphalt surfaces are limited to two scenarios. Scenario 1 being installation of a 50 mm layer over the existing asphalt surface. This is expected for the runway surface based on previous engineering recommendations. Scenario 2 considers “mill and fill” which includes cost for removal and replacement of the asphalt. This scenario is considered for roads and taxiways. It is noted that replacement of aggregate layers is not considered because they will not be disturbed.

Lastly, combined costs for replacing asphalt and gravel road structures. This was included in consideration of trenching linear assets which will disturb these features. All surface replacement costs are summarized in

Table 5-10.

TABLE 5-10: ROAD RESTORATION COSTS (2024)

	METHOD OF MEASUREMENT	AVERAGE COST
Hot Mix Asphalt	m ²	\$ 75
Hot Mix Asphalt Mill & Fill	m ²	\$ 50
300mm Select Granular Sub-base	m ²	\$ 30
150mm Minus 19 mm Crush	m ²	\$ 20
Existing	m ²	\$ 13
COMBINED COSTING		
Asphalt Structure	m ²	\$ 100
Gravel Structure	m ²	\$ 50

Linear Asset Considerations

When replacing the water or sewer mains, asphalt, gravel and existing surface restoration will be required. A minimum area of 3 metres along the length of linear assets is needed to trench to these assets. For this reason, equivalent unit rates for surface restoration for liner assets are provided in Table 5-11. These rates are based on the combined costing in

Table 5-10 with a multiplier of 3 to consider trench width. It is noted that cost efficiencies can be realized if other utilities are replaced simultaneously which would minimize surface restoration costs. These cost efficiencies have not been considered in this analysis.

TABLE 5-11: LINEAR ASSET ROAD RESTORATION COSTS (2024)

METHOD OF MEASUREMENT	AVERAGE COST
Asphalt Cost / m of pipe	\$300 /m
Gravel Cost / m of pipe	\$150 /m
Existing Restoration Cost / m of pipe	\$40 /m

5.3.3.4 Aviation Fuel Station

Costing for the fuel station was taken as the high bid in the 2022 AvGas Fuel Tank and Cardlock Fuel Cabinet RFQ. This corresponded to the W.S.Nicholls Budget Proposal documents which are included in Appendix E. The resulting price from this proposal was \$90,000 over the low bid which represents roughly 26% of the low bid. This is considered reasonable for increased costs from 2022 to 2024.

5.3.3.5 Total Replacement Cost

The asset inventory tables in Appendix G indicate the system components that have been considered in this costing report. Each component was assigned a replacement value using recent cost estimates and construction costs from the Okanagan region. Allowances for Engineering and Contingency have been applied to the subtotal of the estimated replacement costs. A summary of the phased inventory results are presented Figure 5-1 and Table 5-12 on the next page.

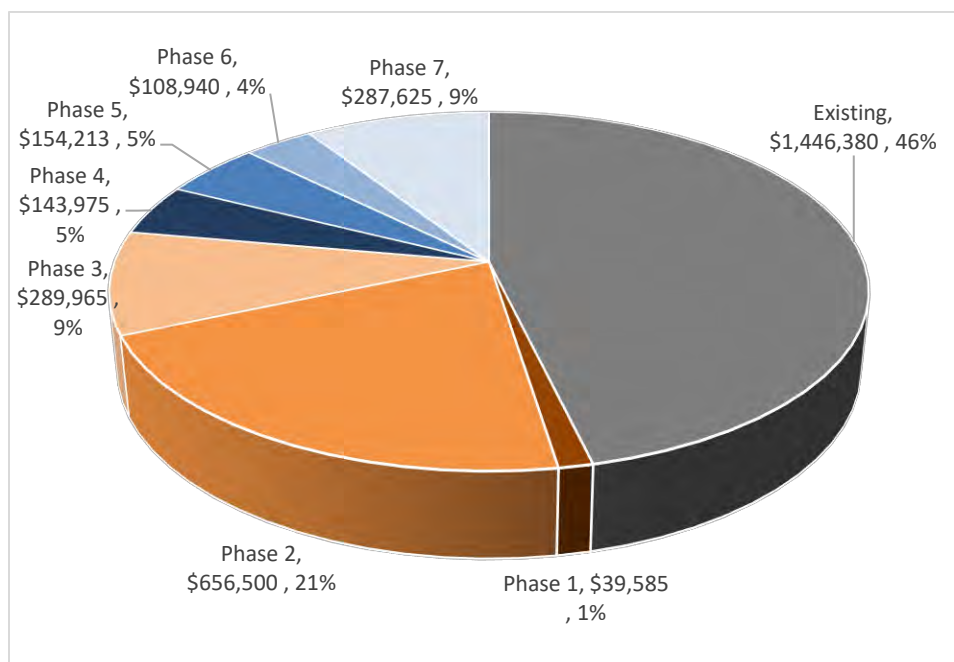


FIGURE 5-1: PHASED TOTAL REPLACEMENT COST (2024 CAD\$)

TABLE 5-12: PHASED ESTIMATE REPLACEMENT COST (2024 CAD\$)

SYSTEM COMPONENT	WATER SYSTEM	SANITARY SYSTEM	PAVEMENT, ROADS AND TIE-DOWNS	FUEL STATION			
SERVICE LIFE	20 - 80	50 - 80	15 - 40	20	SUBTOTAL	30% E & C	GRAND TOTAL

DEPRECIATION RATE	1.3% - 5.0%	1.3% - 2.0%	2.5% - 6.7%	5.0%			
EXISTING	-	-	\$1,112,600	-	\$1,112,600	\$333,780	\$1,446,380
PHASE 1	-	-	\$30,450	-	\$30,450	\$9,135	\$39,585
PHASE 2	-	-	\$75,000	\$430,000	\$505,000	\$151,500	\$656,500
PHASE 3	\$74,550	\$31,000	\$117,500	-	\$223,050	\$66,915	\$289,965
PHASE 4	\$21,000	\$21,000	\$68,750	-	\$110,750	\$33,225	\$143,975
PHASE 5	\$25,000	\$25,000	\$68,625	-	\$118,625	\$35,588	\$154,213
PHASE 6	\$7,000	\$9,000	\$67,800	-	\$83,800	\$25,140	\$108,940
PHASE 7	-	-	\$221,250	-	\$221,250	\$66,375	\$287,625
TOTALS	\$127,550	\$86,000	\$1,761,975	\$430,000	\$2,405,525	\$721,658	\$3,127,183

5.3.4 Roads and Pavement Network Proposed Maintenance Plan

Asphalt maintenance has been considered on a high level in this asset management plan. It is common that asphalt surfaces require progressive maintenance to maintain subgrade integrity, surface quality and the intended level of service. Based on TRUE's experience, an estimated service life of 40 years is quite long for asphalt surfaces. It is common for failures to occur as early as 5 to 10 years from the installation date. However, this is highly dependant on many factors which are not considered in the scope of this report. Moving forward, we believe that it is important to consider an annual maintenance budget for asphalt assets.

The proposed annual maintenance budget was taken as the cost to maintain 2.5% of the total area of asphalt assets within a given year at \$40 per square meter. Thus, the maintenance budget will increase with the construction of new phases. The proposed maintenance costs per phase are summarized in Table 5-13. This budget is intended to fund maintenance works including:

- Engineering inspections,
- Crack sealing,
- Pot hole repairs,
- Seal coating, and
- Other forms of maintenance as deemed necessary.

Undertaking these works will allow the asphalt assets to fulfill the prescribed ESL and may extend it. However, this should be assessed in the field based on asphalt performance and site-specific conditions. Furthermore, the proposed maintenance budgets should be adjusted based on the field assessments and actual maintenance required.

TABLE 5-13: PROPOSED ASPHALT MAINTENANCE BUDGET

PHASE	INSTALLATION DATE	TOTAL ASPHALT AREA (M ²)	REPAIR AREA (M ²)	PHASED ANNUAL COST	CUMULATIVE ANNUAL COST
Existing	-	19,636	491	\$19,636	\$19,636
1	2026	340	9	\$340	\$19,976
2	2027	1000	25	\$1,000	\$20,976
3	2028	1300	33	\$1,300	\$22,276
4	2030	650	16	\$650	\$22,926
5	2032	475	12	\$475	\$23,401
6	2034	-	-	\$-	\$23,401
7	2035	2950	74	\$2,950	\$26,351

5.3.5 Average Annual Investment

The proposed average annual investment (AAI) is the value required to fund replacement costs presented in Section 5.3.3.5 and fund maintenance costs proposed in Section 5.3.4. These values were determined on a phased basis to determine the incremental increase to the AAI as new phases are constructed. Methods for calculating the AAI differ for existing and future assets as per the following Sections. Whereas the AAI for the proposed maintenance works simply equals the estimated maintenance costs.

5.3.5.1 Existing Assets Average Annual Investment

The AAI for existing assets was determined with a small-scale reserve balance model with a break-even reserve balance of \$0 at the end of the anticipated model period (further discussed in Section 5.3.5.4). This was undertaken in consideration of assets that are currently depreciating because funds in addition to the depreciation value will need to be collected for the project replacement cost.

The reserve balance model considers the following parameters.

1. Replacement of existing system components in Tables PR1 and PR2 as per the asset inventory tables in Appendix G. To be clear, the only existing assets are the asphalt runway and taxiway, and tie-downs. The existing gravel tie down area was not considered because it will be removed by phased works in the master plan.
2. The reserve balance model time-period was selected as the year when all system components were replaced at least once. This year is 2114 which corresponds to Phase 6 PVC piping which has the longest service life and the latest installation date.
3. Contingency and engineering costs at 30% of replacement costs.
4. No existing reserve balance was considered.
5. Interest gained on a positive reserve balance at 2.5%, and interest paid on a negative reserve balance at 8%.
6. The model assumes 0% inflation such that all values reflect 2024 Canadian Dollars.

The reserve balance model results and corresponding table can be viewed in Appendix G. The required AAI was determined to be \$28,378.

5.3.5.2 Future Assets Average Annual Investment

The AAI for future assets was calculated for each phase. These values are calculated based on amortizing the replacement cost, engineering, and contingency for each system component over the ESL of that system component. The calculation also considered a nominal appreciation rate of 2.5%, assuming a positive reserve balance. This assumption was considered given that the average annual investment for new infrastructure would be collected from the installation date ensuring the require amount of funds for replacement. This method of calculating the AAI allows for continual replacement of system components.

5.3.5.3 Phased Average Annual Investment

AAI values for each component category per phase are presented in Table 5-14 and shown Figure 5-2. It is noted that the AAI value in a year would be the summation of the existing and phased AAI values. For this reason, the last column shows cumulative values corresponding to the incremental increase in the AAI. These values are intended for general use and updates to the anticipated AAI should be made based on actual system upgrades.

TABLE 5-14: PHASED AVERAGE ANNUAL INVESTMENT (2024 CAD\$)

SYSTEM COMPONENT	WATER SYSTEM	SANITARY SYSTEM	PAVEMENT, ROADS AND TIE-DOWNS	FUEL STATION			
SERVICE LIFE	20 - 80	50 - 80	15 - 40	20		PHASED TOTAL (INCLUDING 30% E & C)	CUMULATIVE TOTAL (INCLUDING 30% E & C)
DEPRECIATION RATE	1.3% - 5.0%	1.3% - 2.0%	2.5% - 6.7%	5.0%	O & M		
EXISTING	-	-	\$28,378	-	\$19,636	\$48,014	\$48,014
PHASE 1	-	-	\$851	-	\$340	\$1,191	\$49,205
PHASE 2	-	-	\$1,447	\$21,883	\$1,000	\$24,330	\$73,535
PHASE 3	\$1,707	\$259	\$3,330	-	\$1,300	\$6,597	\$80,132
PHASE 4	\$180	\$110	\$2,390	-	\$650	\$3,330	\$83,462
PHASE 5	\$201	\$131	\$3,079	-	\$475	\$3,886	\$87,349
PHASE 6	\$107	\$47	\$4,838	-		\$4,992	\$92,341
PHASE 7	-	-	\$4,267	-	\$2,950	\$7,217	\$99,558
TOTALS	\$2,196	\$547	\$48,581	\$21,883	\$26,351	\$99,558	

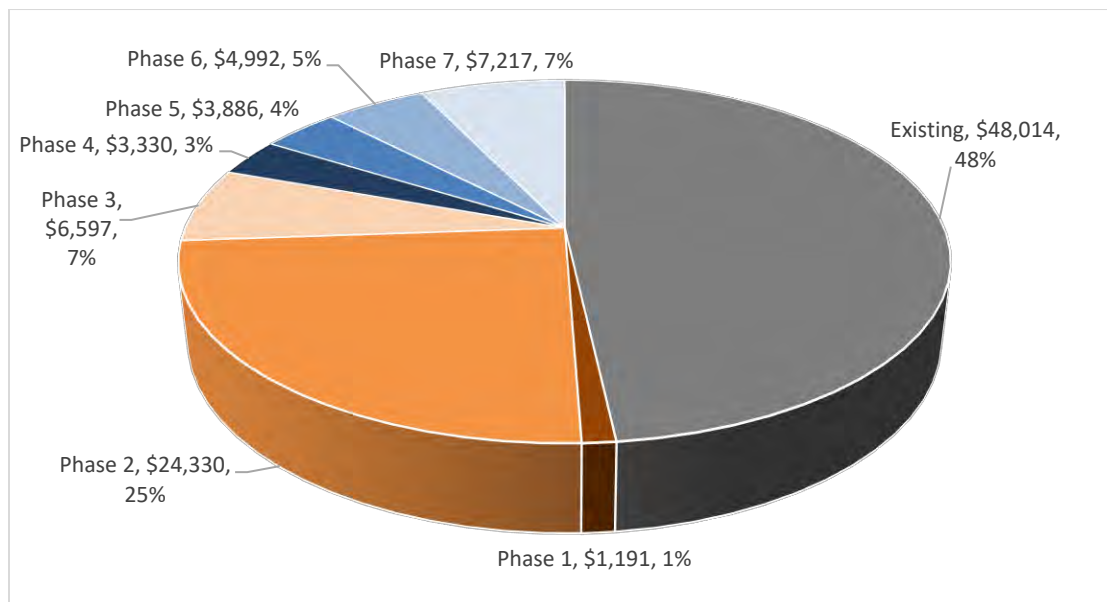


FIGURE 5-2: PHASED TOTAL AVERAGE ANNUAL INVESTMENT

5.3.5.4 Annual Revenue Requirements

Annual revenue requirements would be collected through cost recovery service fees to sustain this asset management plan. This value corresponds to the AAI values presented in Table 5-14. As such, the number of planes that can be serviced by the facility would dictate the required minimum annual service fees. Table 5-15 summarizes the number of planes that can be serviced per phase and the average minimum service fee per plane. Also, the average minimum service fee per plane considering a 65% occupancy rate is include for discussion. In general, 100% occupancy is unrealistic in consideration of winter months. It is observed that the average minimum service fee generally decreases as more planes can be serviced.

TABLE 5-15: AVERAGE MINIMUM SERVICE FEE SUMMARY

PHASE	TIE-DOWNS		HANGARS		AVERAGE SERVICE FEE PER PLANE	AVERAGE SERVICE FEE PER PLANE 65% OCCUPANCY	TOTAL REVENUE
	GRAVEL	ASPHALT	CESSNA	KING AIR			
Existing	9	0	0	0	\$5,335	\$8,208	\$48,014
1	20	0	2	1	\$2,139	\$3,291	\$49,205
2	20	0	2	1	\$3,197	\$4,919	\$73,535
3	20	0	4	1	\$3,205	\$4,931	\$80,132
4	18	0	7	1	\$3,210	\$4,939	\$83,462
5	20	0	9	2	\$2,818	\$4,335	\$87,349
6	26	0	11	3	\$2,309	\$3,552	\$92,341
7	22	4	11	3	\$2,489	\$3,829	\$99,558

5.3.6 Reserve Balance Model

A reserve balance model was developed to show the expected trend in reserve balance funds. The model calculates the reserve balance on an annual basis as per the following formula.

$$RB_Y = RB_{Y-1} + AAI - O\&M - \text{Total Replacement Costs}$$

Where:

RB_Y = Reserve balance current year (CAD\$), RB_{Y-1} = Reserve balance previous year, AAI = Average annual investment in the current year, O&M = Operations and Maintenance Cost in the current year, Total Replacement Costs = the summation of replacement costs for each infrastructure category.

The reserve balance model considers the following parameters.

1. Replacement of all system components as per the asset inventory tables in Appendix G.
2. The reserve balance model time-period was selected as the year when all system components were replaced at least once. The last component to be replaced is Phase 6 PVC pipe because it has the latest installation date and the largest service life. This year is 2114 as shown in Figure 5-3.

3. Contingency and engineering costs at 30%.
4. The AAI increases incrementally as per the cumulative values in Table 5-14.
5. The proposed maintenance cost for asphalt and roads is the only O&M cost considered because the Financial Analysis completed by Development Consulting Group considers the other operations and some maintenance costs.
6. The current reserve fund value was set to zero.
7. Interest gained on a positive reserve balance at 2.5%, and interest paid on a negative reserve balance at 8.0%.
8. The model assumes 0% inflation such that all values reflect 2024 Canadian Dollars.

The reserve balance model results can be viewed in Figure 5-3 and the corresponding table can be viewed in Appendix G. Initially, a large value is accumulated until 2046 to pave over the existing asphalt runway surface which was installed in 2006. In the following year, the first replacement of the fuel station occurs. The next large expenditure in 2062 corresponds to the runway extension and taxi-way installed in 2022. Subsequently, replacement costs in 2066 to 2068 correspond to the first asphalt replacements from Phase 1 to 3. Also, the second replacement of the fuel station occurs during this period. Following, the period between 2069 and 2086 is characterized by minor replacement costs from the master plan phases including water valves, the hydrant, services, a sanitary manhole, and asphalt and gravel surfaces. In 2086 and 2087, the large expenditure corresponds to the second and third replacement of the runway and replacement fuel station, respectively. Lastly, the period between 2102 and 2114 includes major costs including the forth replacement of the fuel station, third replacement of existing asphalt surfaces and the first replacements of water and sewer mains at the end of the analysis.

It is important to note, that the final value of the reserve balance is not zero. This is caused by collection of the AAI which was calculated for continuous replacement of assets. In general, the reserve balance will oscillate in a positive balance as costs are experienced and the AAI is continually deposited.

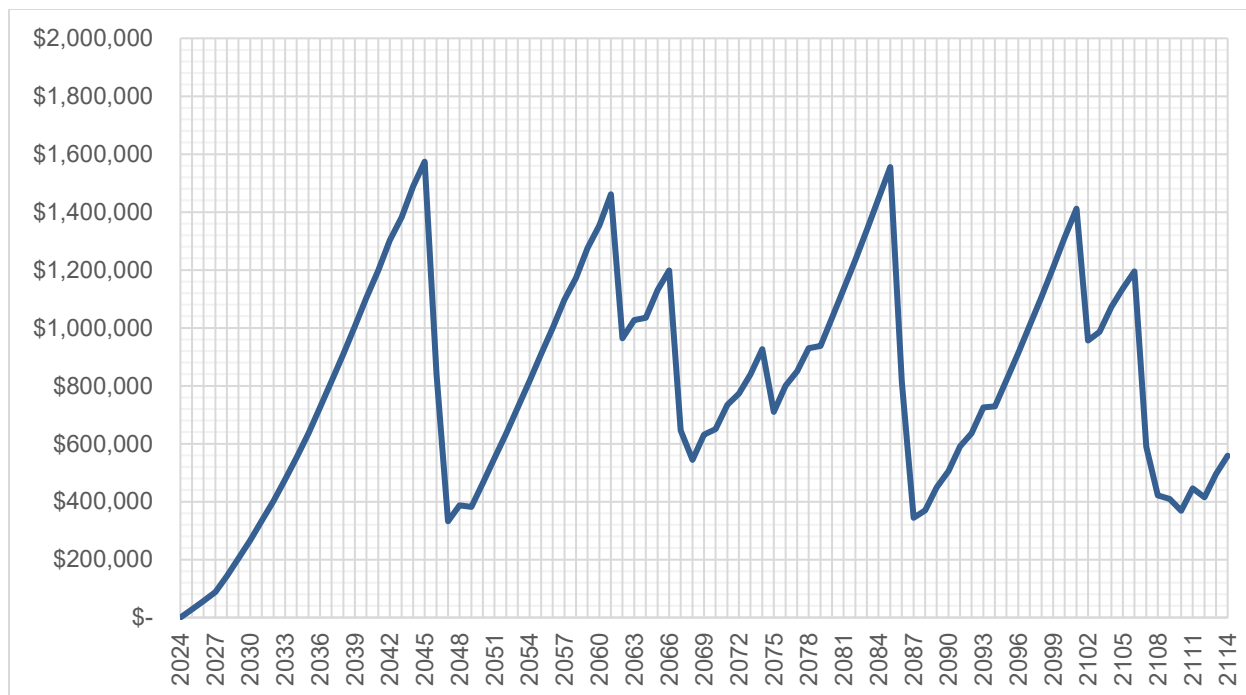


FIGURE 5-3: RESERVE BALANCE MODEL

5.4 Financial Assessment Discussion

This section discusses maintenance costing and scope discrepancies between the Financial Analysis and the Asset Management Plan. Section 7.4: Repairs and Maintenance of the Financial Analysis considers these costs as follows:

- 1% of the project hard costs in year 1 and 2% per annum thereafter.
- A \$12,000 allowance to cover “pre-existing” infrastructure.
- Costing excludes the hangar buildings and the runway which are the responsibility of the plane owners and the Town of Osoyoos, respectively.

In contrast, the Asset Management plan considers all existing infrastructure (including the runway), replacement costs of assets, and proposed asphalt maintenance budget. It also does not consider any costs for hangar buildings.

To make a more direct comparison, a summary is presented in Table 5-16 with runway maintenance costs broken out of the Asset Management Plan. This summary compares the maintenance expenses in line 19 of Table 2 in the Financial Analysis report to the recommended AAI values in Table 5-14 in the Asset Management Plan. To be clear, the AAI values reported consider the existing AAI with the runway costs removed which is a value of \$35,415.04. Thus, the reported existing AAI value is \$12,599. Subsequent values are cumulative from this point based on the Phased Total (including 30% E & C) AAI values in Table 5-14.

It is observed that the Existing and Phase 1 maintenance costs are very similar. In Phase 2, there is a large difference which is the result of collecting more cost recovery service fees for the future replacement of the fuel station and asphalt taxi-way extension. In phase 2, the percentage difference has the largest discrepancy given the large AAI increase resulting from the fuel station and asphalt assets. From this point, the percent difference decreases until Phase 5 and does not increase significantly in Phase 7. The Phase 7 percent difference is less than 15% which is within the 15% contingency carried in the Asset Management Plan. In conclusion, the Financial Analysis and Asset Management Plan proposed maintenance costs are not significantly different for the purposes of this report.

TABLE 5-16: MAINTENANCE COST COMPARISON

PHASE	YEAR	MAINTENANCE COSTS		PERCENT DIFFERENCE
		FINANCIAL ANALYSIS	ASSET MANAGEMENT PLAN	
Existing	2025	\$12,000	\$12,599	5%
1	2026	\$14,000	\$13,790	-2%
2	2027	\$20,000	\$38,120	48%
3	2028	\$30,000	\$44,717	33%
3	2029	\$35,000	\$44,717	22%
4	2030	\$37,000	\$48,047	23%
4	2031	\$40,000	\$48,047	17%
5	2032	\$44,000	\$51,933	15%
5	2033	\$48,000	\$51,933	8%
6	2034	\$51,000	\$56,926	10%
7	2035	\$57,000	\$64,143	11%

It is noted that the recommended AAI values for the Asset Management Plan would follow those reported in Table 5-16 if the runway maintenance cost is excluded.

6.0 Summary Conclusion

TRUE Consulting (TRUE) was retained by the Osoyoos Airport Development Society (OADS) to provide civil engineering services associated with the continued development and sustainability of the Osoyoos Airport. TRUE has been working with OADS on the Osoyoos Airport Extension project as funded by the Community Economic Recovery Infrastructure Program (CERIP) grant.

This report details a seven-phase master plan that has been developed in collaboration with OADS. Key design criteria for the layout are as follows.

- Aerodrome design is compliant with the most recent version of Transport Canada's Aerodrome Standards and Recommended Practices.
- The current airport was determined to have an AGN I (lowest AGN) classification for Non-instrument/ Non-precision Runways. Based on the corresponding critical aircraft dimensions, a Beech Craft King Air C90 is the critical aircraft. It is noted that the King Air C90-1 will exceed the AGN I critical aircraft dimensions (AGN II).
- The master plan layout considers future expansion to allow upgrades to achieve AGN III which would allow larger aircraft to use the facility. It is noted that this would likely require a significant runway extension, extending over two agricultural lots, NW of the airstrip.

The resulting master plan is summarized in the following Table which summarizes key design features.

TABLE 6-1: MASTER PLAN SUMMARY

PHASE	INSTALL YEAR	FEATURE DESCRIPTION
1	2026	Three bay hangar Building #1 with lounge and communal washroom, two lane access road to Empire St. with a 7 stall parking lot, expand gravel tie-downs to service 20 planes, and fuel station electrical service
2	2027	14,000-litre Aviation Fuel Station, asphalt taxi-way extension and fuel station apron, shallow utilities for each building
3	2028	Two bay hangar Building #2, on-site utilities services, asphalt and gravel taxi-way extensions, expanded gravel tie-down area to service 20 planes, install 10 stall asphalt parking lot
4	2030	Three bay hangar Building #3, on-site utilities services, gravel taxi-way extensions, expand gravel tie-down area to service 18 planes, expand asphalt parking lot with 16 additional stalls (total 26)
5	2032	Three bay hangar Building #3, on-site utilities services, gravel taxi-way extensions, expand asphalt parking lot with 26 additional stalls (total 52)
6	2034	Three bay hangar Building #3, on-site utilities services, gravel taxi-way extensions, expand gravel tie-down area to service 26 planes
7	2035	Asphalt taxi-way extension, access and turn-around at the South end of airstrip with, asphalt tie-down pads to service four King Airs or a Dash 8
8		Additional Two bay hangar Building

Utility capacity was assessed to confirm servicing for the hangar buildings. Shallow utilities were limited to proposed layouts because the utility companies will dictate this design. However, shallow utilities are readily available in this area. The sanitary sewer main located on Empire St. likely has ample capacity to accommodate hangar buildings. This will require a manhole connection and on-site sanitary main to service individual hangar buildings. The domestic water main located on Empire St. will service the hangar buildings with an on-site water main and on-site hydrant. The hydrant was designed to allow the maximum available fire flow of 100 L/s on-site. Additionally, the required fire flow for hangar buildings was determined in several building scenarios. In general, building requirements to achieve fire flows with an appropriate safety factor (1000 L/min) are listed below.

1. Implement an NFPA 13 compliant sprinkler system in combination with one or more of the following points.
 - a. 2-hr fire resistant fire walls between each hangar bay with protected openings.
 - b. Prefabricated steel structures classified as Type II Construction Coefficient.
2. Require 2-hr fire resistant fire walls between each hangar bay with protected openings for Type III Construction Coefficient.
 - a. Prefabricated steel structures classified as Type II Construction Coefficient.
3. Require a Type I Construction Coefficient with 2-hr fire resistance prefabricated steel structures and constructed with non-combustible materials.

Building Guidelines were also established for hangar buildings which are summarized below.

- Buildings will be located on a parcel leased from the Airport for a set term. Lease rates will be “triple net” and include cost recovery service fees for OADS.
- Hangar buildings may be owned by one or more entities. For multiple owners, a contractual agreement must be established.
- Hangar building construction must be compliant with all applicable statutory codes and regulations. These regulation take precedence over requirements in this report.
 - o Minimum construction requirements for fire protection as per FUS.
 - o Dimensions of buildings are required to adhere to the requirements of the Obstacle limitations surface.
 - o Building layouts and footprints are strictly required to adhere to the hangar building layouts in the Master Plan.
- Building aesthetics are generally required to comply with the Town of Osoyoos Bylaw No. 1375. Considerations for the Industrial Development Permit Area are considered.

A detailed financial assessment for the airport master plan was completed. This work included a financial analysis completed by Development Consulting Group Ltd. (DCG) and an Asset Management Plan completed by TRUE. The Financial Analysis was completed for the previous master plan concept, but the end result is similar considering the current updates. For this reason, the Financial Analysis was not updated. It is summarized as follows.

- Development costs for all seven phases is estimated at \$10,648,000 which includes a 15% allowance for soft costs such as engineering and planning fees as well as a 15% contingency allowance.
- Development cost sharing is considered between the Town of Osoyoos (\$10,000 per phase), private plane owners (100% of hangar building costs) and OADS (the remainder of development costs).
- Airport operating revenues (for service cost recovery) are expected from plane tie-downs, land leases, fuel sales, ToO annual contributions, events, and property taxes. Operating expenses are expected to include management fees (for service cost recovery) payable to OADS, repairs and maintenance and miscellaneous items.
- Net operating income for the Town of Osoyoos is property tax revenues less the expense of annual contributions. The net operating income for the is projected at \$10,000 by 2035.
- Net operating income for OADS includes all revenue (excluding property taxes) and expense items Net operating income is projected to fluctuate from a loss of \$2,000 in 2025 to a profit of \$5,000 in 2035.
- The successful implementation of the master plan will largely depend on OADS ability to secure the funding for their contribution which totals \$2,685,000 by the end of 2035.
- Finding a small number of individuals who are prepared to pay for 100% of the capital and operating costs of hangar buildings at the Osoyoos airport will be key to moving the project forward.

The Asset Management Plan updated based on the revised master plan layout. It was developed for the purpose of monitoring depreciating assets to prepare for the replacement of aging infrastructure. This plan complies with the asset management principals of the BC Government Guide to the Amortization of Tangible Capital Assets (BCGATCA) 2008. Key components of this analysis are summarized as follows.

- Existing infrastructure assess includes on-site water and sanitary service provision, on-site roads and pavement infrastructure, and the fuel station.
- Estimated replacement costs consider current construction methods and regulations, comparable costing within the Okanagan region and linear (pipes) asset replacement includes surface restoration.
- Total replacement costs and the average annual investment for all works in the master plan per utility are summarized in the following Table. It is noted that pavement, roads, and tie-downs represent the largest cost which could be mitigated by executing an ongoing maintenance program.

TABLE 6-2: TOTAL COST AND AVERAGE ANNUAL INVESTMENT SUMMARY

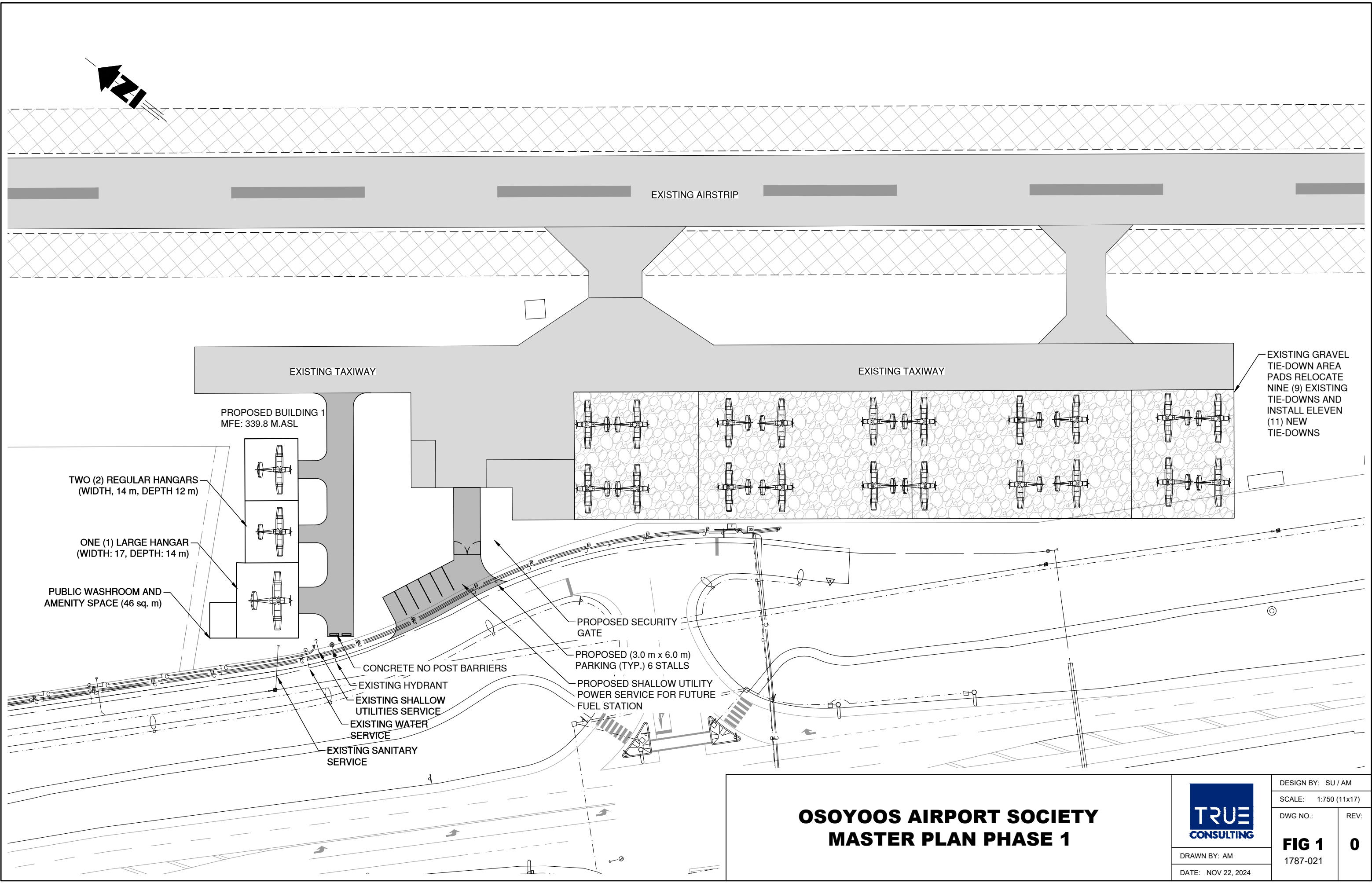
	WATER SYSTEM	SANITARY SYSTEM	PAVEMENT, ROADS AND TIE-DOWNS	FUEL STATION	30% E & C	GRAND TOTAL
REPLACEMENT COSTS	\$134,950	\$86,000	\$1,715,110	\$430,000	\$709,818¹	\$3,075,878
AAI	\$2,234	\$547	\$48,158	\$21,883	\$25,596²	\$98,418

1. 30% Engineering and Contingency, 2. Operations and Maintenance Costs

The Reserve Balance will fluctuate between \$300,000 and \$1,600,000 to sustain the proposed asset management plan.

APPENDIX A

Master Plan Phasing and Utility Plan Drawings



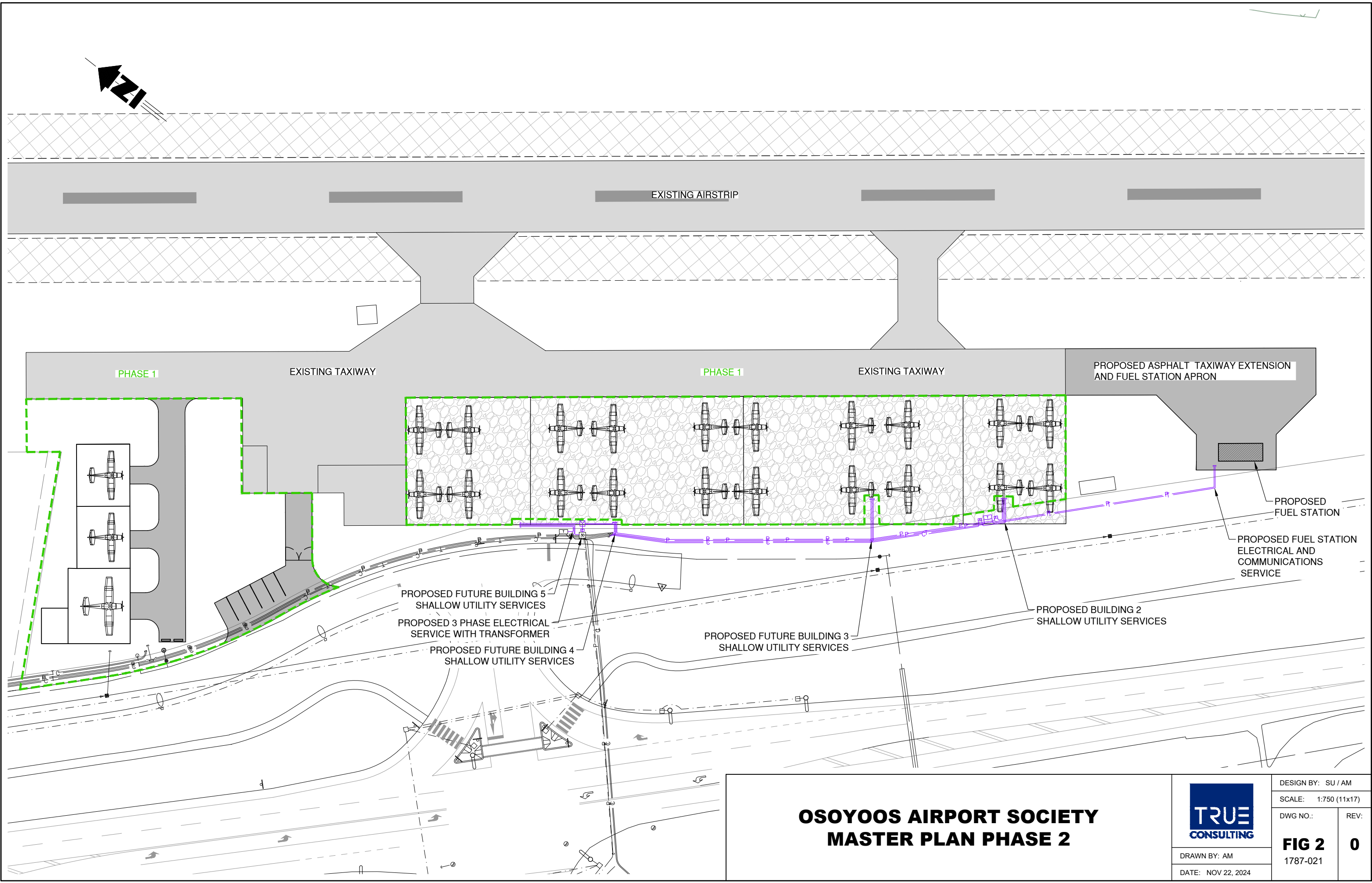
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 1**



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DATE: NOV 22, 2024

DESIGN BY: SU / AM	
SCALE: 1:750 (11x17)	
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FIG 1 1787-021	0

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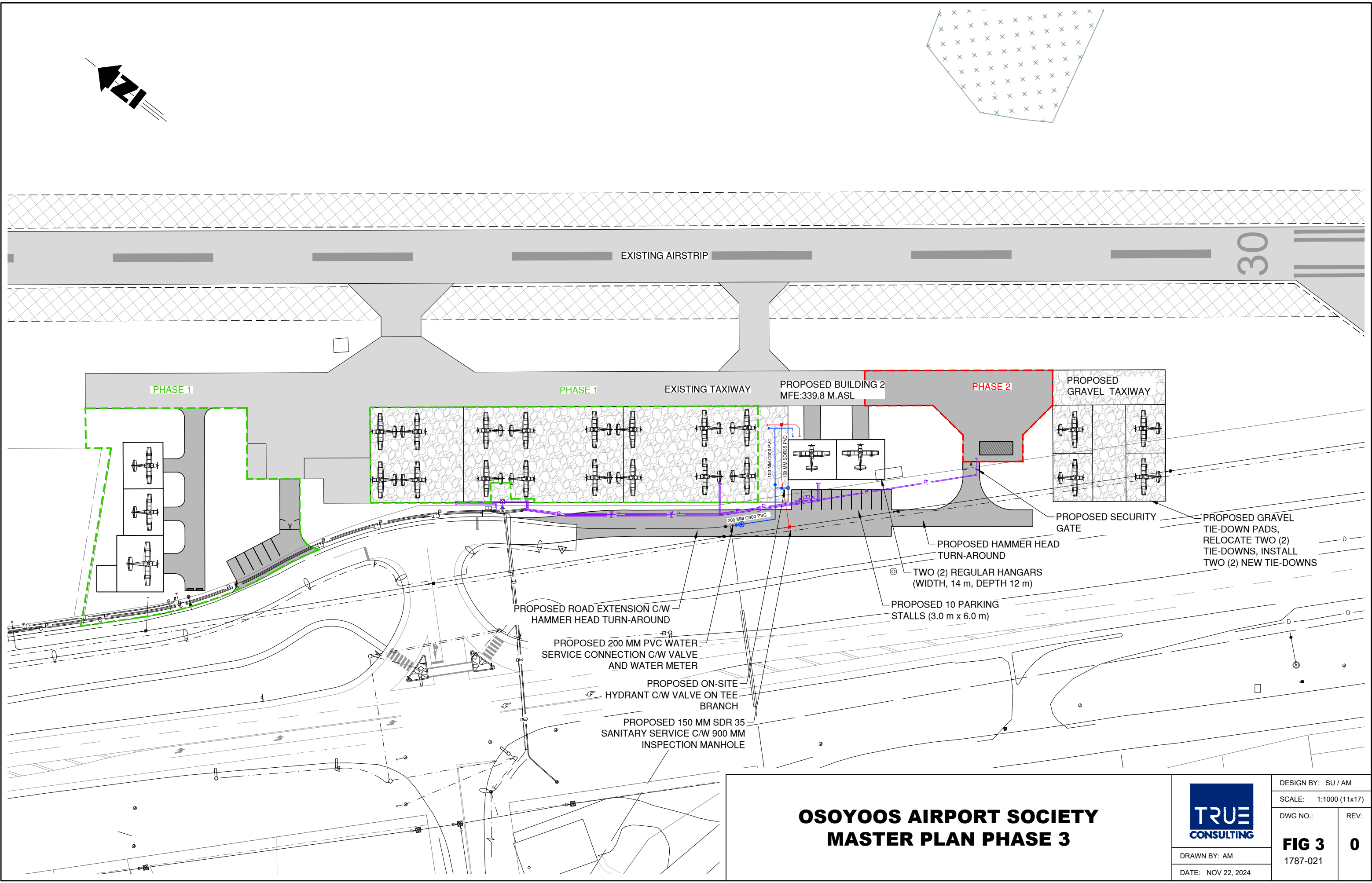
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 2**



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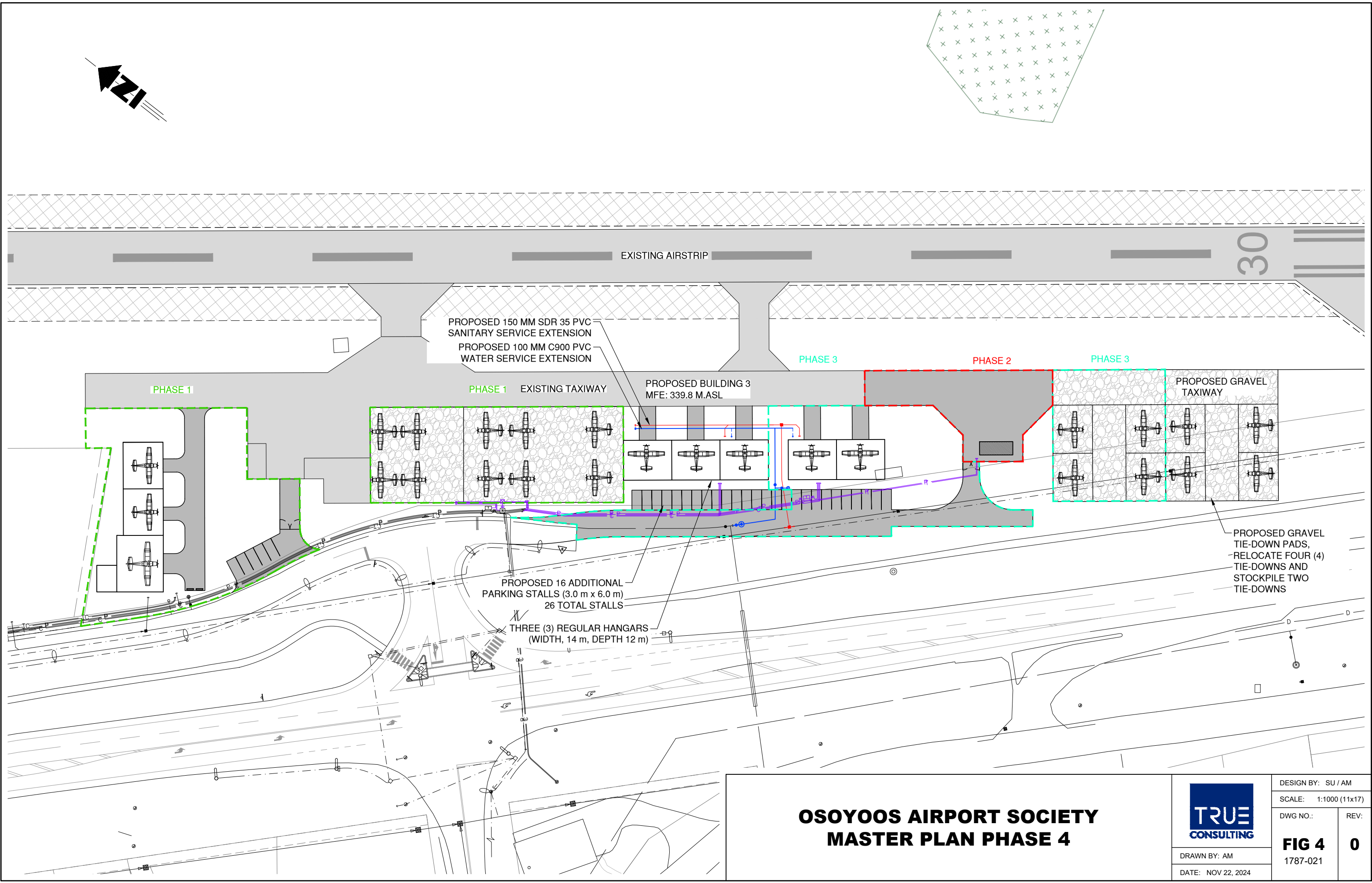
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 3**



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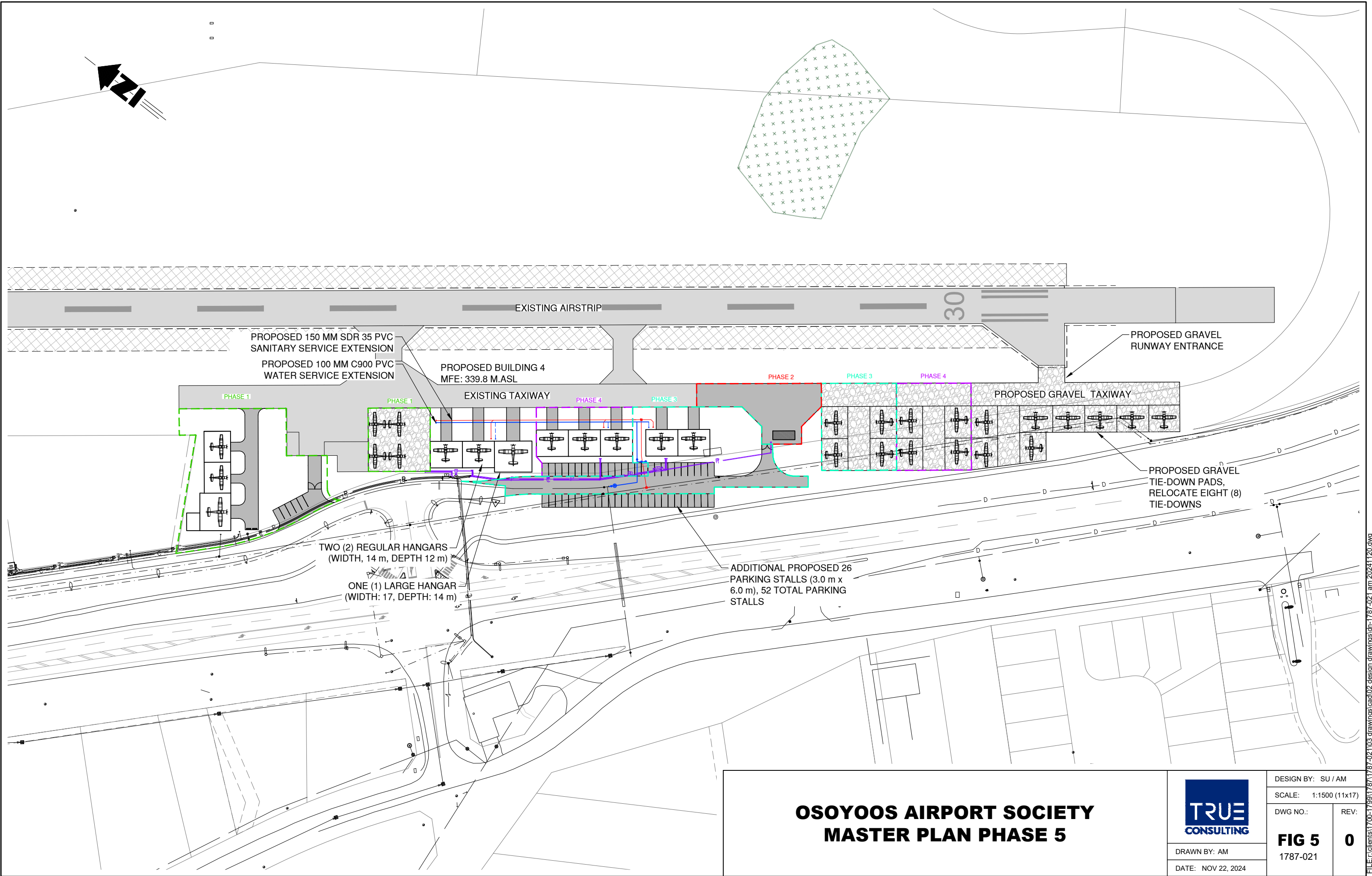
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 4**



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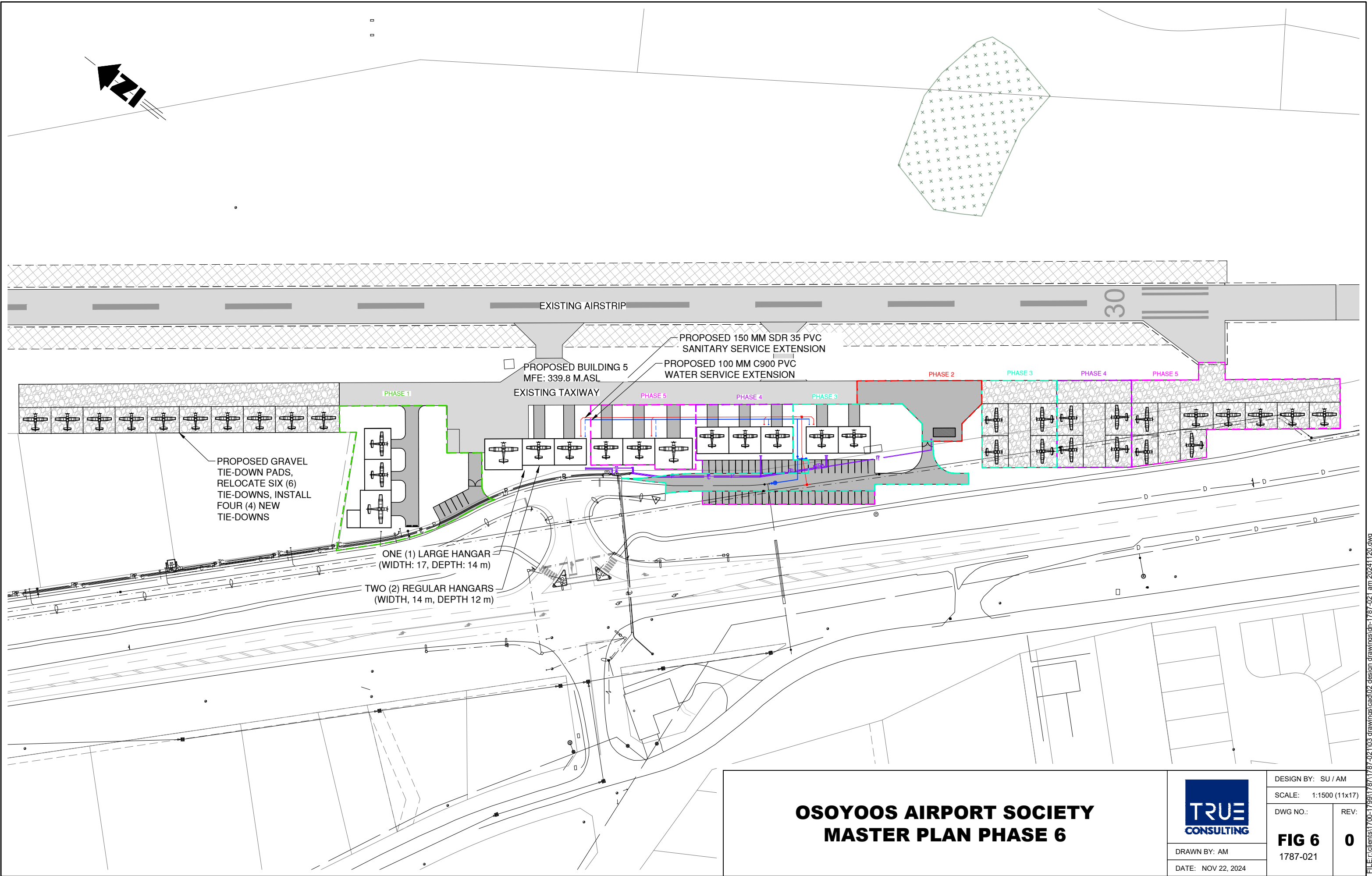
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 5**



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FIG 5
1787-021
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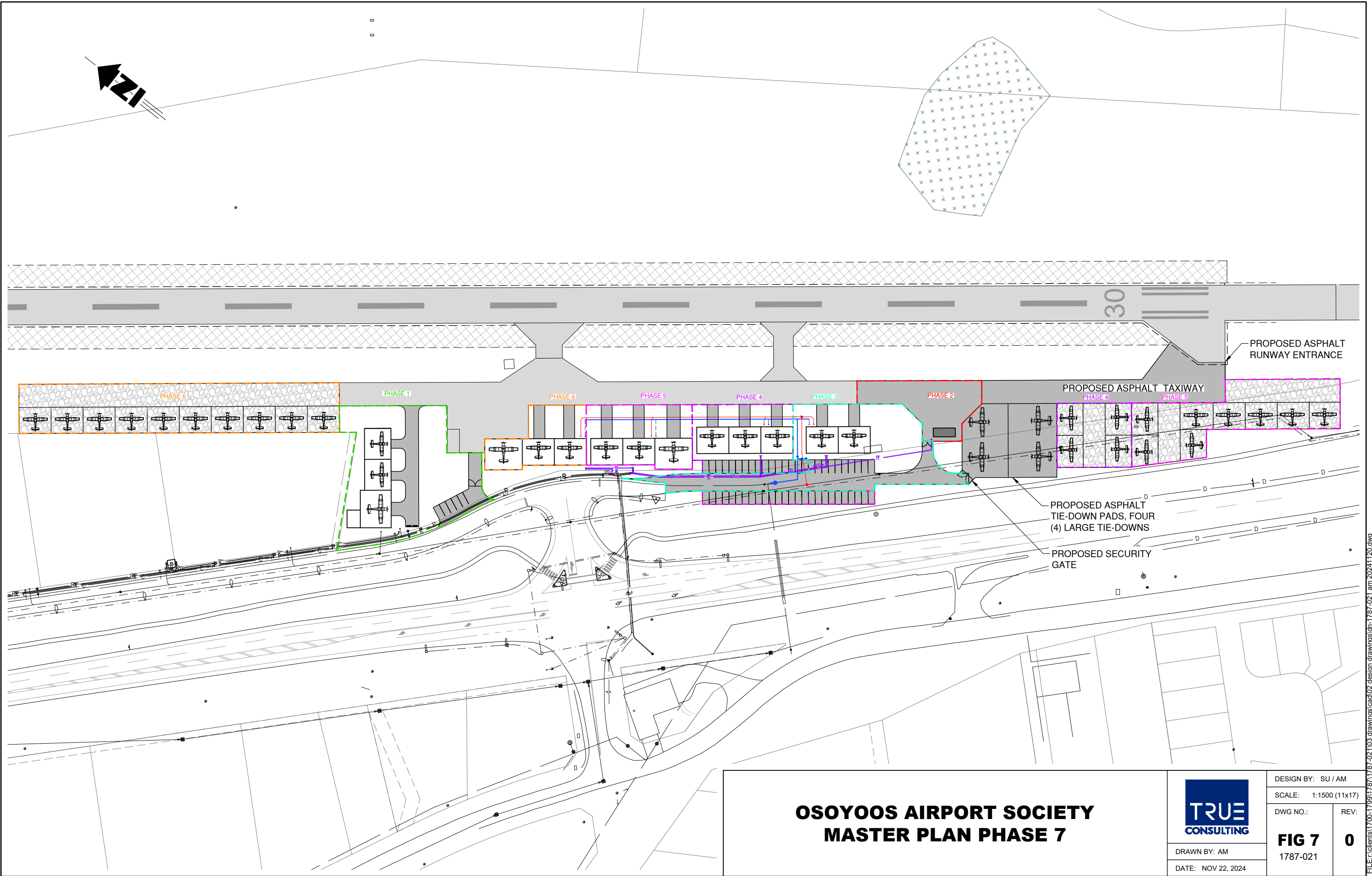
**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 6**



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FIG 6
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**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 7**



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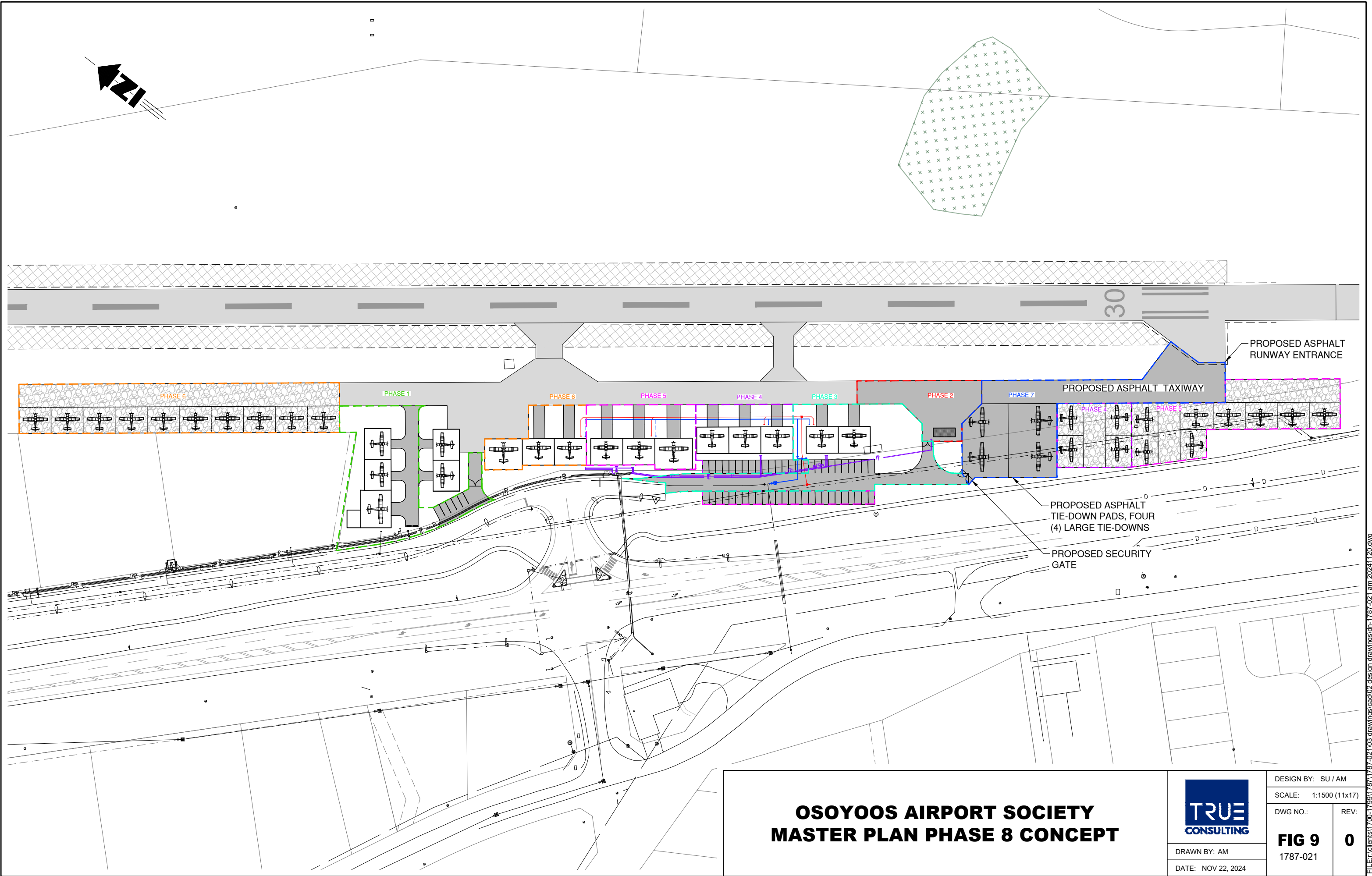
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FIG 7
1787-021 **0**

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APPENDIX B

Geotechnical Report

**- INTERIOR -
TESTING SERVICES
- LTD. -**

**MATERIALS TESTING • SOILS
CONCRETE • ASPHALT • CORING
GEOTECHNICAL ENGINEERING**

**1 - 1925 KIRSCHNER ROAD
KELOWNA, B.C. V1Y 4N7
PHONE: 860-6540
FAX: 860-5027**

True Consulting Group
Suite 201 2079 Falcon Road
Kamloops, B.C. V2C 4J2

September 19, 2005
Job 5.114

Attention: Mr. Steve Underwood, P. Eng.

Dear Sir:

Re: **Additional Geotechnical Investigation
Proposed Osoyoos Airport Runway Upgrade
Osoyoos, B.C.**

Further to your letter of September 2, 2005, Interior Testing Services Ltd. (ITSL) has carried out an additional test pit investigation for the above noted project. Please find attached two pages of typed test pit logs and a copy of our two page "Terms of Engagement", which forms the basis on which we undertake this work.

INTRODUCTION

There is an existing geotechnical report dated June 17, 2005 that should be referenced for additional information.

We understand that the depth of existing granular material within the airport runway is required in order to provide more accurate budget estimates for construction of the proposed runway upgrade.

Our revised scope of work for this project was to determine the depth and condition of the existing granular materials within the airport runway, as well as provide comments on the potential for construction of a reduced classification to Standard Gear Load (SGL) 2, with the option of future upgrading to SGL 5.

FIELD WORK AND RESULTS

On September 13, 2005, a rubber tired backhoe operated by the City of Osoyoos was used to excavate a total of 6 test pits to depths ranging from 0.46 to 1.07 m below existing grade. The test pits were observed and logged in the field and referenced to the previously excavated test pits along the edges of the runway.

Based on the six test pits excavated within the runway, the surface material of the runway typically consists of 0.38 to 0.86 m of light brown SAND and GRAVEL, with some silt and cobble. This material would commonly be referred to as imported pit run, and would likely meet the Transport Canada Pavement Design requirements of a selected granular, subbase course.

PAVEMENT DESIGN

1. Based on the results of our soils investigation, and the relevant extracts from Transport Canada Pavement Design Document (AK-68-12) as provided in our prior report of June 17, 2005, the following pavement structure is recommended.

50 mm	ASPHALT
150 mm	crushed gravel, base course

2. The pavement structure recommended above has been based on the information provided that the runway upgrade is to correspond to SGL 2.
3. In the event that future upgrading to SGL 5 is desired, it is expected that the existing thickness of selected granular subbase is sufficient so that the additional 80 mm of crushed gravel base course ($230 - 150 = 80$) would not be necessary, and only an overlay of roughly 15 mm of ASPHALT would be required. However, it is just as likely that placement of only 15 mm of ASPHALT will not be realistically possible, such that an overlay of roughly 30 mm should be expected for budgetary purposes.

To that end, construction at this time to SGL 5 standards by placing 65 mm of ASPHALT should be considered, as it may be less expensive than the option of upgrading in the future.

4. We recommend that all runway pavement structure FILLS be well compacted to Transport Canada Pavement specifications, or at least 100% MPD. Field density tests should be carried out at the surface of each material to confirm that adequate compaction has been achieved.

CONCLUSIONS AND RECOMMENDATIONS

1. Recommendations for the pavement structure for the proposed runway upgrade have been provided in the previous section of this report.
2. It is recommended that ITSL review the final proposed runway upgrade designs prior to construction.
3. It is further recommended that ITSL should carry out site inspections at the time of construction. This is to confirm that the natural soils are as expected, or to advise of suitable alternative measures, if necessary. In addition, field density tests should be carried out as the pavement structure fills are placed and compacted to confirm that adequate compaction is being achieved.

We trust this will assist you. If you have any questions, please call.

Yours truly,
Interior Testing Services Ltd.

Peter Hanenburg, P. Eng.



Norman K. Williams, P. Eng.

TEST PIT LOGS

Job 5.114

September 13, 2005

**Preliminary Geotechnical Investigation
Proposed AIRPORT SITE
Highway No. 3
Osoyoos, B.C.**

Notes:

1. Depths shown are in meters, measured from ground surface at the test pit locations.
 2. All test pits were excavated using a rubber-tired backhoe supplied by the City of Osoyoos.
 3. No groundwater was noted at the time of investigation unless noted below.
 4. Test pits TP1A – TP6A were located in the middle of the runway, in line with the previous test pits, TP1 – TP6, which were located on the edge of the runway.
-

TP1A

0.00 – 0.38 Light brown SAND and GRAVEL, some silt, some cobble.
0.38 – 0.46 Brown silty SAND/sandy SILT.
0.46 Bottom of Hole at 0.46 m.

TP2A

0.00 – 0.56 Light brown SAND and GRAVEL, some silt, some cobble.
0.56 – 0.76 Brown silty SAND/sandy SILT.
0.76 Bottom of Hole at 0.76 m.

TP3A

0.00 – 0.69 Light brown SAND and GRAVEL, some silt, some cobble.
0.69 – 0.91 Brown silty SAND/sandy SILT.
0.91 Bottom of Hole at 0.91 m.

TEST PIT LOGS

Job 5.114

September 13, 2005

TP4A

0.00 – 0.86 Light brown SAND and GRAVEL, some silt, some cobble.

0.86 – 1.07 Brown silty SAND.

1.07 Bottom of Hole at 1.07 m.

TP5A

0.00 – 0.61 Light brown SAND and GRAVEL, some silt, some cobble.

0.61 – 0.76 Brown SAND, some to trace silt.

0.76 Bottom of Hole at 0.76 m.

TP6A

0.00 – 0.38 Light brown SAND and GRAVEL, some silt, some cobble.

0.38 – 0.46 Brown SAND, some to trace silt.

0.46 Bottom of Hole at 0.46 m.

TERMS OF ENGAGEMENT

GENERAL

Interior Testing Services Ltd. (ITSL) shall render the Services performed for the Client on this Project in accordance with the following Terms of Engagement. ITSL may, at its discretion and at any stage, engage subconsultants to perform all or any part of the Services.

COMPENSATION

Charges for the Services rendered will be made in accordance with ITSL's Schedule of Fees and Disbursements in effect from time to time as the Services are rendered. All Charges will be payable in Canadian Dollars. Invoices will be due and payable by the Client within thirty (30) days of the date of the invoice without hold back. Interest on overdue accounts is 12% per annum.

REPRESENTATIVES

Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

TERMINATION

Either party may terminate this engagement without cause upon thirty (30) days' notice in writing. On termination by either party under this paragraph, the Client shall forthwith pay ITSL its Charges for the Services performed, including all expenses and other charges incurred by ITSL for this Project.

If either party breaches this engagement, the non-defaulting party may terminate this engagement after giving seven (7) days' notice to remedy the breach. On termination by ITSL under this paragraph, the Client shall forthwith pay to ITSL its Charges for the Services performed to the date of termination, including all fees and charges for this Project.

ENVIRONMENTAL

ITSL's field investigation, laboratory testing and engineering recommendations will not address or evaluate pollution of soil or pollution of groundwater. ITSL will co-operate with the Client's environmental consultant during the field work phase of the investigation.

PROFESSIONAL RESPONSIBILITY

In performing the Services, ITSL will provide and exercise the standard of care, skill and diligence required by customarily accepted professional practices and procedures normally provided in the performance of the Services contemplated in this engagement at the time when and the location in which the Services were performed.

LIMITATION OF LIABILITY

ITSL shall not be responsible for:

- (a) the failure of a contractor, retained by the Client, to perform the work required in the Project in accordance with the applicable contract documents;
- (b) the design of or defects in equipment supplied or provided by the Client for incorporation into the Project;
- (c) any cross-contamination resulting from subsurface investigations;
- (d) any damage to subsurface structures and utilities;
- (e) any Project decisions made by the Client if the decisions were made without the advice of ITSL or contrary to or inconsistent with ITSL's advice;
- (f) any consequential loss, injury or damages suffered by the Client, including but not limited to loss of use, earnings and business interruption;
- (g) the unauthorized distribution of any confidential document or report prepared by or on behalf of ITSL for the exclusive use of the Client.

The total amount of all claims the Client may have against ITSL under this engagement, including but not limited to claims for negligence, negligent misrepresentation and breach of contract, shall be strictly limited to \$5000.00. Only if specifically agreed to in writing by ITSL would this be revised to the amount of any professional liability insurance ITSL may have available at the time such claims are made. In the event that ITSL is not carrying professional liability insurance at the time of a claim, the total amount payable would be \$0 under either circumstance.

April 26, 2007

Our File: 302-101

Town of Osoyoos
Box 3010
Osoyoos, B.C.
V0H 1V0

Attention: Ms. Helen Koning

Dear Ms. Koning:

RE: *Airport*

Your email of April 18, 2007 requested some information on the design wheel loading of the airport runway. Briefly, the background to the design wheel loading and constructed runway structure is as follows:

- in 2005 Destination Osoyoos makes application for a grant to pave the Osoyoos Airport on the basis of a total project cost of \$160,500.
- June 2005, geotechnical assessment completed on which basis paving capital costs are estimated by TRUE to be in the range of \$290,000 to \$340,000 for Standard Gear Load 5.
- August 2005, TRUE meets with Airport Committee to discuss project estimated costs in relation to approved grant. It was agreed to undertake additional geotechnical assessments for initial construction for Standard Gear Loading 2 and future upgrading to SGL5.
- Runway Paving tendered in September 2005. Tender included options to construct to SGL2 and SGL5. Council authorized contract award to Peters Bros. Construction based on SGL2. Total completed project costs were \$230,000.

I can confirm that the crushed gravel subbase constructed under the runway in the spring of 2006 (i.e. 150mm of 19mm crush) was as per the geotechnical recommendations of Interior Testing for future upgrading for SGL5. Future upgrading will, as per the September 2005 report by Interior Testing, require an asphalt overlay of at least 30mm.

I trust the letter adequately responds to your questions related to the runway construction. Should any further information be required in this regard, please call.

Yours truly,



T.R. Underwood, P. Eng.

TRU/cab

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APPENDIX C

Development Consulting Group Ltd. Financial Analysis

**OSOYOOS AIRPORT EXPANSION
FINANCIAL ANALYSIS
OSOYOOS, BRITISH COLUMBIA**

Prepared For:

Osoyoos Airport Development Society

July, 2024

Development Consulting Group Ltd.
4770 Woodburn Road
West Vancouver, B.C. V7S 3B2
Tel. (604) 662 8099
Email ardagh@telus.net

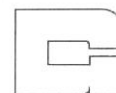
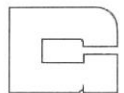
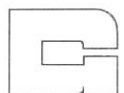


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EXECUTIVE SUMMARY – DRAFT COPY

Development Consulting Group and True Consulting have been retained by the Osoyoos Airport Development Society (OADS) to prepare a master plan for the Osoyoos Airport. This master plan envisages a seven phase expansion of the airport. The primary purpose of this report is to provide a financial analysis of the proposed master plan. The principal findings of this financial analysis are summarized under the following headings.

Airport Master Plan

1. The following chart provides a summary description of the proposed master plan.

Component	Timing	Major Project Components
Phase 1	2026	site services and a 6,200 square foot hangar building for three planes and a pilot/passenger lounge/washroom facility
Phase 2	2027	card lock style fuel station
Phase 3	2028	4,800 square foot hangar building for three planes
Phase 4	2030	4,800 square foot hangar building for three planes
Phase 5	2032	5,700 square foot hangar building for three planes
Phase 6	2034	5,700 square foot hangar building for three planes
Phase 7	2035	airport infrastructure including paved taxiway extension

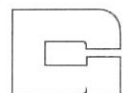
Development Costs

2. Total development costs for the airport master plan are estimated at \$2,031,000 for phase 1, \$493,000 for phase 2, \$2,054,000 for phase 3, \$1,634,000 for phase 4, \$2,128,000 for phase 5, \$2,017,000 for phase 6 and \$291,000 for phase 7. For all seven phases, the total development cost is estimated at \$10,648,000. All of these budget estimates include a 15% allowance for soft costs such as engineering and planning fees as well as a 15% contingency allowance.

Development Cost Sharing

3. The financial analysis presented in this report assumes that total development costs as summarized above will be shared by three “stakeholder groups”: the Town of Osoyoos, private plane owners and OADS. The Town of Osoyoos is expected to contribute \$10,000 towards the cost of each phase. Private plane owner are expected to pay for 100% of the cost of hangar buildings and the site works related thereto. The remainder, consisting mostly of airport related infrastructure such as site services and taxi-way improvements, is expected to be paid by OADS.

4. Based on this cost sharing formula, stakeholder group contributions are projected to be as follows: \$70,000 from the Town of Osoyoos (1% of the total project cost), \$8,190,000 from plane owners (77% of the total project cost) and \$2,388,000 from OADS (22% of the total project cost).



Airport Operating Revenues & Operating Expenses

5. The Osoyoos airport is expected to generate operating revenue from a number of sources including plane tie-downs, hangar building land leases, fuel sales, annual contributions from the Town of Osoyoos and the Wine Country Racing Association as well as property taxes. Operating expenses are expected to include management fees payable to OADS, repairs and maintenance and a variety of miscellaneous items including security, accounting and janitorial services for the pilot/passenger lounge facility.

Net Operating Income – Town Of Osoyoos

6. Net operating income for the Town of Osoyoos is defined as property tax revenues less the expense of annual contributions. Assuming that annual contributions increase from \$12,000 in 2025 to \$37,000 in 2035, cumulative net operating income for the Town of Osoyoos is projected at \$10,000 by 2035 as shown on line #7 of Table 3 at the back of this report.

Net Operating Income - OADS

7. Net operating income for OADS includes all of the revenue and expense line items noted above with the exception of property taxes which will accrue to the Town of Osoyoos. Net operating income is projected to fluctuate from a loss of \$2,000 in 2025 to a profit of \$5,000 in 2035. Cumulative net operating income for OADS is projected at \$32,000 by 2035 as shown on line #21 of Table 3 at the back of this report.

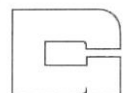
Capex Funding Requirement - OADS

8. The successful implementation of the seven phase Osoyoos airport expansion project as outlined in this report will depend to a large degree on the ability of OADS to secure the funding needed to pay for its portion of the project. Including a 2% inflation factor from 2024 going forward, funding requirements for OADS are projected to start at \$146,000 for phase 1 in 2026 and end at \$347,000 for phase 7 in 2035. Cumulative funding requirements total \$2,685,000 by the end of 2035.

Concluding Comments

9. Finding a small number of individuals who are prepared to pay for 100% of the capital and operating costs of hangar buildings at the Osoyoos airport will be key to moving the project forward. OADS has advised the consultant that it has been in contact with at least one such individual. Whether this person (or others) is prepared to make the financial commitment identified in this report remains to be determined.

10. For OADS, securing the funding required to pay for all of the airport infrastructure is the number one task. Whether OADS can secure a total of more than \$2.6 million within the timeline set out in this report also remains to be determined.



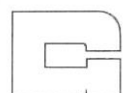
Development Consulting Group has been retained by the Osoyoos Airport Development Society (OADS) to prepare a financial analysis of a proposed multi-phase expansion of the existing airport in Osoyoos. This airport is currently owned by the Town of Osoyoos.

The primary purpose of this financial analysis is to determine the capital cost of each phase of the proposed airport expansion as well as the operating revenues and operating expenses related thereto. A secondary objective is to determine a preferred allocation of the airport expansion capital costs amongst the “stakeholder” groups including the Town of Osoyoos, OADS and private plane owner investors.

With these objectives in mind, this report includes:

- A description of the existing airport (section 2);
- Background market data including information on the airports in Oliver, Penticton, Princeton and Pitt Meadows (section 3)
- A recommended expansion and phasing plan for the Osoyoos airport (section 4);
- An estimate of development costs for each phase of the airport expansion (section 5);
- A forecast of operating revenues and operating expenses for each phase of the airport expansion (sections 6-7);
- A forecast of net operating income and net cash flow for the Town of Osoyoos and OADS (section 8).

Based on the results of this financial analysis, the final section of this report provides a number of concluding comments about the project.



2.0

AIRPORT DESCRIPTION

This section of the report provides a thumbnail sketch of the existing airport facilities and a summary description of the airport master plan prepared by True Consulting in May of 2024.

2.1 Location

The Town of Osoyoos is located approximately 400 kilometres east of Vancouver, 60 kilometres south of Penticton and less than 10 kilometres north of the Canada/US border. The closest small airports are in Oliver (about 20 kilometres to the north via Highway 97) and Princeton (about 120 kilometres to the west via Highway 3). The closest major airport is Penticton which has regularly scheduled service to both Calgary and Vancouver.

The airport property abuts Highway 3 on the western edge of town. Most residents of Osoyoos can drive to the airport in less than ten minutes.

2.2 Existing Facilities

The existing airport in Osoyoos is a “no frills” facility that includes:

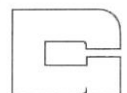
- a paved runway that is just under 2,800 feet long and 50 feet wide;
- a paved parallel taxiway that is just under 800 feet long and 35 feet wide;
- a gravel surface tie down area with nine parking spaces;
- a two meter high perimeter security fence;
- vehicle access from Empire Street (a two lane paved municipal road) via a manually operated and locked gate. Empire Street connects to Highway 3 at a stop sign controlled intersection,

There is no fuel station at the airport. There are also no airplane hangars and no terminal building.

In 2021, the Town of Osoyoos and OADS received a \$524,000 grant from the federal government to fund airport improvements. The Town of Osoyoos contributed an additional \$10,000.

This money was used to pay for a 300 foot extension of the runway, a tie down area for small planes, an apron extension, a taxi-way extension connecting the apron to the runway and perimeter fencing. A “card lock” style fuel station was also planned but was subsequently deferred due to its higher than expected capital cost.

Compared to other nearby airports, the runway at Osoyoos is still relatively short. According to their web sites, the Oliver and Princeton airport runways are about 3,300 feet and 3,900 feet long respectively.



A 2,800 foot long paved runway is more than enough for small single engine planes. A Cessna 172, for example, requires about 1,500 feet for takeoff under normal weather conditions.

For many larger twin engine aircraft, however, a 2,800 foot long paved runway is not long enough. A King Air 90, for example, requires about 2,300 feet for takeoff at sea level and about 3,800 feet at a 5,000 foot elevation under normal weather conditions.

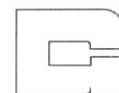
Given that the Osoyoos airport elevation is about 1,100 feet (335 metres) and given that summer time temperatures routinely exceed 30 degrees C, a further extension of the paved runway will probably be required in order to safely accommodate the twin engine segment of the private plane market. This runway related constraint needs to be borne in mind when the hangar building component of the Osoyoos airport master plan is refined.

2.3 Proposed Expansion

True Consulting has been retained by OADS to prepare a master plan that is intended to guide the expansion of the airport over the next decade. The principal elements of this master plan are:

- an expansion of the tie down area to accommodate up to 20 small (single engine) planes;
- five hangar buildings of different sizes with a combined capacity 15 planes;
- an extension of the paved taxiway;
- a “card lock” style fuel station;
- municipal service connections (sewer, water, power and telephone/cable) to each hangar building;
- amenity space (washrooms and pilot/passenger lounge) attached to the first hangar building;
- customer parking.

The financial analysis presented in the following sections of this report includes the capital cost for all of these line items as well as the operating revenues and operating expenses related thereto.



3.0

BACKGROUND MARKET DATA

This section of the report provides some background market data for the Osoyoos airport expansion project. Sections 3.1 and 3.2 that follows provide a comparison of the Osoyoos and Oliver markets.

The next four subsections provide a range of market data for the airports in Oliver, Penticton, Princeton and Pitt Meadows. This background market data provides some context and rationale for the recommended expansion/phasing plan for the Osoyoos airport set out in Section 4 of this report.

3.1 Population Trends

A major determinant of the demand for private plane tie downs and hangars at any airport is the size of the local market. Population is one of the simplest measures of market demand.

Based on data from BC Stats, the following chart provides a comparison of population trends for the Town of Oliver, the Town of Osoyoos and the City of Penticton during the past ten years.

Market	2013 Population	2023 Population	2013-2023 Increase
Oliver	4,800	5,300	+500 (+10%)
Osoyoos	4,900	5,800	+900 (+18%)
Penticton	33,300	38,600	+5,300 (+16%)

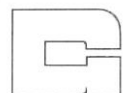
Ten years ago, Oliver and Osoyoos were almost identical from a population standpoint. Now, Osoyoos is a bit bigger due to a population growth rate that is nearly double during the past ten years. This positive demographic data suggests that the demand for tie downs and hangars at the airport in Osoyoos should be comparable (if not a bit higher) to the airport in Oliver.

3.2 Real Estate Prices

Other things being equal, a bigger and more affluent market will generate additional demand for airport facilities such as tie downs and hangars. Real estate values are typically correlated with household incomes.

Based on current data from the Multiple Listing Service (MLS), the following chart provides a comparison of high value residential properties for the Town of Oliver and the Town of Osoyoos. High value properties are defined as those with a minimum asking price of \$1 million.

Market	Total MLS Listings	MLS Listings > \$1 Million
Oliver	65	8 (12%)
Osoyoos	246	40 (16%)



Compared to Oliver, the residential resale market in Osoyoos as measured by the number of MLS listings is about four times the size. The high end market in Osoyoos is five times the size of Oliver. This positive residential real estate profile also suggests that the demand for tie downs and hangars at the airport in Osoyoos should be comparable (if not a bit higher) to the airport in Oliver.

3.3 Oliver Airport

The Oliver airport is the closest competitor for Osoyoos. At the present time, Oliver is a bigger and better facility with a longer paved runway, runway lighting, a card lock style fuel station, a number of outdoor tie down spaces, ten hangar buildings of varying sizes and ages for private planes as well as two large commercial tenants (Transwest and Northern Lights Helicopters).

The airport is owned and operated by the Town of Oliver. All of the small plane hangars are believed to be privately owned; some of these owners (maybe 20-30%) live in Osoyoos. All of the hanger owners pay an annual land lease to the airport/Town of Oliver.

Tie down rates for small planes are currently \$1,000 per year for a paved space and \$500 per year for a gravel space. For short term visitors, the airport charges \$25 per day after a one week grace period.

Inside the security gate that allows vehicle access to the airport lands are eight metal clad buildings (believed to be 30-40 years old) with a combined total of 23 separate airplane hangars. Nearby are two newer buildings (about ten years old) with a combined total of 8 hangars.

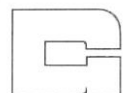
Most of these hangars are in the 1,500-2,000 square foot range and appear to be individually metered for electrical service. All of them have paved access to the airport taxiway.

The lease document for one of these typical older hangars provides for an initial term of five years with renewal options for another fifteen years. The land lease is “triple net” with the hangar owner responsible for all repairs and maintenance, insurance, utilities and property taxes.

The annual land lease payment for the one older hanger viewed by the consultant is currently 28 cents per square foot of gross building area. The lease provides for a rent adjustment at five year intervals based on an appraisal paid for by the Town of Oliver.

Operation of the fuel station has been contracted out to a third party, an Edmonton based company called Flight Fuels. A representative of Flight Fuels indicated that their company is responsible for supplying fuel and for all of the operating expenses related to the facility including replacing minor components like filters and hoses as well as for a government inspection every two years.

Flight Fuels pays the airport a “throughput fee” which is currently set at 5 cents per litre. Fuel sales in 2023 were approximately 40,000 litres.



3.4 Penticton Airport

One of the tenants at the Penticton airport is the Penticton Flying Club. The Penticton Flying Club owns one plane (a Cessna 172) and one small hangar. The club currently has 19 members; members pay a \$2,000 non-refundable fee to join the club and \$650 per year to use one of the tie down spots next to their hanger.

According to one of the club members, small plane hangars rarely come up for sale or rent. Rental rates for older small plane hangars located near the Penticton Flying Club are currently in the \$600-700 per month range.

3.5 Princeton Airport

The Princeton airport has a card lock style fuel station, a very old “carport” style hangar building with room for two small planes, a 2,000 square foot terminal building that was completed in 2010, perimeter security fencing and a gravel parking lot. The terminal building has three small offices, washrooms and a large open space of about 1,000 square feet that is used by pilots and passengers who are transiting the airport.

A sign posted next to entrance indicates that the airport recently received funding from the provincial government to install several light standards near the terminal building.

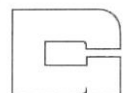
The fuel station appears to be very similar to the one at Oliver, a single above ground tank located a hundred meters or so from the terminal building on one side of the taxiway. The contact person for the fuel station is a town employee from the public works department. Unfortunately, this individual did not respond to emails asking for information on the operation of the fuel station.

3.6 Pitt Meadows Airport

Pitt Meadows is one the biggest “satellite” airports in Metro Vancouver. The airport web site lists several development projects including Golden Ears Airpark, a multi-building complex with half a dozen hangars designed for small planes. Most of the “build to suit” hangars shown on the site plan range in size from 1,400 square feet (44 feet wide by 33 feet long) to 3,000 square feet (60 feet wide by 51 feet long).

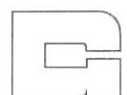
All of these new hangars have electric bifold doors for the planes, 3x7 foot entry doors for the pilots, LED ceiling lights, concrete floors and a paved parking pad that provides access to the airport taxiways. All hangars are insulated and sprinklered for fire protection and have rough ins for a two piece bathroom at the back of the building. Building construction is wood frame with exterior metal cladding and metal roofs.

According to the realtor who is marketing the Golden Ears Airpark, building construction costs are currently estimated at \$160-\$180 per square foot. Optional upgrades include an epoxy floor coating and a larger bathroom that includes a shower.



All of the buildings are part of a strata development that is located on a parcel of land leased from the airport for a 40 year term. Examples of hangars currently listed for sale include:

- unit #A109, a new 3,036 square foot hangar with 16 foot ceiling height as well as several upgrades including epoxy floor covering and a full bathroom with shower, The asking price is \$689,000 (\$227 per square foot). Strata fees which include land lease payments and property taxes are \$1,123 per month.
- unit #C107, a new 2,107 square foot hangar with a concrete slab floor and a rough in bathroom. The asking price is \$430,000 (\$204 per square foot). Strata fees are \$785 per month.
- unit #D103, a new 1,050 square foot “T hangar” with 14 foot ceiling height, 60 amp electrical service and a two piece bathroom. The asking price is \$179,000 (\$170 per square foot). Strata fees are \$388 per month.
- unit #D111, a new 1,650 square foot “T hangar” with a small second floor office space. The asking price is \$499,000 (\$302 per square foot). Strata fees are \$610 per month.
- unit #D114, a new 1,050 square foot “T hangar” with 14 foot ceiling height, 60 amp electrical service and a two piece bathroom. The asking price is \$189,000 (\$180 per square foot), Strata fees are \$388 per month.
- unit #TBD, a 1,408 square foot hangar with 14 foot ceiling height, 60 amp electrical service and a rough in bathroom planned for a 2024 construction start. The asking price is \$261,000 (\$185 per square foot), Strata fees are estimated at \$521 per month.



4.0

RECOMMENDED AIRPORT EXPANSION PLAN

This section of the report sets out a recommended expansion plan for the airport. This recommended expansion plan is consistent with the latest version of the master plan report prepared by True Consulting.

This latest version of the master plan takes into consideration discussions with OADS, background market data (in particular the size of the Osoyoos market relative to Oliver) as well as the anticipated funding requirements for the existing and future stakeholders of the project.

4.1 Hangar Buildings

Hangar buildings will be the single most expensive line item in the Osoyoos airport expansion plan capital budget. The draft master plan includes five hangar buildings with a combined capacity of 16 planes.

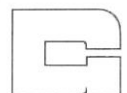
In reality, the size and timing of hangar building development will be dictated in large part by the wishes of a few individuals who reside in the Osoyoos area and wish to store their airplanes at the local airport.

With this caveat in mind, the following hangar building and phasing plan seems reasonable from both a market and financial standpoint:

- building #1: two small plane hangars (45 feet wide by 35 feet deep or about 1,600 square feet) and one medium size hangar (55 feet wide by 45 feet deep or about 2,500 square feet) plus a 500 square foot allowance for a shared washroom facility and a small pilot/passenger lounge. Based on these individual components, building #1 will have a gross floor area of approximately 6,200 square feet.
- building #2: three small plane hangars with a total gross floor area of 4,800 square feet.
- building #3: three small plane hangars with a total gross floor area of 4,800 square feet;
- building #4: two small plane hangars and one medium size hangar with a total gross floor area of about 5,700 square feet;
- building #5: two small plane hangars and one medium size hangar with a total gross floor area of about 5,700 square feet.

The Osoyoos airport will have a total of 15 private plane hangars once these five building have been developed; this total amounts to roughly 50% of the current number of private plane hangars at the Oliver airport.

Adding five hangar buildings as outlined above will require a substantial investment in site services and airport improvements including taxi-ways, airplane tie-downs, airplane parking



pads, vehicle parking and security gates. A description of this support infrastructure is provided in the aforementioned airport master plan prepared by True Consulting and fully costed in the financial analysis presented in the next section of this report.

4.2 Fuel Station

A fuel station similar to the one at the airport in Oliver would be a big amenity for the airport in Osoyoos. Being able to buy fuel “on site” should help to convince some local area plane owners to buy a hangar at the Osoyoos airport.

The flip side of this coin is that without any hangars/planes “on site”, the volume of fuel sales will be too low to justify the initial capital cost and the ongoing operating costs of a fuel station. Accordingly, it is our opinion that the development of a fuel station should be deferred until building #1 has been completed and fully occupied.

4.3 Phasing Plan

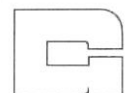
The airport expansion plan summarized above will be implemented over a number of years. The timing of development will be determined in large part by the ability of the various airport “stakeholder groups” to secure funding for their share of the capital costs. OADS will be one of these stakeholder groups along with hangar owners and, possibly, the Town of Osoyoos.

Including soft costs and a small contingency allowance, the hangar buildings described above are expected to cost approximately \$250 per square foot of gross floor area assuming a 2024 construction start. Based on this number, a small plane hangar will cost about \$400,000 at the present time. Note that this budget estimate does not include a land cost since hangar buildings are typically located on land leased from the airport.

Given the relatively high level of risk associated with developing a hangar building at the airport in Osoyoos, a third party investor would require an annual return on cost of at least 10% in our opinion. This minimum rate of return implies a starting lease rate of \$40,000 per annum or just over \$3,300 per month. This lease rate is expected to be “triple net”, meaning that the hangar user pays for all building maintenance costs, utilities, insurance as well as a land lease and property taxes in addition to the base rent.

In our opinion, the resulting “gross rent” will be so high as to preclude any demand for hangars except from a non-profit group like the Penticton Flying Club and from individuals who live in the Osoyoos area and wish to park their plane at the local airport. OADS has indicated that they have been in touch with several persons who fit this description and are prepared to commit to the first hangar building.

Although it is reasonable to assume that individuals will pay for 100% of the capital costs and operating costs of the hangar buildings, it is also reasonable to assume that other stakeholders will have to fund all of the supporting infrastructure including site services, taxiway extensions/upgrades, parking, one or two security gates and so on. To allow OADS enough time to secure this funding, it has been assumed that new hangar buildings will be spaced two years apart.

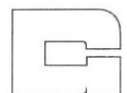


With this requirement in mind, the recommended phasing plan for the Osoyoos airport is as follows:

- phase 1: hangar building #1 as described above in 2026;
- phase 2: fuel station in 2027;
- phase 3: hangar building #2 as described above in 2028;
- phase 4: hangar building #3 as described above in 2030;
- phase 5: hangar building #4 as described above in 2032;
- phase 6: hangar building #5 as described above in 2034.

The financial analysis presented in the following sections of this report is based on this phasing plan.

True Consulting have identified a phase 7 which consists primarily of a paved tie down area for larger (twin engine) planes and paved extension of the taxiway. The financial analysis that follows assumes that this final phase of the airport master plan will be built in 2035.



5.0

PROJECT DEVELOPMENT COSTS

This section of the report provides an estimate of the total development cost for each phase of the proposed Osoyoos airport expansion. Total development costs include hard costs, soft costs and a contingency allowance as discussed under the following headings. Note that all dollar amounts cited in this section of the report assume a 2024 construction start.

5.1 Phase 1-7 Hard Costs

The upper portion of Table 1 at the back of this report provides a summary of hard costs for each phase of the Osoyoos airport expansion project. Based on information provided by True Consulting, hard costs have been disaggregated into half a dozen subcategories including site preparation, the water and sanitary sewer systems, shallow utilities including Fortis and Telus connections, building site works and the hangar buildings.

For phase 1, total hard costs are estimated at \$1,536,000. The biggest component by far is the hangar building which is expected to cost \$1,364,000 (6,200 square feet at \$220 per square foot). Building related site works including asphalt driveways for each hangar is the second biggest line item at \$58,000.

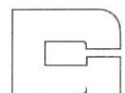
Phase 2 is the fuel station. Based on discussions with True Consulting, the total hard cost for the fuel station is simply the highest quote received for a request for proposals issued in the fall of 2022. This \$429,000 quote from W.S.Nicholls includes the supply, installation and commissioning of a “card lock” style fuel station with a 14,000 litre above ground tank. The quote also includes engineering services related to the installation.

For phase 3, total hard costs are estimated at \$1,533,000. The biggest component by far once again is the hangar building which is expected to cost \$1,056,000 (4,800 square feet at \$220 per square foot). Site preparation is the second biggest line item at \$271,000. Phase 3 site preparation includes \$132,000 for a parking area, \$50,000 for a gravel surface tie-down area and \$35,000 for an asphalt extension of the taxi-way.

For phase 4, total hard costs are estimated at \$1,236,000. The cost of the hangar building is the same as for phase 3 and site preparation is once again the second biggest line item at \$83,000. Phase 4 site preparation includes \$50,000 for another gravel surface tie-down area and \$18,000 for a gravel extension of the taxi-way.

For phase 5, total hard costs are estimated at \$1,609,000. The biggest component by far once again is the hangar building which is expected to cost \$1,254,000 (5,700 square feet at \$220 per square foot). Site preparation is once again the second biggest line item at \$231,000. Phase 5 site preparation includes \$82,000 for a gravel surface tie-down area, \$76,000 for expanding the parking area and \$54,000 for a gravel extension of the taxi-way.

For phase 6, total hard costs are estimated at \$1,525,000. The cost of the hangar building is the same as for phase 5 and site preparation is once again the second biggest line item at \$179,000.



Phase 6 site preparation includes \$86,000 for another gravel surface tie-down area and \$76,000 for a gravel extension of the taxi-way.

Finally, total hard costs for phase 7 are estimated at \$220,000 of which site preparation accounts for the lions share. Phase 7 site preparation includes \$101,000 for an asphalt extension of the taxi-way and \$89,000 for a concrete surface tie-down area for larger (twin engine) planes.

5.2 Phase 1-7 Soft Costs & Contingency Allowance

Based on discussions with True Consulting, soft costs have been budgeted at 15% of total hard costs. Engineering fees are expected to be the biggest single component of soft costs which will also include legal and accounting fees as well as development cost charges for the buildings.

Line #11 of Table 1 shows the soft cost budget for each phase of the Osoyoos airport expansion project using the simple formula cited above. As an example, soft costs are estimated at \$230,000 for phase 1. Note that the fuel station budget (phase 2) does not include any allowance for soft costs because they are assumed to be included in the bid price.

At this early stage of the design and costing process, a contingency allowance should be added to cover unexpected changes in the project scope. Based on discussions with True Consulting, this contingency allowance has been calculated at 15% of the combined subtotal of hard costs and soft costs. Using this percentage, line #13 of Table 1 shows the contingency allowance for each phase of the Osoyoos airport expansion project.

5.3 Phase 1-7 Total Development Costs

Line #14 of Table 1 shows the total development cost for each phase of the Osoyoos airport expansion project. Total development cost is defined as the sum of hard costs plus soft costs plus the contingency allowance.

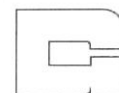
Total development costs are projected to range from a low of \$291,000 for phase 7 to a high of \$2,128,000 for phase 5. For all seven phases, the total development cost is estimated at \$10,648,000.

5.4 Total Development Costs – Hangar/Plane Owner Share

Total development costs as determined above are expected to be shared by three “stakeholder groups”: the hangar/plane owners, the Town of Osoyoos and OADS. Each one of these stakeholder groups is expected to be responsible for specific components of the Osoyoos airport expansion project.

More specifically, hangar/plane owners are expected to pay for 100% of the total development costs of the hangar buildings and the site works related thereto. Based on this assumption, the hangar/plane owner share of total development costs for each phase will be as follows:

- for phase 1: \$1,364,000 for the building plus \$58,000 for site works plus \$213,000 for soft costs plus a \$246,000 contingency allowance for a total of \$1,881,000;



- for phase 2: nil;
- for phase 3: \$1,056,000 for the building plus \$27,000 for site works plus \$162,000 for soft costs plus a \$187,000 contingency allowance for a total of \$1,432,000;
- for phase 4: \$1,056,000 for the building plus \$35,000 for site works plus \$164,000 for soft costs plus a \$188,000 contingency allowance for a total of \$1,443,000;
- for phase 5: \$1,254,000 for the building plus \$44,000 for site works plus \$195,000 for soft costs plus a \$224,000 contingency allowance for a total of \$1,717,000;
- for phase 6: the same as phase 5;
- for phase 7: nil

For all seven phases combined, hangar/plane owners are expected to contribute a total of \$8,190,000 as per line #16 of Table 1. This sum amounts to approximately 77% of the total project cost.

5.5 Total Development Costs – Town Of Osoyoos Share

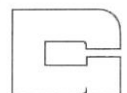
The financial analysis presented in this report assumes that the Town of Osoyoos will contribute \$10,000 towards the capital cost of each phase of the Osoyoos airport expansion project. This assumption seems very conservative given the economic benefits that will flow to the Town and many of the businesses located there as a direct result of the Osoyoos airport expansion project. It is also consistent with the financial assistance that the Town of Osoyoos provided in connection with the airport improvements completed in 2022.

This assumption implies that the Town of Osoyoos will contribute a total of \$70,000 for all seven phases combined as per line #17 of Table 1. This sum amounts to less than 1% of the total project cost.

5.6 Total Development Costs – OADS Share

The amount of funding required from OADS for each phase of the Osoyoos airport expansion project is simply the total project cost less the contributions from the hangar/plane owners and the Town of Osoyoos as determined above. As an example, the funding required from OADS for phase 1 is estimated at \$140,000 (total project cost of \$2,031,000 less contributions of \$1,881,000 from the hangar/plane owners and \$10,000 from the Town of Osoyoos).

This assumption implies that OADS will contribute a total of \$2,388,000 for all seven phases combined as per line #15 of Table 1. This sum amounts to about 22% of the total project cost.



6.0

AIRPORT OPERATING REVENUES

This section of the report provides a forecast of operating revenues for the Osoyoos airport on an annual basis from 2025 to 2035. Table 2 at the back of this report provides a breakdown of operating revenues into six separate components: plane tie-downs, hangar building land leases, contributions from the Town of Osoyoos and the Wine Country Racing Association, fuel sale royalties and property taxes. The assumptions used to generate each one of these revenue streams are summarized under the following headings.

6.1 Plane Tie-Downs

The airport is expected to rent tie-down spaces to small plane owners on an annual basis. The number of rented tie-downs is projected to increase from 2 in 2025 to 14 in 2035 as shown on line #2 of Table 2. The cost to rent one of these tie-downs is projected to increase by 2% per annum from \$1,000 in 2025 to \$1,219 in 2035 as shown on line #5 of Table 2. Note that the starting cost matches the current price for a tie-down space at the Oliver airport.

Annual revenue equals the number of tie-downs rented times the annual rental rate. Based on this formula, tie-down revenues are projected to increase from \$2,000 in 2025 to \$11,000 in 2030 and to \$17,000 in 2035 as per line #10 of Table 2.

6.2 Hangar Building Land Leases

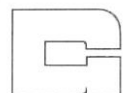
The financial model assumes that each one of the hangar buildings will be owned by one or more plane owners and that the land upon which all of the hangar buildings are located will be leased from the Town of Osoyoos. Land lease revenues will be determined by the size of each building and an annual per square foot levy.

The recommended size and timing of each hangar building is summarized in Section 4.4 of this report. Based on this phasing plan, the cumulative hangar building floor area will increase from 6,200 square feet in 2026 to 27,200 square feet in 2034 and remain constant thereafter as shown on line #4 of Table 2.

The hangar building annual land lease rate has been set at \$1.00 per square foot of gross floor area for the first five years (2025-2029) of the forecast period. Based on a 2% annual inflation rate, this annual land lease rate will increase to \$1.10 for the next five years (2030-2034) and to \$1.22 per square thereafter as shown on line #6 of Table 2.

The starting annual land lease rate is based on a land value of \$700,000 per acre (just over \$16 per square foot) and a cap rate of 6%. To put this land value into context, a 1.0 acre parcel of industrial zoned land on nearby Empire Street is currently assessed at \$605,000.

Annual revenue equals the cumulative hangar building floor area times the annual land lease rate. Based on this formula, hangar building land lease revenues are projected to increase from \$0 in 2025 to \$17,000 in 2030 and to \$33,000 in 2035 as per line #11 of Table 2.



6.3 Town Of Osoyoos & WCRA Contributions

The financial model assumes that the Town of Osoyoos and the Wine Country Racing Association (WCRA) will make small annual contributions to the airport. Reflecting prior year amounts, the contribution from the Town of Osoyoos has been set at \$12,000 in 2025 and is projected to increase by \$2,000 for each phase of the project as shown on line #12 of Table 2. Also reflecting prior year amounts, the contribution from the WCRA has been set at \$8,000 in 2025 and is projected to increase by \$1,000 every year thereafter until 2030 when it drops to zero as shown on line #13 of Table 2. At that time, increasingly busy airport operations are expected to preclude any further use of the runway as a race car track.

6.4 Fuel Station Royalties

The operating model currently in place at the Oliver airport and described in Section 3 of this report provides a good template for the proposed fuel station at the airport in Osoyoos. Accordingly, the financial model assumes that a “third party” fuel station operator will pay a royalty to the airport based on the volume of fuel sold each year. This royalty has been set at 5 cents per litre for the first five years of the fuel station operation (2027-2031) and at 6 cents per litre for the remainder of the forecast period.

The annual volume of fuel sales takes into consideration the number of tie-downs, the number of hangars and an allowance for “transiting” aircraft. Based on this formula, fuel sales are projected to increase from 26,000 litres in 2027 to 59,000 litres in 2035 as shown on line #7 of Table 2. The volume of fuel sales at the end of the forecast period is believed to be comparable to the current volume of fuel sales at the Oliver airport.

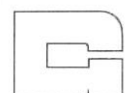
Annual fuel sale revenues to the airport equal the volume of fuel sales time the per litre royalty. Based on this formula, fuel station royalties are projected to increase from \$1,000 in 2027 to \$4,000 in 2035 as per line #14 of Table 2.

6.5 Property Taxes

The owners of the hangar buildings are expected to pay property taxes to the Town of Osoyoos. The amount of these property taxes will be based in part on the assessed value of the buildings and in part on the applicable mill rate.

With regards to the former, the assessed value of the hangar buildings has been set at \$250 per square foot of gross floor area. This figure is slightly higher than the hangar building hard cost noted in Section 5 of this report. With regards to the latter, the mill rate for light industrial property seems to be most appropriate. The 2024 mill rate for light industrial property in the Town of Osoyoos is \$6.78 per thousand dollars of assessed value. This mill rate is assumed to remain unchanged in 2025 and to increase very slowly thereafter as shown on line #9 of Table 2.

Property tax revenues equal the total assessed value of the hangar buildings times the mill rate. Based on this formula, property taxes payable to the Town of Osoyoos are projected to increase from \$11,000 in 2026 to \$50,000 in 2035 as per line #15 of Table 2.



7.0

AIRPORT OPERATING EXPENSES

This section of the report provides a forecast of operating expenses for the Osoyoos airport on an annual basis from 2025 to 2035. Table 2 at the back of this report provides a breakdown of operating expenses into five separate components: fuel station operations, insurance, management fees, repairs and maintenance and other/miscellaneous items. The assumptions used to generate each one of these revenue streams are summarized under the following headings.

7.1 Fuel Station Operations

Fuel station operating costs include the regular replacement of small parts like filters and hoses, credit card fees as well as testing/calibrating/certifying the dispenser system every two years. Under the third party operating model recommended in this report, all of these expenses will be the sole responsibility of the fuel station operator. Accordingly, the cost of fuel station operations has been set to zero throughout the forecast period as per line #16 of Table 2.

7.2 Insurance

Plane owners are expected to be responsible for insurance coverage of the hangar buildings. Insurance coverage for all other aspects of the airport, both physical assets and operations, are assumed to be the sole responsibility of the Town of Osoyoos. Accordingly, the cost of insurance for the airport has been set to zero throughout the forecast period as per line #17 of Table 2.

7.3 Management Fees

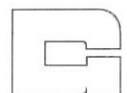
Airport operations going forward are expected to be overseen by OADS. While OADS may be a non-profit organization staffed by volunteers, it will nonetheless incur some operating expenses such as organizing an annual general meeting and filing annual financial statements.

To help offset these operating expenses, provision has been made for management fees calculated at \$1,000 for each phase of the proposed airport expansion plan. Based on this performance oriented formula, management fees are projected to increase from \$1,000 in 2026 to \$7,000 in 2035 as per line #18 of Table 2.

7.4 Repairs & Maintenance

The airport is expected to be responsible for repairs and maintenance of all infrastructure built during each phase of the airport expansion project. This specifically excludes the hangar buildings and the runway which are the responsibility of the plane owners and the Town of Osoyoos respectively.

With these exclusions in mind, repairs and maintenance costs are based on 1% of the project hard costs in year 1 and 2% per annum thereafter plus a \$12,000 allowance to cover “pre-existing” infrastructure. Based on this formula, repairs and maintenance costs are projected to more than quadruple from \$12,000 in 2025 to \$57,000 in 2035 as shown on line #19 of Table 2.

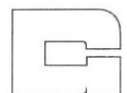


As a result, repairs and maintenance will be the single largest line item by far in the airport operating budget.

7.5 Other Expenses

The airport is expected to incur a number of operating costs in addition to those identified above. Other expenses include a 24 hour security monitoring system and accounting as well as garbage and janitorial services for the amenity space/pilot lounge included in the phase 1 hangar building.

For the purposes of this analysis, an allowance of \$1,000 per month/\$12,000 per year has been made in 2025. Other expenses are projected to increase by \$1,000 per annum after that, reaching \$22,000 in 2035 as per line #20 of Table 2.



8.0

AIRPORT NET OPERATING INCOME & NET CASH FLOW

This section of the report provides a forecast of net operating income and net cash flow for the Osoyoos airport on an annual basis from 2025 to 2035. More specifically, Table 3 at the back of this report provides a breakdown of net operating income and net cash flow for two of the major “stakeholders” in the project, namely the Town of Osoyoos and OADS. The assumptions used for each one of these stakeholders are summarized under the following headings.

8.1 Net Operating Income - Town Of Osoyoos

For the Town of Osoyoos, the financial analysis presented in the preceding section of this report identified one revenue stream (property taxes from the hangar buildings) and one expense stream (annual contributions). Note that expenses do not include major repairs of airport infrastructure (the runway in particular) based on the expectation that this line item will be covered by some combination of federal/provincial government grants.

Net operating income for the Town of Osoyoos is defined as property taxes less annual contributions. Net operating income should improve steadily from a loss of \$12,000 in 2025 to a profit of \$13,000 in 2035 as per line #6 of Table 3. Cumulative net operating income ends at \$10,000 in 2035 as per line #7 of Table 3.

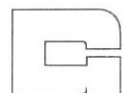
8.2 Net Operating Income - OADS

For the Osoyoos Airport Development Society, the financial analysis presented in the preceding section of the report identified five line items under the heading of operating revenues and another five line items under the heading of operating expenses. These ten line items are copied from Table 2 to Table 3.

Total operating revenues for OADS are defined as the sum of airplane tie-downs, hangar building land leases, contributions from the Town of Osoyoos and the Wine Country Racing Association plus fuel sale royalties. Total operating revenues are projected to increase from \$22,000 in 2025 to \$91,000 in 2035 as per line #13 of Table 3.

Total operating expenses for OADS are defined as the sum of fuel station costs, insurance, management fees, repairs and maintenance and other/miscellaneous items. Note that the first two of these line items are “zeroed out” because of assumptions set out in the preceding section of the report. Total operating expenses are projected to increase from \$24,000 in 2025 to \$86,000 in 2035 as per line #19 of Table 3.

Net operating income (total operating revenues less total operating expenses) is projected to fluctuate unevenly from a loss of \$2,000 in 2025 to a profit of \$5,000 in 2035 as per line #10 of Table 3. Cumulative net operating income reaches \$32,000 in 2035 as per line #21 of Table 3.

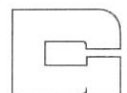


8.3 Capex Funding Requirement - OADS

OADS is a non-profit society and will probably remain so during the forecast period. Given the minimal cumulative net operating income projected for 2035 as determined above, it would be prudent to assume that 100% of the funding needed to pay for the OADS share of capital expenditures will have to come from one or more third parties,

Based on this assumption, the last two lines of Table 3 track this funding requirement on an annual basis from 2025 to 2035. Line #21 shows the portion of capital expenditures for which OADS will be responsible. These amounts, starting with \$146,000 for phase 1 in 2026 and ending with \$347,000 for phase 7 in 2035, are taken from line #15 of Table 1 and inflated by 2% per annum going forward.

Line #22 shows the running total of OADS funding requirements over the forecast period. Based on the inflated cost for each phase of the project, cumulative funding requirements are projected at \$2,685,000 by the end of 2035.



The financial model presented in this report identifies three stakeholder groups whose approval will be required for the Osoyoos airport expansion project to move forward. The costs and benefits for each one of these stakeholder groups are very different.

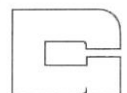
For the Town of Osoyoos, the proposed funding formula is essentially risk free. The municipality will be expected to continue providing support (both financial and non-financial) in a few areas such as insurance coverage for airport operations as well as support for funding applications to senior levels of government for major repairs and maintenance of airport improvements.

The current modest level of annual contributions from the Town is expected to increase slowly over time as each phase of the airport expansion project comes onstream; these contributions should be more than offset by property tax revenues collected on the hangar buildings.

Finding a small number of individuals who are prepared to pay for 100% of the capital and operating costs of small airplane hangar buildings at the Osoyoos airport will be key to moving the project forward. OADS has advised the consultant that it has been in contact with at least one such individual; whether this person (or others) is prepared to make the financial commitment identified in this report remains to be determined.

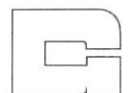
For the Osoyoos Airport Development Society, securing the funding required to pay for the airport infrastructure is the number one task. A total of more than \$2.6 million will be required to pay for OADS share of the seven phase airport expansion envisaged in the master plan prepared by True Consulting. Whether OADS can secure this amount of funding within the timeline set out in this report also remains to be determined.

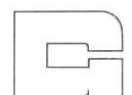
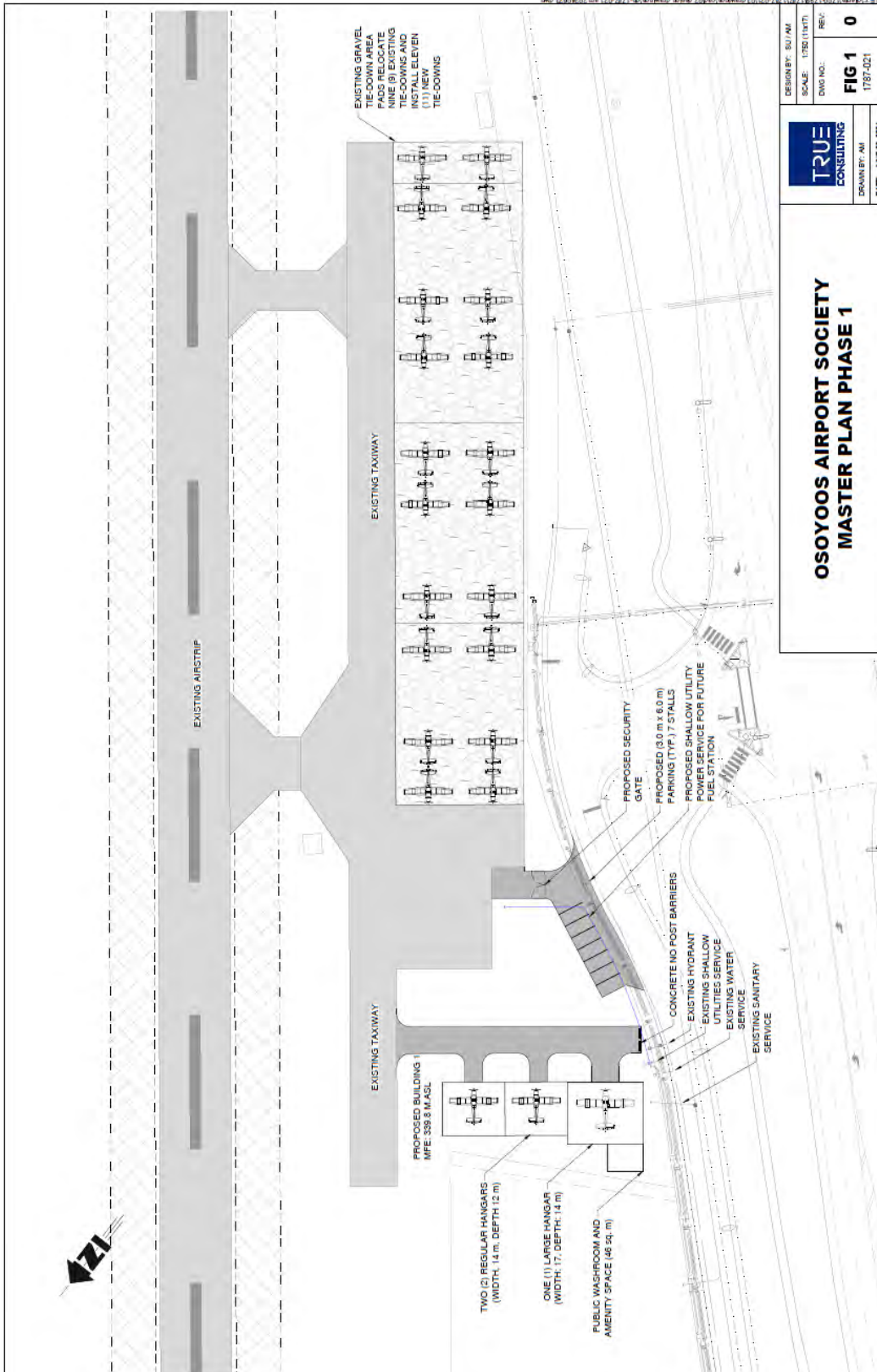
As a final comment, it should be noted that the Osoyoos Indian Band (OIB) has not been identified as a stakeholder in the project even though it is probably the single largest land owner and business operator in the Osoyoos area. OIB and its wide ranging business interests will benefit at least indirectly from the proposed expansion of the airport. If OIB were to make a small financial contribution to the project (perhaps similar to that envisaged from the Town of Osoyoos), it would reduce funding requirements for OADS and improve its chances of securing contributions from the federal and provincial governments.

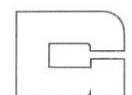
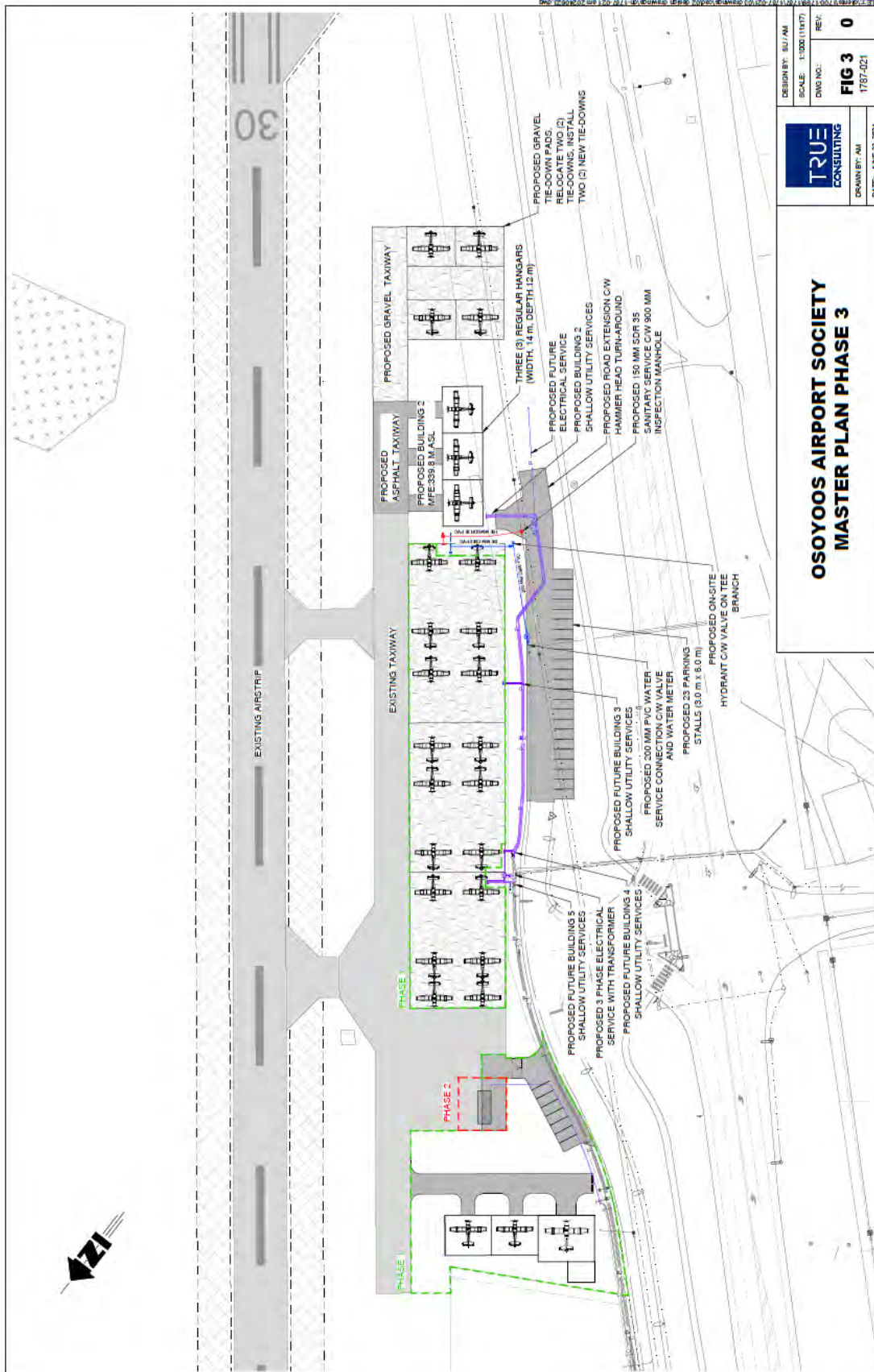


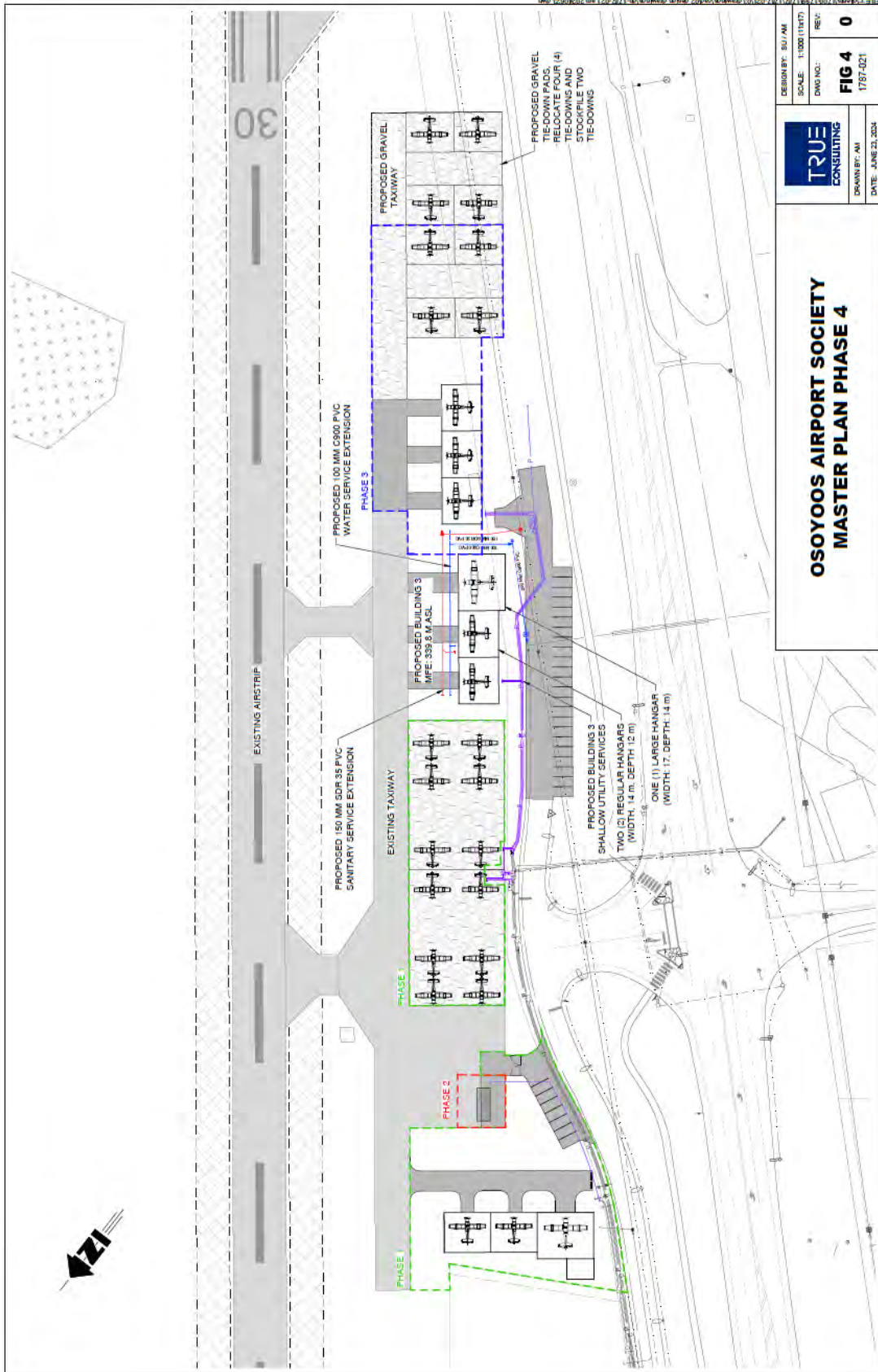
APPENDIX A: AIRPORT SITE PLANS

True Consulting has prepared a site plan for each one of the seven phases of the Osoyoos airport expansion project. These site plans are enclosed following this page.



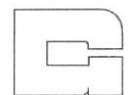


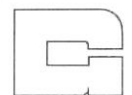
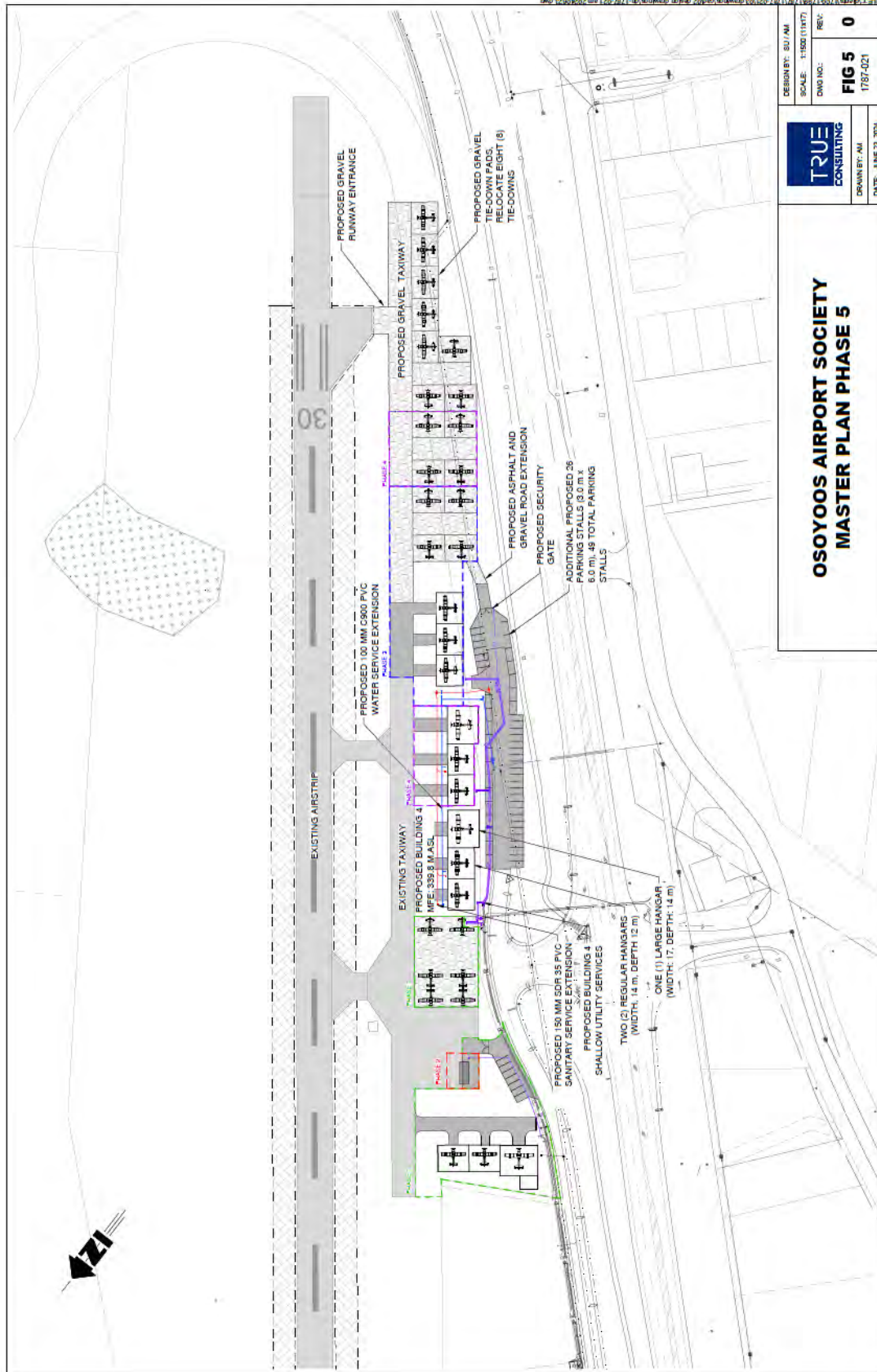


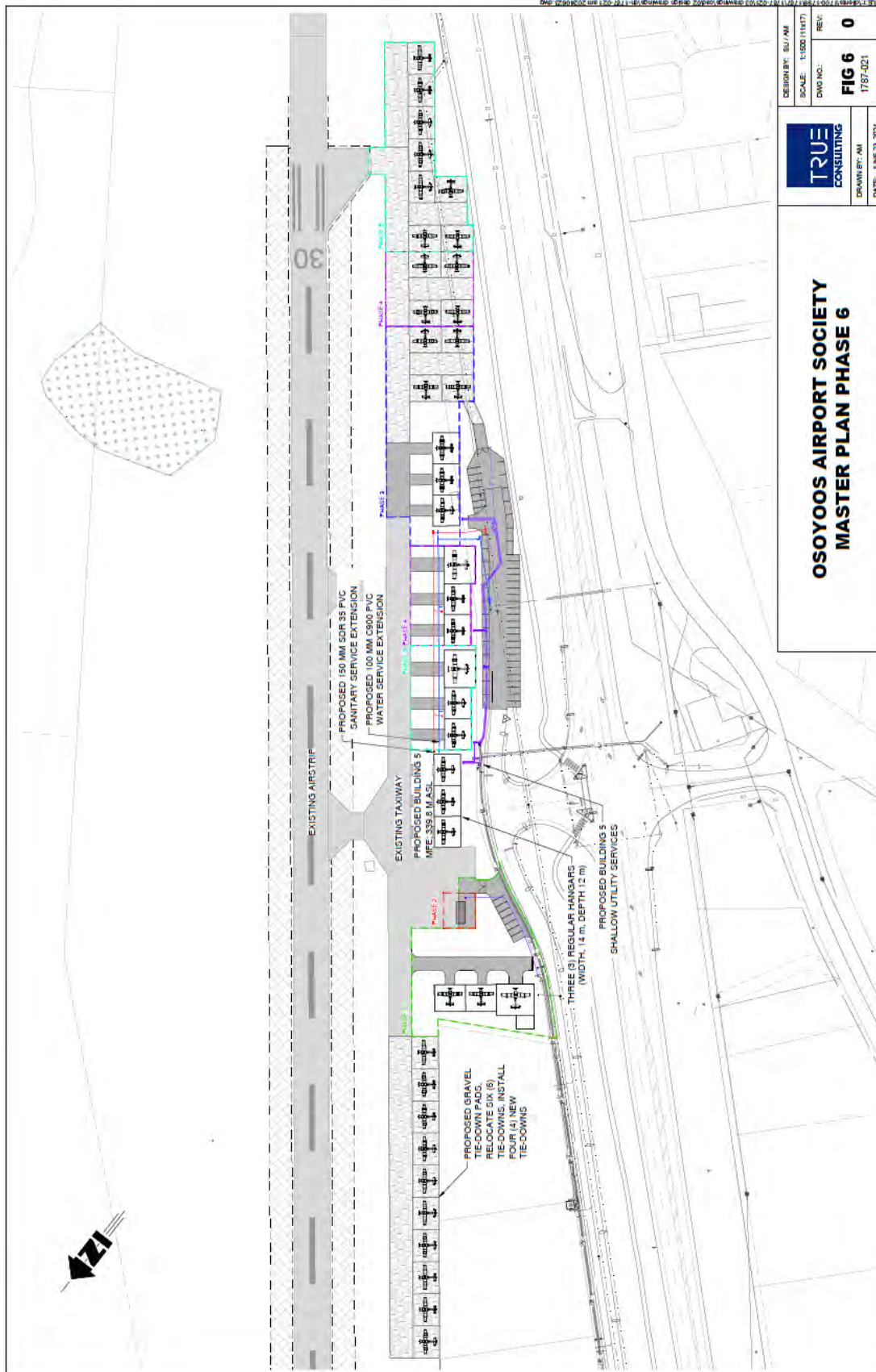


DESIGN BY: SU/AM	SCALE: 1"=50' (1:157)	REV: 0
DWG NO.: FIG 4	FIG 4	1787-021
DRAWN BY: AM	DATE: JUNE 23, 2024	

OSOYOOS AIRPORT SOCIETY MASTER PLAN PHASE 4

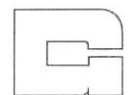


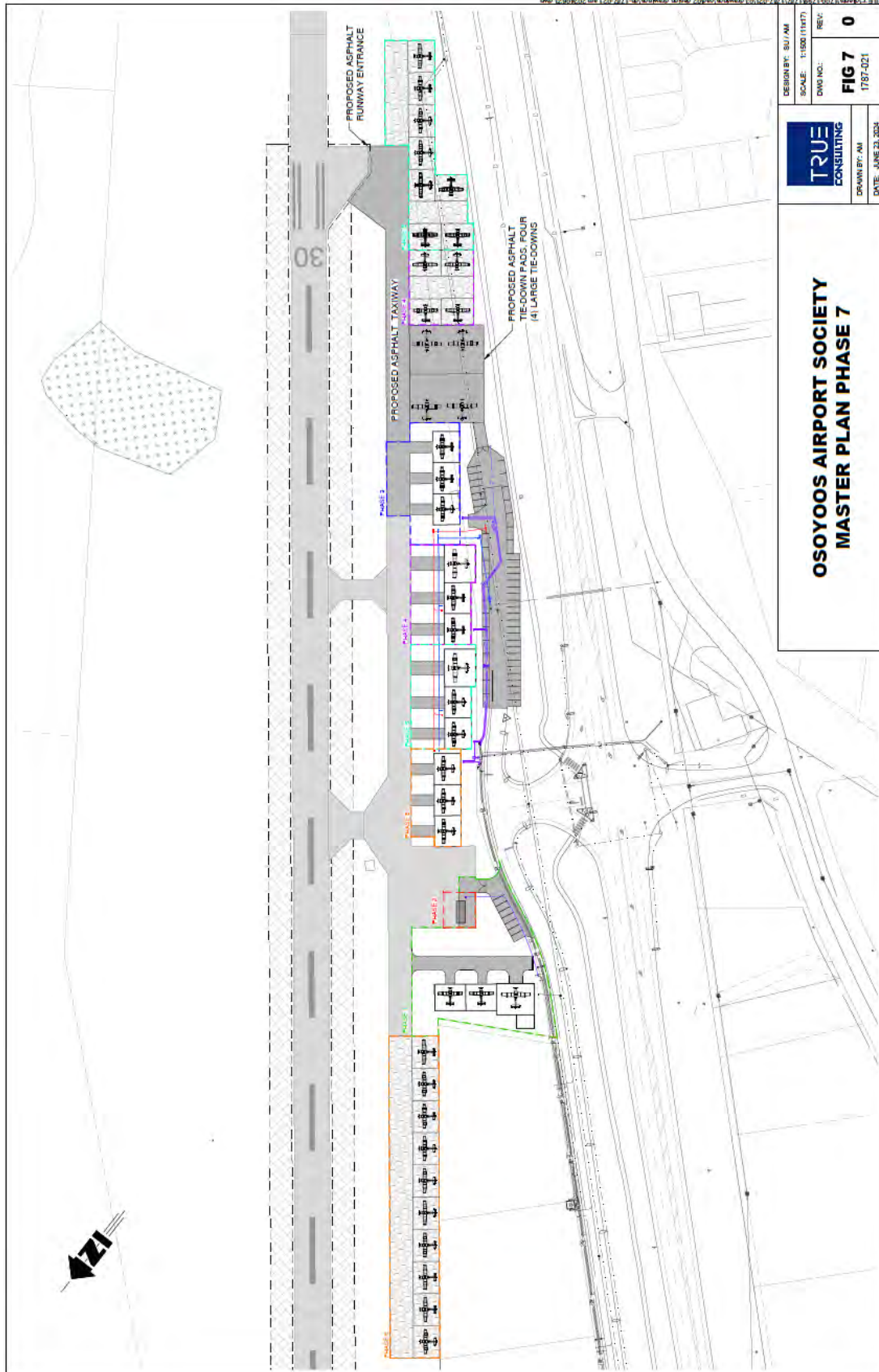




DESIGN BY: SU / AM	SCALE: 1"=50' (1:152)	REV: 0
TRUE CONSULTING	DWG NO: FIG 6	1757-021
DATE: JUNE 23, 2024	DRAWN BY: AM	

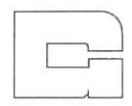
OSOYOOS AIRPORT SOCIETY MASTER PLAN PHASE 6





OSOYOOS AIRPORT SOCIETY MASTER PLAN PHASE 7

DESIGN BY: SJ/AM SCALE: 1"=500' (1:1617) DWG NO.: FIG 7 DATE: JUNE 23, 2024	REV: 0 1757-021



APPENDIX B: FINANCIAL PROJECTIONS

The following tables are enclosed following this page:

- Table 1: Osoyoos Airport Development Costs
- Table 2: Osoyoos Airport Operating Revenues & Operating Expenses
- Table 3: Osoyoos Airport Net Operating Income & Net Cash Flow

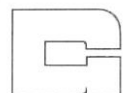
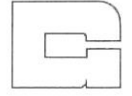


		TABLE 1															
		OSOYOOS AIRPORT DEVELOPMENT COSTS(1)															
Line #	Building Component	Phase 1 Cost	Phase 2 Cost	Phase 3 Cost	Phase 4 Cost	Phase 5 Cost	Phase 6 Cost	Phase 7 Cost	Phase 1-7 Total Cost								
1	General	\$ 10,000		\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 135,000								
2	Site Preparation	\$ 50,000		\$ 271,000	\$ 83,000	\$ 231,000	\$ 179,000	\$ 193,000	\$ 1,007,000								
3	Water System	\$ 5,000		\$ 61,000	\$ 17,000	\$ 19,000	\$ 9,000		\$ 111,000								
4	Sanitary System	\$ 5,000		\$ 30,000	\$ 17,000	\$ 17,000	\$ 7,000		\$ 76,000								
5	Shallow Utilities	\$ 18,000		\$ 80,000	\$ -		\$ -		\$ 98,000								
6	Miscellaneous	\$ 26,000		\$ 3,000	\$ 3,000	\$ 19,000	\$ 7,000	\$ 2,000	\$ 60,000								
7	Hangar Buildings(2	\$ 1,364,000		\$ 1,056,000	\$ 1,056,000	\$ 1,254,000	\$ 1,254,000		\$ 5,984,000								
8	Building Site Works	\$ 58,000		\$ 27,000	\$ 35,000	\$ 44,000	\$ 44,000		\$ 208,000								
9	Fuel Station(3		\$ 429,000						\$ 429,000								
10	Subtotal #1	\$ 1,536,000	\$ 429,000	\$ 1,553,000	\$ 1,236,000	\$ 1,609,000	\$ 1,525,000	\$ 220,000	\$ 8,108,000								
11	Soft Costs @ 15%	\$ 230,000	\$ -	\$ 233,000	\$ 185,000	\$ 241,000	\$ 229,000	\$ 33,000	\$ 1,151,000								
12	Subtotal #2	\$ 1,766,000	\$ 429,000	\$ 1,786,000	\$ 1,421,000	\$ 1,850,000	\$ 1,754,000	\$ 253,000	\$ 9,259,000								
13	Contingency @ 15%	\$ 265,000	\$ 64,000	\$ 268,000	\$ 213,000	\$ 278,000	\$ 263,000	\$ 38,000	\$ 1,389,000								
14	Total Project Cost	\$ 2,031,000	\$ 493,000	\$ 2,054,000	\$ 1,634,000	\$ 2,128,000	\$ 2,017,000	\$ 291,000	\$ 10,648,000								
15	Airport Cost	\$ 140,000	\$ 483,000	\$ 612,000	\$ 181,000	\$ 401,000	\$ 290,000	\$ 281,000	\$ 2,388,000								
16	Hangar/Plane Owner Cost(4	\$ 1,881,000	\$ -	\$ 1,432,000	\$ 1,443,000	\$ 1,717,000	\$ 1,717,000	\$ -	\$ 8,190,000								
17	Town Cost(5	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 70,000								
1) Development Consulting Group estimates based on information provided by True Consulting. All cost estimates assume a construction start in 2024.																	
2) Hangar building costs are based on 6,200 square feet in phase 1, 4,800 square feet in phase 3/4 and 5,700 square feet in phase 5/6.																	
3) Fuel station cost is the highest price bid received in 2022.																	
4) Hangar/plane owner cost is building plus site works plus soft costs plus contingency.																	
5) Assumed contribution from the Town of Osoyoos.																	



APPENDIX D

Master Plan Phase Cost Estimates

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 1**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 10,000.00	\$10,000.00
Subtotal Part 1.0					\$10,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	340	\$ 2.00	\$680.00
2.2	Bring site to subgrade				
2.2.2	Cut to Stockpile	m ³	180	\$ 25.00	\$4,500.00
2.3	Construct parking area				
2.3.1	50mm asphalt	m ²	340	\$ 50.00	\$17,000.00
2.3.2	150mm crushed gravel	m ²	340	\$ 20.00	\$6,800.00
2.3.3	300mm pitrun base	m ²	340	\$ 30.00	\$10,200.00
2.3.4	Painted pavement markings	LS	1	\$ 2,000.00	\$2,000.00
2.5	Site finishing and landscaping	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 2.0					\$46,180.00
PART 3.0 - WATER SYSTEM					
3.1	Connect to existing water service	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 3.0					\$5,000.00
PART 4.0- SANITARY SYSTEM					
4.1	Connect to existing sanitary service	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 4.0					\$5,000.00
PART 5.0 - SHALLOW UTILITIES					
5.1	Connect to Fortis includes transformer	LS	1	\$7,500.00	\$7,500.00
5.2	Connect to Telus	l.m.	1	\$1,500.00	\$1,500.00
5.3	Connect to Cable	ea.	1	\$1,500.00	\$1,500.00
Subtotal Part 5.0					\$10,500.00
PART 6.0 - MISCELLANEOUS					
6.1	Security Gate including concrete post foundation	LS	1	\$ 15,000.00	\$15,000.00
6.2	Supply and install lock block tie-downs	ea.	11	\$ 1,000.00	\$11,000.00
6.2	Relocate existing lock block tie-downs	ea.	9	\$ 500.00	\$4,500.00
Subtotal Part 6.0					\$26,000.00

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 7.0 - BUILDING					
7.1	Construct wood frame building with metal cladding				
	Building #1	ft ²	6200	\$ 220.00	\$1,364,000.00
Subtotal Part 7.0					\$1,364,000.00
PART 8.0 - BUILDING SITE AND EARTHWORKS					
8.1	Clearing & grubbing	m ²	1120	\$ 2.00	\$2,240.39
8.2	Bring site to subgrade				
	8.2.1 Cut to fill	m ³	100	\$ 25.00	\$2,500.00
	8.2.2 On-site material to fill	m ³	380	\$ 25.00	\$9,500.00
8.3	Construct Building driveways				
	8.3.1 50mm asphalt	m ²	440	\$ 50.00	\$22,000.00
	8.3.2 150mm crushed gravel	m ²	440	\$ 20.00	\$8,800.00
	8.3.3 300mm pitrun base	m ²	440	\$ 30.00	\$13,200.00
Subtotal Part 8.0					\$58,240.39
SUMMARY					
Part 1.0 - General Requirements					\$10,000.00
Part 2.0 - Site and Earthworks					\$46,180.00
Part 3.0 - Water System					\$5,000.00
Part 4.0 - Sanitary System					\$5,000.00
Part 5.0 - Shallow Utilities					\$10,500.00
Part 6.0 - Miscellaneous					\$26,000.00
Subtotal Parts 1.0 to 6.0					\$102,680.00
Part 7.0 - Building					\$1,364,000.00
Part 8.0 - Building Site and Earthworks					\$58,240.39
Subtotals Part 7.0 to 8.0					\$1,422,240.39
Subtotals Part 1.0 to 8.0					\$1,524,920.39
Contingency and Engineering Allowance (30%)					\$457,476.12
GST (5% of Subtotal and Contingency Allowance)					\$99,119.83
Total Sum					\$2,081,516.33

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 2**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 10,000.00	\$10,000.00
Subtotal Part 1.0					\$10,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	1000	\$ 2.00	\$2,000.00
2.2	Bring site to subgrade				
2.2.2	Cut to Stockpile	m ³	200	\$ 25.00	\$5,000.00
2.3	Construct Asphalt Taxi-way Extension and Fuel Station Apron				
2.3.1	50mm asphalt	m ²	1000	\$ 50.00	\$50,000.00
2.3.2	150mm crushed gravel	m ²	1000	\$ 20.00	\$20,000.00
2.3.3	300mm pitrun base	m ²	1000	\$ 30.00	\$30,000.00
2.3.4	Painted pavement markings	LS	1	\$ 2,000.00	\$2,000.00
Subtotal Part 2.0					\$109,000.00
PART 3.0 - SHALLOW UTILITIES					
3.1	Common Trenching (Fortis, Telus, Shaw)	l.m.	180	\$100.00	\$18,000.00
3.2	Fortis buried duct	l.m.	360	\$20.00	\$7,200.00
3.3	Supply and Install Fortis junction box	ea.	1	\$2,500.00	\$2,500.00
3.4	Supply and Install Fortis service box	ea.	5	\$2,000.00	\$10,000.00
3.5	Telus buried duct	l.m.	180	\$25.00	\$4,500.00
3.6	Supply and Install Telus service vault	ea.	1	\$2,100.00	\$2,100.00
3.7	Install Telus service box	ea.	5	\$1,500.00	\$7,500.00
3.8	Cable buried duct	l.m.	120	\$20.00	\$2,400.00
3.9	Supply and Install Cable service vault	ea.	1	\$2,100.00	\$2,100.00
3.10	Install Cable service box	ea.	4	\$1,500.00	\$6,000.00
3.11	Fortis supply	LS	1	\$25,000.00	\$25,000.00
Subtotal Part 3.0					\$87,300.00
SUMMARY					
Part 1.0 - General Requirements					\$10,000.00
Part 2.0 - Site and Earthworks					\$109,000.00
Part 3.0 - Shallow Utilities					\$87,300.00
Subtotals Part 1.0 to 3.0					\$206,300.00
Contingency and Engineering Allowance (30%)					\$61,890.00
GST (5% of Subtotal and Contingency Allowance)					\$13,409.50
Total Sum					\$281,599.50

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 3**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 25,000.00	\$25,000.00
Subtotal Part 1.0					\$25,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	2650	\$ 2.00	\$5,300.00
2.2	Bring site to subgrade				
2.2.1	Cut to fill	m ³	398	\$ 25.00	\$9,937.50
2.3	Construct parking area and Hammer Head				
2.3.1	50mm asphalt	m ²	1300	\$ 50.00	\$65,000.00
2.3.2	150mm crushed gravel	m ²	1300	\$ 20.00	\$26,000.00
2.3.3	300mm pitrun base	m ²	1300	\$ 30.00	\$39,000.00
2.3.4	Painted pavement markings	LS	1	\$ 4,000.00	\$4,000.00
2.4	Construct gravel tie-down area				
2.4.1	150mm crushed gravel	m ²	1000	\$ 20.00	\$20,000.00
2.4.2	300mm pitrun base	m ²	1000	\$ 30.00	\$30,000.00
2.5	Construct gravel taxi-way extension				
2.5.1	150mm crushed gravel	m ²	375	\$ 20.00	\$7,500.00
2.5.2	300mm pitrun base	m ²	375	\$ 30.00	\$11,250.00
2.6	Site finishing and landscaping	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 2.0					\$222,987.50

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 3.0 - WATER SYSTEM					
3.1	Supply and install on-site water service complete with Type I bedding and approved backfill.				
3.1.1	100mm Ø C900 DR18	l.m.	24	\$250.00	\$6,000.00
3.1.2	200mm Ø C900 DR18	l.m.	24	\$350.00	\$8,400.00
3.2	Supply and install on-site water service appurtenances including thrust blocks and Type I bedding.				
3.2.1	100 mm Ø Tee.	ea.	1	\$1,250.00	\$1,250.00
3.2.2	100 mm Ø end cap.	ea.	1	\$1,000.00	\$1,000.00
3.2.3	200 mm Ø Tee.	ea.	1	\$3,000.00	\$3,000.00
3.2.4	200 mm Ø Elbow.	ea.	1	\$1,200.00	\$1,200.00
3.2.4	100 mm Ø gate valve.	ea.	1	\$2,500.00	\$2,500.00
3.2.5	200 mm Ø gate valve.	ea.	1	\$4,500.00	\$4,500.00
3.2.6	Hydrant Assembly.	ea.	1	\$15,000.00	\$15,000.00
3.3	Supply and install water service to hangars c/w 25Ø service saddle, corp stop, riser, and PEX line	ea.	1	\$5,000.00	\$5,000.00
3.4	Couple to 200 mm Ø water service connection at property line.	allow	1	\$3,000.00	\$3,000.00
3.4	Supply and install on-site water meter and chamber	ea.	1	\$10,000.00	\$10,000.00
Subtotal Part 3.0					\$60,850.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 4.0- SANITARY SYSTEM					
4.1	Tie-in to existing sanitary sewer c/w bypass or isolation as required, manholes included in 4.3	ea.	1	<u>\$10,000.00</u>	<u>\$10,000.00</u>
4.2	Supply and install 150mm Ø SDR35 PVC on-site sanitary sewer main complete with Type I bedding and approved backfill.	l.m	35	<u>\$305.00</u>	<u>\$10,675.00</u>
4.3	Supply and install 900 Ø precast base, barrel, lid, frame and cover complete with concrete benching, grout sealing and adjusting rings.	ea.	2	<u>\$5,000.00</u>	<u>\$10,000.00</u>
4.4	Supply and install end cap c/w marker stubbed 1 m from building foundation.	ea.	1	<u>\$1,000.00</u>	<u>\$1,000.00</u>
Subtotal Part 4.0					<u>\$31,675.00</u>
PART 5.0 - MISCELLANEOUS					
5.1	Security Gate including concrete post foundation	LS	1	\$ 15,000.00	\$15,000.00
5.2	Relocate lock block tie-downs	ea.	4	\$ 500.00	<u>\$2,000.00</u>
Subtotal Part 6.0					<u>\$17,000.00</u>

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 6.0 - BUILDINGS					
6.1	Construct wood frame building with metal cladding				
	Building #2	ft ²	3200	\$ 220.00	\$704,000.00
Subtotal Part 7.0					\$704,000.00
PART 7.0 - BUILDING SITE AND EARTHWORKS					
7.1	Clearing & grubbing	m ²	340	\$ 2.00	\$680.00
7.2	Bring site to subgrade				
	7.2.1 Cut to fill	m ³	190	\$ 25.00	\$4,750.00
	7.2.2 On-site material to fill	m ³	130	\$ 25.00	\$3,250.00
7.3	Construct Building #2 driveways				
	7.3.1 50mm asphalt	m ²	105	\$ 50.00	\$5,250.00
	7.3.2 150mm crushed gravel	m ²	105	\$ 20.00	\$2,100.00
	7.3.3 300mm pitrun base	m ²	105	\$ 30.00	\$3,150.00
Subtotal Part 8.0					\$19,180.00
SUMMARY					
Part 1.0 - General Requirements					\$25,000.00
Part 2.0 - Site and Earthworks					\$222,987.50
Part 3.0 - Water System					\$60,850.00
Part 4.0 - Sanitary System					\$31,675.00
Part 5.0 - Miscellaneous					\$17,000.00
Subtotal Parts 1.0 to 5.0					\$357,512.50
Part 6.0 - Building					\$704,000.00
Part 7.0 - Building Site and Earthworks					\$19,180.00
Subtotals Part 6.0 to 7.0					\$723,180.00
Subtotals Part 1.0 to 7.0					\$1,080,692.50
Contingency and Engineering Allowance (30%)					\$324,207.75
GST (5% of Subtotal and Contingency Allowance)					\$70,245.01
Total Sum					\$1,475,145.26

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 4**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 25,000.00	\$25,000.00
Subtotal Part 1.0					\$25,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	1700	\$ 2.00	\$3,400.00
2.2	Bring site to subgrade				
2.2.1	Cut to fill	m ³	255	\$ 25.00	\$6,375.00
2.3	Construct parking area				
2.3.1	50mm asphalt	m ²	650	\$ 50.00	\$32,500.00
2.3.2	150mm crushed gravel	m ²	650	\$ 20.00	\$13,000.00
2.3.3	300mm pitrun base	m ²	650	\$ 30.00	\$19,500.00
2.3.4	Painted pavement markings	LS	1	\$ 4,000.00	\$4,000.00
2.4	Construct gravel tie-down area				
2.4.1	150mm crushed gravel	m ²	1000	\$ 20.00	\$20,000.00
2.4.2	300mm pitrun base	m ²	1000	\$ 30.00	\$30,000.00
2.5	Construct gravel taxi-way extension				
2.5.1	150mm crushed gravel	m ²	350	\$ 20.00	\$7,000.00
2.5.2	300mm pitrun base	m ²	350	\$ 30.00	\$10,500.00
2.6	Site finishing and landscaping	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 2.0					\$82,275.00
PART 3.0 - WATER SYSTEM					
3.1	Supply and install on-site water service complete with Type I bedding and approved backfill.				
3.1.1	100mm Ø C900 DR18	l.m.	40	\$250.00	\$10,000.00
3.2	Supply and install on-site water service appurtenances including thrust blocks and Type I bedding.				
3.2.1	100 mm Ø end cap.	ea.	1	\$1,000.00	\$1,000.00
3.3	Supply and install water service to hangars c/w 25Ø service saddle, corp stop, riser, and PEX line	ea.	1	\$5,000.00	\$5,000.00
Subtotal Part 3.0					\$16,000.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 4.0- SANITARY SYSTEM					
4.1	Supply and install 150mm Ø SDR35 PVC on-site sanitary sewer main complete with Type I bedding and approved backfill.	l.m	42	\$305.00	\$12,810.00
4.2	Supply and install end cap c/w marker stubbed 1 m from building foundation.	ea.	1	\$1,000.00	\$1,000.00
Subtotal Part 4.0					\$13,810.00
PART 5.0 - MISCELLANEOUS					
5.1	Relocate lock block tie-downs	ea.	4	\$ 500.00	\$2,000.00
5.2	Stockpile lock block tie-downs	ea.	2	\$ 250.00	\$500.00
Subtotal Part 6.0					\$2,500.00
PART 6.0 - BUILDINGS					
6.1	Construct wood frame building with metal cladding				
	Building #3	ft ²	4800	\$ 220.00	\$1,056,000.00
Subtotal Part 7.0					\$1,056,000.00
PART 7.0 - BUILDING SITE AND EARTHWORKS					
7.1	Clearing & grubbing	m ²	500	\$ 2.00	\$999.00
7.2	Bring site to subgrade				
7.2.1	Cut to fill	m ³	250	\$ 25.00	\$6,250.00
7.2.2	On-site material to fill	m ³	175	\$ 25.00	\$4,375.00
7.3	Construct Building #3 driveways				
7.3.1	50mm asphalt	m ²	160	\$ 50.00	\$8,000.00
7.3.2	150mm crushed gravel	m ²	160	\$ 20.00	\$3,200.00
7.3.3	300mm pitrun base	m ²	160	\$ 30.00	\$4,800.00
Subtotal Part 8.0					\$27,624.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
SUMMARY					
	Part 1.0 - General Requirements				\$25,000.00
	Part 2.0 - Site and Earthworks				\$82,275.00
	Part 3.0 - Water System				\$16,000.00
	Part 4.0 - Sanitary System				\$13,810.00
	Part 5.0 - Miscellaneous				\$2,500.00
	Subtotal Parts 1.0 to 5.0				\$139,585.00
	Part 6.0 - Building				\$1,056,000.00
	Part 7.0 - Building Site and Earthworks				\$27,624.00
	Subtotals Part 6.0 to 7.0				\$1,083,624.00
	Subtotals Part 1.0 to 7.0				\$1,223,209.00
	Contingency and Engineering Allowance (30%)				\$366,962.70
	GST (5% of Subtotal and Contingency Allowance)				\$79,508.59
	Total Sum				\$1,669,680.29

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 5**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 25,000.00	\$25,000.00
Subtotal Part 1.0					\$25,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	3250	\$ 2.00	\$6,500.00
2.2	Bring site to subgrade				
2.2.1	Cut to fill	m ³	488	\$ 25.00	\$12,187.50
2.3	Construct parking area extension				
2.3.1	50mm asphalt	m ²	475	\$ 50.00	\$23,750.00
2.3.2	150mm crushed gravel	m ²	475	\$ 20.00	\$9,500.00
2.3.3	300mm pitrun base	m ²	475	\$ 30.00	\$14,250.00
2.3.4	Painted pavement markings	LS	1	\$ 5,000.00	\$5,000.00
2.4	Construct SE gravel tie-down area				
2.4.2	150mm crushed gravel	m ²	1650	\$ 20.00	\$33,000.00
2.4.3	300mm pitrun base	m ²	1650	\$ 30.00	\$49,500.00
2.5	Construct SE gravel taxi-way extension				
2.5.2	150mm crushed gravel	m ²	1100	\$ 20.00	\$22,000.00
2.5.3	300mm pitrun base	m ²	1100	\$ 30.00	\$33,000.00
2.60	Site finishing and landscaping	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 2.0					\$213,687.50
PART 3.0 - WATER SYSTEM					
3.1	Supply and install on-site water service complete with Type I bedding and approved backfill.				
3.1.1	100mm Ø C900 DR18	l.m.	50	\$250.00	\$12,500.00
3.2	Supply and install on-site water service appurtenances including thrust blocks and Type I bedding.				
3.2.2	100 mm Ø end cap.	ea.	1	\$1,000.00	\$1,000.00
3.3	Supply and install water service to hangars c/w 25Ø service saddle, corp stop, riser, and PEX line	ea.	1	\$5,000.00	\$5,000.00
Subtotal Part 3.0					\$18,500.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 4.0- SANITARY SYSTEM					
4.1	Supply and install 150mm Ø SDR35 PVC on-site sanitary sewer main complete with Type I bedding and approved backfill.	l.m	50	\$305.00	\$15,250.00
4.2	Supply and install end cap c/w marker stubbed 1 m from building foundation.	ea.	1	\$1,000.00	\$1,000.00
Subtotal Part 4.0					\$16,250.00
PART 5.0 - MISCELLANEOUS					
5.1	Relocate lock block tie-downs	ea.	8	\$ 500.00	\$4,000.00
Subtotal Part 6.0					\$4,000.00
PART 6.0 - BUILDING					
6.1	Construct wood frame building with metal cladding and foundation for Building #4	ft ²	5700	\$ 220.00	\$1,254,000.00
Subtotal Part 7.0					\$1,254,000.00
PART 7.0 - BUILDING SITE AND EARTHWORKS					
7.1	Clearing & grubbing	m ²	800	\$ 2.00	\$1,600.00
7.2	Bring site to subgrade				
7.2.1	Cut to fill	m ³	400	\$ 25.00	\$10,000.00
7.2.2	On-site material to fill	m ³	200	\$ 25.00	\$5,000.00
7.3	Construct Building #4 driveways				
7.3.1	50mm asphalt	m ²	250	\$ 50.00	\$12,500.00
7.3.2	150mm crushed gravel	m ²	250	\$ 20.00	\$5,000.00
7.3.3	300mm pitrun base	m ²	250	\$ 30.00	\$7,500.00
Subtotal Part 8.0					\$41,600.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
SUMMARY					
	Part 1.0 - General Requirements				\$25,000.00
	Part 2.0 - Site and Earthworks				\$213,687.50
	Part 3.0 - Water System				\$18,500.00
	Part 4.0 - Sanitary System				\$16,250.00
	Part 5.0 - Miscellaneous				\$4,000.00
	Subtotal Parts 1.0 to 5.0				\$277,437.50
	Part 6.0 - Building				\$1,254,000.00
	Part 7.0 - Building Site and Earthworks				\$41,600.00
	Subtotals Part 6.0 to 7.0				\$1,295,600.00
	Subtotals Part 1.0 to 7.0				\$1,573,037.50
	Provisional Contract Sum (Contingency Allowance 30%)				\$471,911.25
	GST (5% of Subtotal and Contingency Allowance)				\$102,247.44
	Total Sum				\$2,147,196.19

OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 6

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 25,000.00	\$25,000.00
Subtotal Part 1.0					\$25,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	3300	\$ 2.00	\$6,600.00
2.2	Bring site to subgrade				
2.2.1	Cut to fill	m ³	495	\$ 25.00	\$12,375.00
2.3	Construct NW gravel tie-down area				
2.3.2	150mm crushed gravel	m ²	1750	\$ 20.00	\$35,000.00
2.3.3	300mm pitrun base	m ²	1750	\$ 30.00	\$52,500.00
2.4	Construct NW gravel taxi-way extension				
2.4.2	150mm crushed gravel	m ²	1550	\$ 20.00	\$31,000.00
2.4.3	300mm pitrun base	m ²	1550	\$ 30.00	\$46,500.00
2.5	Site finishing and landscaping	LS	1	\$ 5,000.00	\$5,000.00
Subtotal Part 2.0					\$188,975.00
PART 3.0 - WATER SYSTEM					
3.1	Supply and install on-site water service complete with Type I bedding and approved backfill.				
3.1.1	100mm Ø C900 DR18	l.m.	5	\$500.00	\$2,500.00
3.2	Supply and install on-site water service appurtenances including thrust blocks and Type I bedding.				
3.2.2	100 mm Ø end cap.	ea.	1	\$1,000.00	\$1,000.00
3.3	Supply and install water service to hangars c/w 25Ø service saddle, corp stop, riser, and PEX line	ea.	1	\$5,000.00	\$5,000.00
Subtotal Part 3.0					\$8,500.00

SCHEDULE OF QUANTITIES
Project # 1787-021

DESCRIPTION		UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 4.0- SANITARY SYSTEM					
4.1	Supply and install 150mm Ø SDR35 PVC on-site sanitary sewer main complete with Type I bedding and approved backfill.	l.m	10	\$500.00	\$5,000.00
4.2	Supply and install end cap c/w marker stubbed 1 m from building foundation.	ea.	1	\$1,000.00	\$1,000.00
Subtotal Part 4.0					\$6,000.00
PART 5.0 - MISCELLANEOUS					
5.1	Relocate lock block tie-downs	ea.	6	\$ 500.00	\$3,000.00
5.2	Supply and install lock block tie-downs	ea.	4	\$ 1,000.00	\$4,000.00
Subtotal Part 5.0					\$7,000.00
PART 6.0 - BUILDING					
6.1	Construct wood frame building with metal cladding and foundation for Building #5	ft ²	5700	\$ 220.00	\$1,254,000.00
Subtotal Part 6.0					\$1,254,000.00
PART 7.0 - BUILDING SITE AND EARTHWORKS					
7.1	Clearing & grubbing	m ²	500	\$ 2.00	\$1,000.00
7.2	Bring site to subgrade				
7.2.1	Cut to fill	m ³	250	\$ 25.00	\$6,250.00
7.2.2	On-site material to fill	m ³	125	\$ 25.00	\$3,125.00
7.3	Construct Building #5 driveways				
7.3.1	50mm asphalt	m ²	160	\$ 50.00	\$8,000.00
7.3.2	150mm crushed gravel	m ²	160	\$ 20.00	\$3,200.00
7.3.3	300mm pitrun base	m ²	160	\$ 30.00	\$4,800.00
Subtotal Part 8.0					\$26,375.00

SCHEDULE OF QUANTITIES
Project # 1787-021

DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
SUMMARY				
Part 1.0 - General Requirements				\$25,000.00
Part 2.0 - Site and Earthworks				\$188,975.00
Part 3.0 - Water System				\$8,500.00
Part 4.0 - Sanitary System				\$6,000.00
Part 5.0 - Miscellaneous				\$7,000.00
Subtotal Parts 1.0 to 5.0				\$235,475.00
Part 6.0 - Building				\$1,254,000.00
Part 7.0 - Building Site and Earthworks				\$26,375.00
Subtotals Part 6.0 to 7.0				\$1,280,375.00
Subtotals Part 1.0 to 7.0				\$1,515,850.00
Provisional Contract Sum (Contingency Allowance 30%)				\$454,755.00
GST (5% of Subtotal and Contingency Allowance)				\$98,530.25
Total Sum				\$2,069,135.25

**OSOYOOS AIRPORT SOCIETY
MASTER PLAN PHASE 7**

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
PART 1.0 - GENERAL REQUIREMENTS					
1.0	Survey, Records, and O&M	LS	1	\$ 25,000.00	\$25,000.00
Subtotal Part 1.0					\$25,000.00
PART 2.0 - SITE AND EARTHWORKS					
2.1	Clearing & grubbing	m ²	690	\$ 2.00	\$1,380.00
2.2	Bring site to subgrade				
2.2.1	Cut to fill	m ³	100	\$ 25.00	\$2,500.00
2.3	Construct taxi-way extension				
2.3.1	50mm asphalt	m ²	1550	\$ 50.00	\$77,500.00
2.3.2	150mm crushed gravel	m ²	270	\$ 20.00	\$5,400.00
2.3.3	300mm pitrun base	m ²	270	\$ 30.00	\$8,100.00
2.3.4	Painted pavement markings	LS	1	\$ 4,000.00	\$4,000.00
2.4	Construct concrete tie-down area				
2.4.1	50mm asphalt	m ²	1400	\$ 50.00	\$70,000.00
2.4.2	150mm crushed gravel	m ²	420	\$ 20.00	\$8,400.00
2.4.3	300mm pitrun base	m ²	420	\$ 30.00	\$12,600.00
Subtotal Part 2.0					\$189,880.00
PART 3.0 - MISCELLANEOUS					
3.1	Relocate lock block tie-downs	ea.	4	\$ 500.00	\$2,000.00
3.2	Security Gate including concrete post foundation	LS	1	\$ 15,000.00	\$15,000.00
Subtotal Part 7.0					\$17,000.00

SCHEDULE OF QUANTITIES
Project # 1787-021

ITEM	DESCRIPTION	UNIT	EST. QUANT.	UNIT PRICE	TOTAL PAYMENT
SUMMARY					
	Part 1.0 - General Requirements				\$25,000.00
	Part 2.0 - Site and Earthworks				\$189,880.00
	Part 3.0 - Miscellaneous				\$17,000.00
	Subtotal Parts 1.0 to 3.0				\$231,880.00
	Provisional Contract Sum (Contingency Allowance 30%)				\$69,564.00
	GST (5% of Subtotal and Contingency Allowance)				\$15,072.20
	Total Sum				\$316,516.20

APPENDIX E

2022 AvGas Fuel Tank and Cardlock Fuel Cabinet
Request for Quotation

and

W.S.Nicholls Budget Proposal Documents



Our Ref: 1787-021 Rev.0

***Osoyoos Airport Society - Request for Quotation; Supply and Installation
14,000 L (3698.4 US gallon) Avgas Fuel Tank and Cardlock Fuelling Cabinet.***

On behalf of the Osoyoos Airport Society, our firm is overseeing the design and construction of a proposed fuel dispensing station. This letter is an invitation to your company to prepare a competitive, firm price for the supply and installation of a new 14,000 L (3698.4 US gallon) Avgas Fuel Tank and Cardlock Fuelling Cabinet.

1.0 Background

As part of the overall Osoyoos Airport Expansion project a fuel dispensing system is required to receive and store bulk avgas and make available for commercial sale to the public.

The airport is located in the town of Osoyoos, BC, along the Crowsnest Highway, 10800 BC-3. The airport taxiway has recently been expanded and has included a location for installation of the fuel tank and dispensing station.

2.0 Project Format

Design drawings for the proposed layout have been attached for your review and use in quotation preparation. These drawings include:

1787-021-SK2-R1 FUEL DISPENSING STATION

The fuel tank installation location is proposed as a 7.4 m x 14.0m area. The utilizable 'live storage' to be provided within the tank is a minimum of 14,000 L (3698.4 US gallon). The cardlock cabinet is expected to be installed directly beside the tank to facilitate one directional travel of personal aircraft to the cabinet.

3.0 Project Deliverables

3.1 DESIGN STANDARDS

- a. Design and installation of aviation fuel storage facilities shall comply with *National Fire Code of Canada* and any provincial fire code.
- b. Fuel storage facilities shall meet all the requirements of CCME *Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products*.
- c. National Standard of Canada CSA B836:22 Storage, handling and dispensing of aviation fuels at aerodromes.

3.2 DESIGN CRITERIA

Fuel Product: Avgas

Tank Volume: minimum 14,000 L (3698.4 US gallon).

Flow Rate Required: 94.6 – 133.5 l/min (25-30 gpm)

Power available: 600 V / 3 / 60 Hz and/or 240V / 1 / 60 Hz

3.3 STORAGE TANKS

- a. Storage tanks shall be aboveground horizontal or vertical tanks.
 - .1 Horizontal Tanks shall comply with ULC 601, EN 12285/2 or approved equivalent standard.
 - .2 Vertical tanks shall comply with API650, EN 14015 or approved equivalent standard.
- b. Shall be constructed to avoid ingress of water or dirt.
- c. Be placarded with required regulatory information.
- d. Have a separate inlet and outlet pipe and be designed to minimize turbulence and splashing while filling.
- e. Have a gauge hatch with a slotted tube for sampling and tank dipping.
- f. Have a dedicated access manway.
- g. Provide suitable secondary containment in accordance with the *National Fire Code of Canada*.
- h. Have pressure/vacuum relief valves or a free vent device.
- i. Be fitting with an automatic high-level alarm with audible and visual output in accordance with CCME PN 1326.

- j. Carbon steel tanks shall be epoxy coated on internal surfaces in accordance with EI 1541 (Light Coloured). Epoxy coating shall be compatible with the stored fuel and warranted by the manufacturer. Stainless Steel and Aluminum tanks do not require internal coating.
- k. External coating in accordance with CCME requirements.
- l. Provide a positive low point to collect water and sediment for ease of removal. Horizontal tanks shall be installed with a slope of 1:50. Vertical tanks shall be installed with a 1:30 slope to a center sump.
- m. Stairs or ladder and walkway to provide access to inspection manway and tank top controls.

3.4 FILTRATION

- a. Filtration shall be required for receiving and dispensing fuel from the fuel dispensing station. All filter vessels shall be of new construction and meet the requirements of the latest edition of EI 1596 and include the following:
 - b. The following filters shall be permitted
 - .1 Filter/water separators qualified to EI 1581
 - .2 Microfilters (5 micron or finer) qualified to EI 1590
 - .3 Dirt defense filter qualified to EI 1588
 - .4 Fuel water barrier filters qualified to EI 1588
 - .5 Single element housings tested on principals similar to the applicable EI specifications above.
 - c. All filters shall be equipped with an air eliminator located at the highest point of the filter vessel vented to atmosphere.
 - d. Thermal pressure relief valve or another device that will prevent over pressurization due to thermal expansion.
 - e. Influent and effluent fuel sampling connection.
 - f. DP gauge with an accuracy of +/- 13.8 kPa (2psi).
 - g. Drain port at lowest point of each chamber.
 - h. Placard indicating month and year of last inspection and filter change.
 - i. Data plate in accordance with EI 1596.

3.5 FUELLING CABINET

- a. The fueling cabinet will be installed immediately beside the fuel tank. It shall be constructed in accordance with *National Fire Code of Canada* and local regulations. It will consist of a weatherproof enclosure equipped with a spill tray and contain the following:
 - b. Pump and motor
 - c. Filtration
 - d. Strainer
 - e. Flow meter
 - f. Bonding cable reel
 - g. Thermal relief
 - h. Hose reel
 - i. Hose and nozzle
 - j. Point of Sale (POS) register (See section 3.6)
 - k. Emergency controls in accordance with NFPA 407
 - l. Fire extinguisher
 - m. Area lighting
 - n. Placard identifying fuel type, and “NO SMOKING / NO VAPING” prominently posted on front of cabinet.

3.6 POINT OF SALE REGISTER

- a. A Cardlock Point of Sale register will be supplied to allow for self-serve operation and payment. The register shall be certified by Measurement Canada for approval of the sale of fuel.
- b. Communications protocols capable of connection by ethernet, cellular or WiFi networks.
- c. Printer to supply receipts containing pertinent information.
- d. Keypad and graphical user interface for self-serve operation.

3.7 APPURTENCES

- a. Hoses shall be of continuous length smooth bore synthetic rubber compliant with the requirements of EI 1529, Grade 2, Type C or CT. They shall be installed within 2 years of manufacture and have a minimum 10 year service life.
- b. Strainers shall be in line and not less than 40 mesh.

- c. Piping and fittings shall be capable of meeting the design pressures and temperature. Piping shall be stainless steel, aluminum or carbon steel internally coated. Copper, Cadmium, galvanized steel or zinc coatings shall NOT be permitted.
- d. Gaskets shall be hydrocarbon resistant material, impervious to water, and meet the design temperature and pressure.
- e. Isolation valves shall be provided to allow the isolation of equipment and sections of piping to facilitate maintenance and repairs and act as an emergency shut off in the event of failure of automated controls.
- f. Fire extinguishers shall have a minimum rating of 80-B:C.
- g. A bonding cable shall be incorporated into the design. It shall be constructed of conductive, durable and flexible material. A bare steel lug shall be provided to bond the loading vehicle to the facilities electrical system ground.

3.8 INSTALLATION

- a. The fuel dispensing station shall be skidded and preassembled to the greatest extend possible.
- b. A single electrical connection is expected at the location indicated on the layout drawing. All wiring, instrumentation controls, motor starters will be wired to a single weatherproof control panel included on the skid package.
- c. If foundation upgrades are required, they shall be included as part of the installation.
- d. Bollards or other protective devices to protect from the facilities from vehicular collision shall be provided in compliance with *National Fire Code of Canada* regulation.
- e. Area lighting shall be provided in compliance with *National Fire Code of Canada* regulation.

4.0 Quotation Requirements

The quotation must include the following information:

- description of proposed tank dimensions and style, including manufacturer information in accordance with CSA B836:22
- description of tank accessories and appurtenances to be provided
- description of secondary containment in accordance with National Fire Code of Canada
- description of proposed fuelling cabinet dimensions and style, including manufacturer information
- description of point of sale (POS) meter and register, including certification of approval from Measurement Canada
- clarifications of items to be provided by the owner (Osoyoos Airport Society) in relation to site preparation and certification
- General Arrangements, Piping and Instrumentation Diagram, and/or Process Flow Diagram of proposed system
- description of construction services provided
- description of any proposed deviation from the intended format and deliverables as described in Section 3.0
- cost in Canadian dollars for supply and installation of the stated product, inclusive of applicable taxes
- terms and conditions of payment (including payment schedule)
- warranty information, including a description of general tank and finish (coating) warranty
- proposed schedule for completion of the stated works
- description of expected maintenance requirements and costs over a 20-year service life
- any additional information as needed or desired to allow evaluation per the following Section 5.0

We request that your company submit quotation for the described works to the writer at TRUE Consulting no later than **2:00pm** (Pacific Standard Time) on **October 7, 2022**. Submissions can be made by regular mail address (address noted on letterhead), or email to kkraan@true.bc.ca.

5.0 Quotation Evaluation

The Airport Society intends to evaluate all quotations received and recommend award by October 31, 2022. Quotations will not be solely evaluated based on capital cost.

The following items will be factored into the evaluation but not limited to maintenance costs, tank dimensions, tank and cabinet supplier, installer qualifications, and construction schedule.

The Osoyoos Airport Society reserves the right to accept or to reject any or all proposals as submitted as felt justified and will not be responsible for any costs incurred by proponents in preparing a response.

If you have any questions regarding this request, please do not hesitate to contact the undersigned.

Yours truly,

TRUE CONSULTING

A handwritten signature in black ink, appearing to read 'Kevin Kraan', is written over the printed name.

Kevin Kraan, EIT



Budget Proposal

Request for Quotation
Supply and Installation
Avgas Fuel Tank and Cardlock Fueling Cabinet
True Consulting/Osoyoos Airport Society
Osoyoos Airport

W.S. Nicholls' Ref. No. M-001-943

Prepared By:

W.S. Nicholls Western Construction Ltd.
851 Derwent Way,
Annacis Business Park,
Delta, B.C. V3M 5R4
Phone: (604) 521-2004 Fax: (604) 521-2008

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- 8.3 *Company Sample Environmental Protection Plan*

9.0 Quality Management

- 9.1 *Company Quality Management System (QMS)*
- 9.2 *Company Quality Control Manual*



October 19, 2022

True Consulting
201 - 2079 Falcon Road
Kamloops, British Columbia
V2C 4J2

Attention: Kevin Kraan, EIT

Reference: Request for Quotation - Avgas Fuel Tank and Cardlock Fueling Cabinet
Osoyoos Airport Society
W.S. Nicholls' Ref. No. M-001-943

Subject: Budget Proposal Submission

Dear Sir,

WSN Western Construction (WSN) is pleased to submit our *Budget Proposal* as requested for the above referenced project. Please refer to our attached proposal submission documents for further details regarding our Proposal, expertise, capabilities, Health, Safety and Environmental culture and project history.

We appreciate the opportunity to provide our Proposal for this important project and trust that everything is in order and to your satisfaction. We look forward to hearing from you soon regarding WSN's suitability for providing our services and expertise on this project, and to building a long-lasting relationship with True Consulting and the Osoyoos Airport Society. Should you have any questions or comments regarding our submission please do not hesitate to contact us, thank-you for your consideration.

Best regards,

W.S. NICHOLLS WESTERN CONSTRUCTION LTD.

A handwritten signature in blue ink, appearing to read 'Pat J. Hunt', is shown. The signature is stylized with a large, sweeping flourish at the end.

Pat J. Hunt
President
E-Mail: pat.hunt@wsnconstruction.com

cc. File Copy

SECTION - 1.0

Project Budget Proposal

Section - 1.0

Budget Proposal

WSN Western Construction (WSN) is pleased to submit our *Budget Price Proposal* for the Osoyoos Airport - Avgas Fuel Tank and Cardlock Fueling Cabinet project. The following items are included in the budget price:

-  Detailed design and engineering
-  Shop fabrication and assembly
-  Major equipment supply
-  Site installation (piping and mechanical)
-  Site Installation (civil)
-  Electrical supply and installation (shop and site)
-  Miscellaneous Items

SUB-TOTAL BUDGET PRICE (PST Included)	= \$	429,303.00
GST	= \$	21,465.00
OVERALL TOTAL BUDGET PRICE	= \$	450,768.00

SECTION - 2.0

Corporate Qualifications and References

- 2.1 Company Information
- 2.2 List of Proposed Subcontractors
- 2.3 Company Municipal Business License(s)
- 2.4 Company 'AU License (Technical Safety BC)
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SECTION - 2.0

Sub-Section 2.1

Company Information

INDUSTRIAL CONSTRUCTION

As a leader in the industry, WSN Western Construction prides itself on providing consistent, reliable and quality service to our many clients. Our main focus is on Industrial based construction projects. We have the capabilities to provide all required construction disciplines, from; piping, mechanical, civil, earthworks, structural steel, electrical and more...

TURNKEY PROJECTS

WSN Western Construction is well suited to provide turnkey style projects, or complete design/build projects in partnership with Owners, Engineering companies and/or equipment suppliers.

PROJECT MANAGEMENT

Our attention to detail, experience, knowledge, safety, successful track record and continued efforts make us a leader in Project Management.

W.S. Nicholls Western Construction Ltd. RELIABLE AND QUALITY SERVICE



- **Committed** and capable of undertaking any size job, contact us for all of your project or maintenance needs
- **Committed** to providing the safest and healthiest workplaces possible for our employees, clients and co-workers
- **Committed** to providing our customers with the highest quality service and products available
- **Committed** to and focused on our clients, safety, quality, and cost control which translates into customer satisfaction and a solid base of repeat business

W.S. Nicholls Western Construction Ltd. is a Canadian multi-trade industrial contractor and fabricator that started in 1996 with its head office based in Cambridge, Ontario. In 2000 W.S. Nicholls expanded its operations into British Columbia where they provide industrial construction services to Oil and Gas, Petro-Chemical, Pulp and Paper, Government and a variety of private industry customers throughout Western Canada. A unique aspect of the Western Canada Operations is their vast experience gained through the construction and refurbishment of numerous Airport Fueling Systems and Tank Farm Storage facilities.

The company is recognized as one of only a handful of companies in Canada with sufficient experience, bonding and insurance capabilities to undertake such fueling related work in an Airport environment. Our ongoing commitment to safety is evident in our day to day

operations, WSN Western Construction recognizes that safety excellence cannot be achieved without the active participation of everyone involved.

Both WSN's Western and Eastern Canadian operations (W.S. Nicholls Construction Inc.) have extensive shop fabrication facilities to meet all of your piping fabrication requirements, including: Power Piping, skid mounted or module assemblies, sanitary and food grade process fabrication; all complete with a formal Quality Control Program. WSN is signatory to several Trade Unions, such as: Plumbers and Pipefitters, Boilermakers, Millwrights, Electricians, Ironworkers, Carpenters, Cement Masons and Labourers unions. With these alliances we ensure manpower availability and are capable of providing qualified, trained and skilled trades people for all required construction disciplines.

MAINTENANCE WORK

Our professional, diligent and skilled personnel are well equipped and suited to provide both short-term and long-term maintenance requirements.

SHUT-DOWN WORK

WSN's service-based approach enables us to work closely with our clients to assist in the planning, trouble-shooting, scheduling, implementation, through to successful completion of shut-down based projects.

SHOP FABRICATION

Both WSN's Western and Eastern Canadian operations (W.S. Nicholls Construction Inc.) have extensive shop fabrication facilities to meet all of your piping and skid fabrication requirements complete with a formal Quality Control Program.

PRECISION LEAK DETECTION TESTING

W.S. Nicholls Western Construction has the experience and equipment to service all of the Precision Leak Detection and Integrity Testing requirements for your piping systems.

Service Features and Benefits



WSN Western Construction prides itself as a leader in the Industrial Construction industry providing consistent, safe, reliable and quality service to our many clients. Focused, professional, diligent, experienced and skilled personnel make up the W.S. Nicholls' industrial construction team. Some of the service features and benefits offered by WSN include in-house AutoCAD drafting, piping and skid shop fabrication, formal Quality Control Program, project management, multi-trade capabilities, one-stop shopping and an excellent safety record.



Operations of WSN are guided by documented objectives; our policy is to provide our customers with products and services of the highest quality and the greatest possible value, thereby gaining and holding their respect and loyalty. The essence of customer satisfaction is our commitment to quality, a commitment that extends to every phase of our operation. We continue to work closely with our suppliers to ensure that we receive the highest quality materials. This careful attention to quality enables us to meet or exceed our customer's expectations.

Various Industries Served

- Airport Fueling Systems (Canada), National Department of Defense Fueling Facilities, Pipeline Operations, Fuel Loading/Unloading and Storage Facilities
- Waste Recycling, Manufacturing, Institutional, Food and Beverage
- Power and Cogeneration, Hydro Power, Pulp and Paper, Alternative Energy Systems
- Ethanol, Oil and High-Pressure Gas, Chemical, Petro-Chemical Refineries
- Auto and Feeder Plants, Steel Mills, Municipal Water and Waste Water Treatment Facilities, Mining



Proud Canadian Contractor

SERVICES AVAILABLE

Industrial Construction

Turnkey Projects

Project Management

Maintenance Work

Shut-Down Work

Shop Fabrication

CONTACT INFORMATION

WESTERN CANADA

WSN Western Construction
851 Derwent Way
Annacis Business Park
Delta, British Columbia V3M 5R4
Phone: (604) 521-2004
Fax: (604) 521-2008
E-Mail: wsnwest@wsnicholls.com

EASTERN CANADA

WSN Construction
48 Cowansview Road
Cambridge, Ontario N1R 7N3
Phone: (519) 740-3757
Fax: (519) 740-9752
E-Mail: opportunities@wsnconstruction.com

SECTION - 2.0

Sub-Section 2.2

List of Proposed Subcontractors

Section - 2.2

List of Proposed Subcontractors

WSN Western Construction (WSN) has selected our proposed subcontractors not only based on price alone, but on experience, reliability, reputation and the ability to work as team players. The following is a detailed list of WSN's self-performed scopes of work and our proposed subcontractors for this project:

- Piping Shop Fabrication W.S. Nicholls Western Construction Ltd.
- Custom Fuel Cabinets W.S. Nicholls Western Construction Ltd.
- Piping/Mechanical Installation W.S. Nicholls Western Construction Ltd.
- Civil Excavation and Concrete W.S. Nicholls Western Construction Ltd.
- Informal Survey W.S. Nicholls Western Construction Ltd.
- Existing U/G Services Locates W.S. Nicholls Western Construction Ltd.
- Design and Engineering (Piping/Mechanical/Civil/Electrical) Morrow Engineering Ltd. (North Vancouver, BC)
 - *Established in 1974 and based in North Vancouver, BC, Morrow Engineering provides clients with a high standard of engineering design and project management services. They have provided services to a wide variety of private and public sector clients resulting in a solid understanding of project development. They specialize in the design of petroleum storage and handling, process control, bulk materials handling, power distribution, and industrial control systems. With their wide range of expertise, from high-level conceptual design to hands-on installation, they help clients make the right decisions early and ensure projects run properly and on time.*
- Electrical (Shop and Field) Houle Electric Limited (Burnaby, BC)
 - *Founded in 1944, Houle prides itself on a tradition and reputation of excellence for their industrial, commercial, institutional, and residential customers. Over its lifetime and even today, Houle continues expanding its services to provide its clients with as close to a one-stop shop building and development experience, as possible. Houle is highly sought, not only for electrical construction and service, but also for security and life safety, network systems, industrial capability, power quality, building controls automation, audio visual, and lighting, thanks to the company's unwavering commitment to delivering the highest quality work in any circumstance. Houle's offerings and expertise include design/build-design/assist, cost budgets, project management, construction management, installation and retrofitting, as well as 24-hour emergency and on-call service. Houle serves the entire province of BC, with regional offices in Greater Vancouver, Victoria, Nanaimo,*
- Testing and Commissioning Planning TACK Engineering Ltd. (Delta, BC)



- Shop Non-Destructive Weld Testing
- Shop Non-Destructive Weld Testing
- Cranage

Elander Inspections Ltd. (Richmond, BC)

Stasuk Testing & Inspection Ltd. (Burnaby, BC)

Osoyoos Aggregates (Osoyoos, BC)

SECTION - 2.0

Sub-Section 2.3

Company Municipal Business License(s)

BUSINESS LICENCE

THIS LICENCE MUST BE POSTED IN A CONSPICUOUS PLACE ON THE BUSINESS PREMISES, IS
NON-TRANSFERABLE, NON-REFUNDABLE, AND IS VOID ON CHANGE OF OWNERSHIP.

BUSINESS & MAILING ADDRESS:

WS NICHOLLS WESTERN CONSTRUCTION LIMITED

**851 DERWENT WAY
DELTA BC V3M 5R4**

ACCOUNT NO:

27978

LICENCE NO:

20004633

LICENCE FEE:

\$410.00

BUSINESS LOCATION:

851 DERWENT WAY

ISSUED DATE:

Jun 06, 2022

EXPIRES ON:

Apr 06, 2023

LICENCEE:

WS NICHOLLS WESTERN CONSTRUCTION LIMITED

**851 DERWENT WAY
DELTA BC V3M 5R4**

HAS PAID THEIR REQUIRED LICENCE FEE AND IS ENTITLED TO CARRY ON THE BUSINESS DESCRIBED AS:

CONSTRUCTION OF BUILDINGS

IN A LAWFUL MANNER AND THIS LICENCE IS ISSUED SUBJECT TO THE PROVISIONS OF ALL BYLAWS OF THE CITY OF DELTA, NOW OR HEREAFTER IN FORCE, AND TO ALL AMENDMENTS THAT MAY HEREAFTER, DURING THE CURRENCY OF THIS LICENCE BE MADE TO SAID BYLAWS. IN THE EVENT THE NAME OR NATURE OF THE BUSINESS IS CHANGED, OR THE ADDRESS FROM WHICH THE BUSINESS IS CARRIED ON IS CHANGED, THE BUSINESS LICENCE SECTION MUST BE NOTIFIED IN WRITING. GST/HST EXEMPT #121377592

WS NICHOLLS WESTERN CONSTRUCTION LIMITED
851 DERWENT WAY
DELTA BC V3M 5R4

METRO WEST INTER-MUNICIPAL BUSINESS LICENCE

Valid in the following communities in conjunction with a valid and separate City of Delta Business Licence: City of Surrey, City of Burnaby, City of Richmond, City of Vancouver, City of New Westminster.

BUSINESS & MAILING ADDRESS:

WS NICHOLLS WESTERN CONSTRUCTION LTD

**851 DERWENT WAY
DELTA BC V3M 5R4**

ACCOUNT NO: 10000101

LICENCE NO: 20026517

LICENCE FEE: \$250.00

BUSINESS LOCATION:

851 DERWENT WAY

ISSUED DATE: Jul 12, 2022

EXPIRES ON: May 15, 2023

LICENCEE:

WS NICHOLLS WESTERN CONSTRUCTION LTD

**851 DERWENT WAY
DELTA BC V3M 5R4**

HAS PAID THEIR REQUIRED LICENCE FEE AND IS ENTITLED TO CARRY ON THE BUSINESS DESCRIBED AS:

CONSTRUCTION OF BUILDINGS METRO WEST INTER-MUNICIPAL LICENCE

IN A LAWFUL MANNER AND THIS LICENCE IS ISSUED SUBJECT TO THE PROVISIONS OF ALL BYLAWS OF THE CITY OF DELTA, NOW OR HEREAFTER IN FORCE, AND TO ALL AMENDMENTS THAT MAY HEREAFTER, DURING THE CURRENCY OF THIS LICENCE BE MADE TO SAID BYLAWS. IN THE EVENT THE NAME OR NATURE OF THE BUSINESS IS CHANGED, OR THE ADDRESS FROM WHICH THE BUSINESS IS CARRIED ON IS CHANGED, THE BUSINESS LICENCE SECTION MUST BE NOTIFIED IN WRITING. GST/HST EXEMPT #121377592

WS NICHOLLS WESTERN CONSTRUCTION LTD
851 DERWENT WAY
DELTA BC V3M 5R4

METRO WEST INTER-MUNICIPAL BUSINESS LICENCE

Valid in the following communities in conjunction with a valid and separate City of Delta
Business Licence: City of Surrey, City of Burnaby, City of Richmond, City of Vancouver,
City of New Westminster.

BUSINESS & MAILING ADDRESS:

WS NICHOLLS WESTERN CONSTRUCTION LTD

**851 DERWENT WAY
DELTA BC V3M 5R4**

ACCOUNT NO:

10000550

LICENCE NO:

20027571

LICENCE FEE:

\$250.00

BUSINESS LOCATION:

851 DERWENT WAY

ISSUED DATE:

Sep 26, 2022

EXPIRES ON:

Sep 22, 2023

LICENCEE:

WS NICHOLLS WESTERN CONSTRUCTION LTD

**851 DERWENT WAY
DELTA BC V3M 5R4**

HAS PAID THEIR REQUIRED LICENCE FEE AND IS ENTITLED TO CARRY ON THE BUSINESS DESCRIBED AS:

CONSTRUCTION OF BUILDINGS FRASER VALLEY INTER-MUNICIPAL LICENCE

IN A LAWFUL MANNER AND THIS LICENCE IS ISSUED SUBJECT TO THE PROVISIONS OF ALL BYLAWS OF THE CITY OF DELTA, NOW OR HEREAFTER IN FORCE, AND TO ALL AMENDMENTS THAT MAY HEREAFTER, DURING THE CURRENCY OF THIS LICENCE BE MADE TO SAID BYLAWS. IN THE EVENT THE NAME OR NATURE OF THE BUSINESS IS CHANGED, OR THE ADDRESS FROM WHICH THE BUSINESS IS CARRIED ON IS CHANGED, THE BUSINESS LICENCE SECTION MUST BE NOTIFIED IN WRITING. GST/HST EXEMPT #121377592

WS NICHOLLS WESTERN CONSTRUCTION LTD
851 DERWENT WAY
DELTA BC V3M 5R4

SECTION - 2.0

Sub-Section 2.4

Company 'AU' License (Technical Safety BC)



License No.: LBP0002177
(When inquiring, always refer to this number.)

BOILER & PRESSURE VESSEL CONTRACTOR LICENCE (Wallet Card)

June 30, 2022

W.S. Nicholls Western Construction Ltd.
851 Derwent Way
Delta BC V3M 5R4

Re: Contractor Licence - Wallet Card

This is to certify that the person or firm named above is a licensed contractor under the Safety Standards Act and Regulations.

As indicated in the applicable Safety Regulation(s), this licence entitles the holder named herein to perform the scope of work as defined in the applicable Safety Regulation(s) subject to the terms and conditions specified.

Attached is a Contractor Identification Card which confirms your status as a licensed Boiler and Pressure Vessels Contractor. Ensure your designated person signs this card. This card remains the property of the issuing agency and must be surrendered upon request. Please review and confirm that the information issued on this card is correct.

**BEND HERE
TO LIFT CARD**



BOILER & PRESSURE VESSEL CONTRACTOR LICENCE

This is to certify that:

W.S. Nicholls Western Construction Ltd.

is a licensed Boiler and Pressure Vessels Contractor

Expiry Date: 07/02/2023

License No.: LBP0002177

Class Au



Issued by the Provincial Safety Manager


Signature of Designate



**PLEASE SIGN CARD
WITH A BALLPOINT PEN**

SECTION - 2.0

Sub-Section 2.5

Company WorkSafe BC Information



WORKING TO MAKE A DIFFERENCE

Assessment Department Location

Mailing Address

PO Box 5350
Station Terminal
Vancouver BC V6B 5L5

6951 Westminster Highway
Richmond BC
V7C 1C6
www.worksafebc.com

Clearance Section

Telephone 604 244 6380
Toll Free within Canada
1 888 922 2768
Fax 604 244 6390

WS Nicholls Western Construction Ltd
851 Derwent Way
Annacis Island Business Park
DELTA, V3M 5R4

October 19, 2022

Person/Business : W. S. NICHOLLS WESTERN CONSTRUCTION LTD.
Account number : 654351

We confirm that the above-mentioned account is currently active and in good standing.

This firm has had continuous coverage with us since November 20, 2000 and has satisfied assessment remittance requirements to October 01, 2022.

The next payment that will affect this firm's clearance status is due on October 20, 2022.

This information is only provided for the purposes of Section 258 of the *Workers Compensation Act*, which indicates that a person using a contractor or subcontractor to perform work may be responsible for unpaid assessments of the contractor or subcontractor.

Employer Service Centre
Assessment Department

Clearance Reference # : C133463507
CLRA1A

Now you can report payroll and pay premiums online.

Visit www.worksafebc.com

Please refer to your account number in your correspondence or when contacting the Assessment Department.
To alter this document constitutes fraud.



Year	Industry Base Rate	Experience Rating	Discount	WS Nicholls' Rate
2022	1.70	45.2%	0.77	0.93
2021	1.86	45.0%	0.84	1.02
2020	1.87	45.7%	0.85	1.02
2019	2.03	46.1%	0.94	1.09
2018	2.94	45.2%	1.33	1.61
2017	3.10	44.0%	1.36	1.74
2016	3.09	42.8%	1.32	1.77
2015	2.93	41.1%	1.21	1.72
2014	3.04	39.4%	1.20	1.84
2013	3.08	37.5%	1.16	1.92
2012	3.66	33.3%	1.22	2.44
2011	3.81	33.3%	1.27	2.54
2010	3.41	31.1%	1.06	2.35
2009	3.16	26.7%	0.84	2.32
2008	3.14	21.6%	0.68	2.46
2007	3.61	16.6%	0.60	3.01
2006	4.30	9.6%	0.41	3.89
2005	7.19	6.2%	0.45	6.74
2004	6.66	4.2%	0.28	6.38
2003	5.55	6.5%	0.36	5.19
2002	4.63	2.6%	0.12	4.51
2001	5.20	<i>new customer</i>	<i>no discount</i>	5.20

We started off as class 721028 - Industrial, commercial, institutional or highrise residential Construction

This was amended in 2006

We are now class 721038 - Oil or Gas Pipeline Construction or Repair

**Employer Service Centre**

Mailing Address: PO Box 5350 Station Terminal, Vancouver BC V6B 5L5
P 604.244.6181 | 1.888.922.2768 | F 604.244.6490 | worksafebc.com

March 2, 2022

5076

W. S. NICHOLLS WESTERN CONSTRUCTION LTD.
48 COWANSVIEW RD
CAMBRIDGE ON N1R 7N3

Your account number	654351
Your 2021 net rate	1.02%
Your 2022 net rate	0.93%

Your 2022 premium rate

We're writing to provide information about your premium rate for 2022. You'll use this rate to determine your premium for your 2022 WorkSafeBC insurance - insurance that protects your firm against lawsuits from workers who suffer workplace injuries or occupational diseases and provides benefits to workers who are injured on the job.

One of our goals is to support you in maintaining a safe and healthy workplace.

Your premium rate is dependent on the classification unit assigned to your firm: **Oil or Gas Pipeline Construction or Repair (721038)**. It's very important that you review the enclosed description of this classification unit; if it does not reflect your business operations, please call us right away.

How we calculate your 2022 premium rate

First, we determine a base premium rate, which reflects the historical cost of injuries in your industry's rate group. Then, we compare your firm's claims and payroll history with other firms in your rate group to determine if you qualify for an experience rating discount or if a surcharge applies. Please refer to the following pages for information about your claims and how your firm's claims and payroll history compares to others in your industry.

Base premium rate	1.70%	The base premium rate is stated as a percentage of assessable payroll. It's the same for all firms in your classification unit.
Experience rating discount of 45.2%	-0.77	You've earned a discount of 45.2% based on your firm's claims and payroll history.
Your firm's 2022 net premium rate	0.93%	Multiply this rate by your assessable payroll to determine your premium. For 2022, the maximum assessable payroll per worker is \$108,400.

Through your premiums, your industry funds the BC Construction Safety Alliance (BCCSA), of which you are a member. With programs, services and safety advisors, at no additional cost, they can assist to reduce injuries and their associated costs. For more information, visit bccsa.ca.

Your insurance premium is currently due on a quarterly basis. The first payment for your 2022 premium will be due in April 2022. We'll notify you if your payment schedule changes and will send you more information about reporting your payroll and calculating your premium before your payment is due.

We're here to help

If you have any questions about your WorkSafeBC insurance, please call us at 604.244.6181 (or toll-free at 1.888.922.2768) between 8:30 and 4:30, Monday through Friday. You can find more information about our rate setting process and do business with us anytime at worksafebc.com.

SECTION - 2.0

Sub-Section 2.6

Company Insurance Information



Certificate of Insurance

No.: 2022-32-WSNW

Dated: April 26, 2022

This document supersedes any certificate previously issued under this number

This is to certify that the Policy(ies) of insurance listed below ("Policy" or "Policies") have been issued to the Named Insured identified below for the policy period(s) indicated. This certificate is issued as a matter of information only and confers no rights upon the Certificate Holder named below other than those provided by the Policy(ies).

Notwithstanding any requirement, term, or condition of any contract or any other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the Policy(ies) is subject to all the terms, conditions, and exclusions of such Policy(ies). This certificate does not amend, extend, or alter the coverage afforded by the Policy(ies). Limits shown are intended to address contractual obligations of the Named Insured.

Limits may have been reduced since Policy effective date(s) as a result of a claim or claims.

Certificate Holder:

To Whom It May Concern

Named Insured and Address:

W.S. Nicholls Western Construction Ltd.
851 Derwent Way
Annacis Business Park
Delta, BC V3M 5R4

Evidence of Insurance

Type(s) of Insurance	Insurer(s)	Policy Number(s)	Effective/ Expiry Dates	Sums Insured Or Limits of Liability	
COMMERCIAL GENERAL LIABILITY	Northbridge General Insurance Corporation	CBC 8550020	May 01, 2022 to May 01, 2023	Each Occurrence	CDN 5,000,000
				Products & Completed Operations Aggregate	CDN 5,000,000
				General Aggregate	CDN 5,000,000
AUTOMOBILE	Northbridge General Insurance Corporation	CBC 0671948	May 01, 2022 to May 01, 2023	Bodily Injury and Property Damage Liability	CDN 5,000,000
PROPERTY ALL RISKS	Travelers Insurance Company of Canada	UXTRV30821	May 01, 2022 to May 01, 2023	Builders Risk	CDN 4,292,600
				Contractors Equipment	CDN 5,000,000

Notice of cancellation:

The insurer(s) affording coverage under the policies described herein will not notify the certificate holder named herein of the cancellation of such coverage.

Marsh Canada Limited

120 Bremner Boulevard
Suite 800
Toronto, ON M5J 0A8
Telephone: 1-844-990-2378
Fax: -
constructioncertrequests@marsh.com

Marsh Canada Limited

By:

Justin Campisi



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

04/18/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER McGriff Insurance Services, Inc. P.O. Box 10265 Birmingham, AL 35202	CONTACT NAME: Holly Gilham PHONE (A/C, No, Ext): 800-476-2211 E-MAIL ADDRESS: hgilham@mcgriff.com	FAX (A/C, No):
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Navigators Insurance Company		42307
INSURER B : American International Group UK Limited		
INSURER C :		
INSURER D :		
INSURER E :		
INSURER F :		

INSURED W.S. Nicholls Western Construction Ltd. 851 Derwent Way Annacis Business Park Delta, BC V3M 5R4 CD	

COVERAGES

CERTIFICATE NUMBER: NSCV7RDS

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☐ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☐ PRO-JECT ☐ LOC OTHER:						EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
	AUTOMOBILE LIABILITY ☐ ANY AUTO ☐ OWNED AUTOS ONLY ☐ HIRED AUTOS ONLY ☐ SCHEDULED AUTOS ☐ NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	UMBRELLA LIAB ☒ OCCUR EXCESS LIAB ☐ CLAIMS-MADE DED ☐ RETENTION \$			LA22EXC133264IV	05/01/2022	05/01/2023	EACH OCCURRENCE \$ 5,000,000 AGGREGATE \$ 5,000,000 Prod/Comp Ops Agg \$ 5,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y / N ☐	N / A				PER STATUTE ☐ OTH-ER ☐ E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
B	Excess Liability			62785805 Excess of 5,000,000	05/01/2022	05/01/2023	Per Occurrence \$ 5,000,000 General Aggregate \$ 5,000,000 Prod/Comp Ops Agg \$ 5,000,000 \$ \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
The policies contain no airside exclusions.

CERTIFICATE HOLDER

To Whom It May Concern
(For Evidence of Insurance Only)

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE



ADDITIONAL REMARKS SCHEDULE

Page 2 of 3

PRODUCER McGriff Insurance Services, Inc.		INSURED W.S. Nicholls Western Construction Ltd.	
POLICY NUMBER		ISSUE DATE: 04/18/2022	
CARRIER	NAIC CODE		

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: _____ **FORM TITLE:** _____

Coverage: Excess Liability - 3rd Layer Carrier: Admiral Insurance Company
 Policy No.: BEX0961109617 Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$10,000,000 Each Occurrence or Event / \$10,000,000 General Aggregate
 Excess of: \$10,000,000 Excess Liability

Coverage: Excess Liability - 4th Layer Carrier: Allied World National Assurance Company
 Policy No.: 0305-4064 Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$10,000,000 Each Occurrence / \$10,000,000 General Aggregate
 Excess of: \$20,000,000 Excess Liability

Coverage: Excess Liability - 5th Layer Carrier: Endurance American Insurance Company (Sompo)
 Policy No.: EXC10004723308 Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$10,000,000 Each Occurrence / \$10,000,000 General Aggregate
 Excess of: \$30,000,000 Excess Liability

Coverage: Excess Liability - 6th Layer Carrier: Ascot Bermuda Limited
 Policy No.: RA22UF309J1X Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$10,000,000 Each Occurrence / \$10,000,000 General Aggregate
 Excess of: \$40,000,000 Excess Liability

Coverage: Excess Liability - 7th Layer Carrier (1 of 2): AXIS Surplus Insurance Company
 Policy No.: P00100009370304 Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$15,000,000 Each Occurrence / \$15,000,000 General Aggregate
 Part of: \$40,000,000 (shared layer)
 Excess of: \$50,000,000 Excess Liability

Coverage: Excess Liability - 7th Layer Carrier (2 of 2): Gemini Insurance Company
 Policy No.: CEX09600173-09 Effective: 5/1/22 Expiration: 5/1/23
 Limits of Liability: \$25,000,000 Each Occurrence / \$25,000,000 General Aggregate
 Part of: \$40,000,000 (shared layer)
 Excess of: \$50,000,000 Excess Liability



ADDITIONAL REMARKS SCHEDULE

Page 3 of 3

PRODUCER McGriff Insurance Services, Inc.		INSURED W.S. Nicholls Western Construction Ltd.	
POLICY NUMBER		ISSUE DATE: 04/18/2022	
CARRIER	NAIC CODE		

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: _____ **FORM TITLE:** _____

Coverage: Contractor's Protective Professional Indemnity & Liability/Contractor's Pollution
 Carrier: Berkley Assurance Company
 Policy No.: PCADB-5018111-0522
 Effective: 5/1/22
 Expiration: 5/1/23

Limits of Liability:

Protective Indemnity: \$10,000,000 each claim/aggregate
 Professional Liability: \$10,000,000 each claim/aggregate
 Contractors Pollution Liability: \$10,000,000 each claim/aggregate
 Cyber Liability: \$10,000,000 each claim/aggregate
 Media & Personal Injury Liability: \$10,000,000 each claim/aggregate
 Mitigation: \$5,000,000 each claim/aggregate
 Disciplinary Proceedings Defense Expense: \$10,000 each claim/aggregate
 Subpoena Defense Expense: \$10,000 each claim/aggregate
 ADA and FHA Defense Expense: \$10,000 each claim/aggregate
 Corporate Reputation Rehabilitation: \$10,000 each claim/aggregate
 Building Information Modeling - Extra Expense: \$10,000 each claim/aggregate
 Emergency Expense: \$5,000,000 each claim/aggregate
 Protective Claim Bankruptcy Litigation Expense Reimbursement: \$10,000 each claim/aggregate
 Litigation Attendance Reimbursement: \$500 Each Claim, \$5,000 Aggregate

Policy Aggregate: \$10,000,000

SIR: \$250,000 Each Claim, \$500,000 Aggregate

Retro Dates:

Protective: 4/1/09
 Professional: 1/1/74
 Contractors Pollution: Occurrence
 Cyber: 1/1/74
 Media and Personal Injury: 1/1/74
 Mitigation: 4/1/09

SECTION - 2.0

Sub-Section 2.7

Company Bonding Information



ZURICH INSURANCE COMPANY LTD
100 King St. W., Suite 5500, P.O. Box 290, Toronto, ON M5X 1C9

SURETY'S LETTER OF PREQUALIFICATION

June 17, 2021

To Whom It May Concern

Re: W.S. Nicholls Western Construction Ltd.
Confirmation of Bonding Capacity

We understand the captioned contractor wishes to be prequalified as a tenderer to you.

ZURICH INSURANCE COMPANY LTD (A.M. Best Rating: A+) is privileged to act as surety for W.S. Nicholls Western Construction Ltd. and have established a surety bond facility which consists of a single project limit of \$250,000,000, and an aggregate bonded limit of \$500,000,000.

We will favourably consider a request from W.S. Nicholls Western Construction Ltd. to provide any required bid, performance and payment bonds. Such prequalification and subsequent approval is conditioned upon applicable underwriting considerations such as acceptable contract terms and other relevant underwriting criteria at the time of the request. Naturally, any arrangement for bonds would be a matter between W.S. Nicholls Western Construction Ltd. and ourselves as Surety and we assume no liability to you or third parties if, for any reason, we do not provide the required bonding.

This letter is not an assumption of liability nor is it a bid or performance bond. It is issued only as a bonding reference requested by our client.

Zurich Insurance Company Ltd

Louise Keck, Attorney-in-Fact

SECTION - 2.0

Sub-Section 2.8

Company Similar Project History

Section - 2.8

Company Similar Project History

WSN Western Construction (WSN) prides itself as a leader in the Industrial Construction industry specializing in remote site design/build projects; providing consistent, safe, reliable and quality service to our many valued clients. Focused, professional, diligent, experienced and skilled personnel make up the WSN industrial construction Team. Some of the service features and benefits offered by WSN include in-house AutoCAD drafting, piping and skid shop fabrication, formal Quality Control Program, extensive Design/Build capabilities and experience, project management, multi-trade capabilities, one-stop shopping and an excellent safety record.

As a leader in the industry, WSN prides itself on providing consistent, reliable and quality service to our many clients. Our main focus is on Industrial based construction projects. We have the capabilities to provide all required construction disciplines, from piping, mechanical, civil, concrete, earthworks, structural steel and more...

Operations of WSN are guided by documented objectives; our policy is to provide our customers with products and services of the highest quality and the greatest possible value, thereby gaining and holding their respect and loyalty. The essence of customer satisfaction is our commitment to quality, a commitment that extends to every phase of our operation. We continue to work closely with our suppliers to ensure that we receive the highest quality materials. This careful attention to quality enables us to meet or exceed our customer's expectations.

WSN provides industrial construction services to Oil and Gas, Petro-Chemical, Pulp and Paper, Airports, Government and a variety of private industry customers throughout Western Canada. Throughout our many years of operation we have gained vast experience through the construction and refurbishment of numerous Airport Fueling Systems, Tank Farm Storage facilities and Bulk Storage facilities across Canada, some of these projects are highlighted below. Note that WSN has completed over 400 Airside Aviation Fuel Projects to date, proving our leadership in this field.

Job Number	Project Name	Construction Cost	Dates of Service
07-2526	YVR - Pier C Hydrant System Expansion Vancouver International Airport, British Columbia	\$4.9M	2007
10-3000 & 10-3012	YVR - Tank Farm 2 Jet Fuel Farm Construction Vancouver International Airport, British Columbia	\$40M	2010-2013
13-3082	YVR - Pier A/B Connector, U/G Fuel Header and Hydrant System Expansion Vancouver International Airport, British Columbia	\$4.9M	2013-2015
15-3029	Vancouver Airport Fuel Delivery Project, Tank Farm TF-0 Early Earthworks and Ground Improvements Richmond, British Columbia	\$29M	2015-2018
18-3170	YVR - North Runway 26R End Safety Area (RESA), U/G Fuel Headers PL1 and PL2 Relocation Vancouver International Airport, British Columbia	\$12M	2018-2019

Job Number	Project Name	Construction Cost	Dates of Service
19-3212 & 19-3226	YVR - Pier D Expansion, U/G Fuel Header and Hydrant System Expansion Vancouver International Airport, British Columbia	\$1.062M	2019-2020
07-2530	YEG - Jet Fuel Tank Farm Expansion, Tank No.3 Edmonton International Airport, Alberta	\$1.6M	2007-2008
08-2539	YEG - Jet Fuel Tank Farm Expansion, Tank No.4 Edmonton International Airport, Alberta	\$2.1M	2008-2009
09-2564	YEG - Terminal Expansion, U/G Fuel Header and Hydrant System Edmonton International Airport, Alberta	\$10M	2009
08-2542	YEG - Tank Farm Vista, Gas Bar and Slop Systems Piping Edmonton International Airport, Alberta	\$1.1M	2008-2009
09-2557	YYC - Jet Fuel Tank Farm Expansion, Tank No.4 Calgary International Airport, Alberta	\$3.2M	2009
09-2569	YYC - Airside Fueling Gas/Diesel Bar Calgary International Airport, Alberta	\$1M	2009
10-3004	YYC - Pier A Jet Fuel Hydrant System Calgary International Airport, Alberta	\$3.2M	2010
11-3024	YYC - Jet Fuel Header Re-alignment Calgary International Airport, Alberta	\$3M	2011
11-3031 & 12-3044	YYC - Deerfoot North Cargo Hydrant System Calgary International Airport, Alberta	\$2.5M	2011-2012
11-3025 & 12-3038	YYC - International Facilities Project (IFP) U/G Fuel Header and Hydrant System Expansion Calgary International Airport, Alberta	\$7.95M	2011-2013
13-3075	YYC - Gates 101 to 106 U/G Fuel Header and Hydrant System Expansion Calgary International Airport, Alberta	\$2.55M	2013-2015
06-2507 & 07-2522	YWG - Winnipeg Airport, Jet Fuel Hydrant System Expansion (Phases 1 & 2) Winnipeg International Airport, Manitoba	\$2.8M	2006-2007
10-3010	YWG - Winnipeg Airport, Jet Fuel Tank Farm Upgrades Winnipeg International Airport, Manitoba	\$600K	2010
13-3086 & 14-3107	YOC - Old Crow Airport Fuel Facility Design/Build Project Old Crow Airport, Yukon	\$4.5M	2013-2015
18-3200	World Fuel Services Canada ULC - Existing U/G Fuel System Removal and Remediation Project Port Hardy Airport, British Columbia	\$954K	2019-2020

Job Number	Project Name	Construction Cost	Dates of Service
19-3225	World Fuel Services Canada ULC - Aviation Fuel Tank Farm Upgrades Design/Build Project Victoria International Airport, British Columbia	\$3.5M	2019-2021
19-3208	Seair - YVR Float Plane Dock Upgrade Project (Aviation Fuel System Piping and Mechanical) Vancouver International Airport, British Columbia	\$1.040M	2019-2021
19-3218	Leighton Contracting - CFB Comox Tank Farm Jet Fuel Truck Offloading Design/Build Project (Piping and Mechanical) CFB Comox, Lazo, British Columbia	\$750K	2019-2021
21-3258	CMH Heli-Skiing & Summer Adventures - Cariboo Lodge Diesel Fuel System and Generator Room Upgrades Design/Build Project Valemount, British Columbia	\$1.240M	2021
21-3259	CMH Heli-Skiing & Summer Adventures - Bugaboo Lodge Diesel Fuel System and Generator Room Upgrades Design/Build Project Parson, British Columbia	\$1.148M	2021
21-3261	JDS Energy & Mining - Victoria Gold (Yukon) Firewater Pump Skid/Enclosure Design/Build Project Delta, British Columbia	\$314K	2021
02-2368	CFB Esquimalt/Colwood (Department of National Defense) Marine Terminal Fuel Facility Upgrade CFB Esquimalt, British Columbia	\$10M	2002-2004
05-2493	Petro-Canada (Suncor) - ULSD Treater & Caustic Area Upgrades Burnaby, British Columbia	\$1.3M	2005
12-3051	Harbour Air Seaplane Base Design/Build Project Vancouver Coal Harbour Seaplane Base, British Columbia	\$920K	2012-2013
13-3067	Harbour Air - South Terminal Seaplane Base Modifications Design Build Project Vancouver International Airport, British Columbia	\$200K	2013
13-3071	Suncor/Syncrude - Gas and Diesel Bars Upgrades Fort McMurray, Alberta	\$2.88M	2013-2014

Fuel Storage and Dispensing Upgrades

CMH Cariboos, BC

- **Location:** Cariboo Mountains, Regional District of Fraser-Fort George, BC, Canada
- **Client/Owner:** Canadian Mountain Holidays (CMH)
- **Client Contact:** Patrick Moulday
- **Project Dates:** 2021
- **Project Value:** **\$1,240,000**
- **Project Type:** New Gasoline and Diesel Storage and Dispensing System

Contractor Role: Design-Build Contractor. WSN was responsible for engineering design, procurement, construction, and supply logistics to construct and commission this project in a remote part of British Columbia. Terms of the contract were on a Time and Materials basis.

Sub-Consultant: Morrow Engineering Ltd.

Background

The client operates several remote, high alpine resorts powered by electricity from diesel power generators. CMH Cariboos Lodge required a completely new fuel storage and dispensing system to serve the diesel generators, along with a gasoline system to support mobile equipment. The remote location with surrounding Crown land prompted a state-of-the-art design to mitigate the potential for loss of product to the environment.

The Project

The generators operate 24 hours/day every day of the year and therefore required the new fuel system to be 100% reliable upon commissioning to replace the existing temporary system. The new system consisted of two 50,000 litre double-walled aboveground diesel tanks supplying a small 909 litre day tank from which the three generators draw product.



The project also included a new 3,000 litre double-walled aboveground gasoline storage tank, and gas/diesel dispenser system to serve vehicles and other equipment. The piping system was constructed of stainless steel for long life and minimum maintenance. The storage tank and dispenser systems are fully contained on a concrete pad leading to an oil/water separator.

Mechanical services included distribution piping and connection and priming of generators. In addition to featuring monitoring and sensing equipment for environmental protection, the system was also designed to be simple and reliable in order to function continuously in high-alpine winter conditions without access to 3rd party services for up to 6 months.

As the Design-Build Contractor, WSN was responsible for the organization of delivery logistics and execution of all civil, mechanical, and electrical work, including commissioning and testing of systems and components. Major sub-contracts managed by WSN included:

- ULC tank shop fabrication
- Engineering Services
- Electrical and Controls Package

Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil work and demolition
- Structural steel installation
- Commissioning
- On-site Operation and Maintenance training of the client's personnel



Project Challenges and Successes

The CMH Cariboos Lodge is a high-alpine resort with limited and seasonal road access, presenting logistics challenges for crews and material deliveries.

The selected site for the new facility was the existing storage tank area. This required a temporary fueling system be built to support the resort for the summer months while the new facility was under construction. Extensive demolition and site prepare work was required to remove the existing tanks, foundations, and to lower the average grade in the area to accommodate the new, larger horizontal tanks. This required an extremely condensed construction schedule throughout the busy summer tourism season when facilities and accommodation are prioritized to guests.

Fuel Storage and Dispensing Upgrades

CMH Bugaboos, BC

- **Location:** Purcell Mountains, Regional District of East Kootenay, BC, Canada
- **Client/Owner:** Canadian Mountain Holidays (CMH)
- **Client Contact:** Patrick Moulday
- **Project Dates:** 2021
- **Project Value:** **\$1,148,000**
- **Project Type:** New Gasoline and Diesel Storage and Dispensing System

Contractor Role: Design-Build Contractor. WSN was responsible for engineering design, procurement, construction, and supply logistics to construct and commission this project in a remote part of British Columbia. Terms of the contract were on a Time and Materials basis.

Sub-Consultant: Morrow Engineering Ltd.

Background

The client operates several remote, high alpine resorts powered by electricity from diesel power generators. CMH Bugaboos Lodge required a completely new fuel storage and dispensing system to serve the diesel generators, along with a gasoline system to support mobile equipment. The remote location with surrounding Crown land prompted a state-of-the-art design to mitigate the potential for loss of product to the environment.

The Project

The generators operate 24 hours/day every day of the year and therefore required the new fuel system to be 100% reliable upon commissioning to replace the existing system. The new system consisted of two 40,000 litre double-walled aboveground diesel tanks supplying a small 909 litre day tank from which the three generators draw product.



The project also included a new 3,000 litre double-walled aboveground gasoline storage tank, and gas/diesel dispenser system to serve vehicles and other equipment. The storage tank sites were green field requiring extensive ground preparation to support the large tanks. The piping system was constructed of stainless steel for long life and minimum maintenance. The storage tank and dispenser systems are fully contained on a concrete pad leading to an oil/water separator.

Mechanical services included distribution piping and connection and priming of generators. In addition to featuring monitoring and sensing equipment for environmental protection, the system was also designed to be simple and reliable in order to function continuously in high-alpine winter conditions without access to 3rd party services for up to 6 months.

As the Design-Build Contractor, WSN was responsible for the organization of delivery logistics and execution of all civil, mechanical, and electrical work, including commissioning and testing of systems and components. Major sub-contracts managed by WSN included:

- ULC tank shop fabrication
- Engineering Services
- Electrical and Controls Package

Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil work and demolition
- Structural steel installation
- Commissioning
- On-site Operation and Maintenance training of the client's personnel



Project Challenges and Successes

The CMH Bugaboos Lodge is a high-alpine resort with limited and seasonal road access, presenting logistics challenges for crews and material deliveries.

With an average snowfall of over 5 metres each winter season in the Bugaboos, the facility design needed to consider snow loads, wind-formed cornices, and winter maintenance challenges. WSN worked closely with the client to understand the specific site conditions and construct shields and other reinforcements to provide protection for piping and electrical components.

Victoria Airport Tank Farm Upgrades

Victoria International Airport

- **Location:** Sidney, BC, Canada
- **Client/Owner:** World Fuel Services Canada ULC (WFS)
- **Client Contact:** Greg Lang
- **Project Dates:** 2019 - 2021
- **Project Value:** **\$3.5 Million**
- **Project Type:** Aviation Fuels Bulk Storage and Dispensing Facility

Contractor Role: Design-Build Construction Contract. WSN was responsible for all engineering design, permitting, procurement, construction, commissioning, and demolition services for the new facility on secure airport land at Victoria International Airport. Terms of the contract were on a fixed price lump sum basis.

Sub-Consultants: Argus Consulting, Inc.

Background

The aging tank farm and infrastructure at Victoria Airport required complete replacement within the leased property boundaries. A new fuel storage and dispensing facility was designed to fit within the lease footprint without decommissioning any of the existing operating fuel system. Following successful completion of the new facility, an extensive demolition scope was undertaken to remove the existing vertical tanks and dispensing skids.

The Project

The project consisted of two new aboveground double-walled Jet-A1 fuel tanks with a combined capacity of 320,000 litres, as well as a new 35,000 litre aboveground double-walled Avgas tank. The fuel tanks were connected to combined loading/unloading fuel skids providing a small footprint for performing both receiving and dispensing functions.



All tanks, dispensing equipment and piping connections were installed on a new concrete containment area leading to a new oil/water separator. The project included ancillary equipment for real-time remote monitoring of inventory and alarm conditions, point-of-sale equipment, tanker truck grounding and overfill protection, and electronic monitoring of the oil water separator and lift station pump system. A new electrical enclosure was installed to house the sub-panels, logic control systems, and monitoring and communication equipment.

Detailed commissioning and demolition plans were prepared for client and authority review due to the complex transition from the existing to new systems without interruption of aircraft fueling services.

As the Design-Build contractor, WSN was responsible for the entire project from permitting to commissioning. Major sub-contracts which WSN managed included:

- ULC tanks shop fabrication
- Independent third-party weld inspections
- Shop fabrication of loading/unloading skids
- Engineering Services
- Electrical and controls systems
- Asphalt paving

Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil work and demolition
- Structural steel installation



Project Challenges and Successes

The project, located on airport land under federal Transport Canada jurisdiction, was one of the first projects to be reviewed under the recently deployed *Impact Assessment Act*. As such, WSN was at the forefront of managing the information requirements, feedback, and potential mitigation on the project. WSN worked closely with airport representatives, the Impact Assessment Agency (IAA), and local First Nations representatives to ensure the project complied with the new regulations and stakeholder interests were considered.

With the new tank farm upgrades fully operational 24 hours/day and located immediately adjacent to a public restaurant, airside removal of the large existing structures required extra precautions and planning in consultation with stakeholders to ensure the demolition was undertaken incident-free.



Corporate Project History

RESA Fuel Line Relocation Project

North Runway End Safety Area (RESA) - YVR

- **Location:** Richmond, BC, Canada
- **Client/Owner:** Vancouver Airport Fuel Facilities Corporation (VAFFC)
- **Client Contact:** FSM Management Group Inc. (FSM)
- **Project Dates:** 2018 - 2019
- **Project Value:** **\$13.6 Million**
- **Project Type:** Twin Jet-Fuel Transmission Pipeline Relocation and Abandonment

Contractor Role: WSN provided General Contractor services for 100% of construction. Services were provided on a Time & Materials basis within budget and schedule.

Owner Consultants: Hatch, Golder Associates

Background

VAFFC is a consortium of commercial airlines which owns the jet fuel infrastructure serving airlines at the Vancouver International Airport (YVR). FSM provides administration and management services for VAFFC's day-to-day operations, including client representation and contract administration for all professional and construction services related to its infrastructure. The RESA Fuel Line Relocation Project redirected the twin 500mm diameter transmission pipelines around an extension of the North Runway being constructed to meet new airport safety requirements. The existing pipelines beneath this area could not remain in service and were required to be removed and/or abandoned in place following completion and commissioning of the new lines.

The project was awarded to WSN on a Time & Materials basis due to the complex phasing and integration necessary to work with other contractors and within active aircraft maneuvering areas, including an active runway. WSN's favourable relationship with both the Client and YVR, and decades of previous successful projects, allowed for the contract to be sole-sourced and negotiated directly with WSN.

The Project

The new RESA expansion required the installation of 550m of parallel 500mm diameter pipelines, including new service points, around the perimeter of the RESA footprint to provide for safety and access to the pipeline system after the new runway extension is completed. A complex phasing plan was developed to stage, excavate, install, and backfill numerous segments of pipeline between 50 and 100 meters in length. Careful planning was required to maintain clearance from active aircraft areas, ILS radar ceiling, and to take advantage of short closures of the North Runway. Major sub-contracts included Pilot Tube Guided Boring (PTGB) across an active taxiway, and Lightweight Cellular Concrete (LLC) filling of pipeline to be abandoned and left in place. A complex and



detailed Pipeline Transition Plan was developed in order to execute a precision commissioning plan maintaining uninterrupted fuel service to the airport during the transition to the new fuel lines.

As General Contractor, WSN provided the following third-party services, sub-contracts and procurement:

- All piping, pits, valves and materials
- Survey and locating services
- Bulk excavation, disposal and backfill
- Pipeline PTGB drilling
- Pipeline coatings
- Lightweight Cellular Concrete (LLC)

WSN also provided the following self-performed activities of the Contract:

- Civil and concrete work
- Piping shop fabrication
- Piping and Mechanical installation
- Pipeline flushing and commissioning
- Site Supervision and Coordination labour
- First Aid & Safety labour

Progress Photos



Project Challenges and Successes

The project had a large airside footprint requiring detailed work phasing and scheduling in coordination with the Airport's own development work. As the lifeline of fuel supplying the airport terminal area, the pipelines had to undergo rigorous flushing and testing prior to entering service.

A significant portion of the new pipeline was installed in the same location as the new 350mm diameter supply pipeline being built as part of the Vancouver Airport Fuel Delivery (VAFD) Project. WSN's strategic involvement in the VAFD project allowed the installation of these parallel pipeline segments to proceed efficiently and without incident.

Corporate Project History

YVR PIER D EXPANSION International Terminal Building - YVR

- **Location:** Richmond, BC, Canada
- **Client/Owner:** Vancouver Airport Fuel Facilities Corporation (VAFFC)
- **Client Contact:** FSM Management Group, Inc.
- **Project Dates:** 2019
- **Project Value:** **\$1,062,000**
- **Project Type:** 4 Gate Jet-Fuel Hydrant System Expansion – Laterals Only

Contractor Role: WSN provided General Contractor services for 100% of construction. Services were provided on a Time & Materials basis within budget and schedule.

Owner Consultants: Hatch, Golder Associates

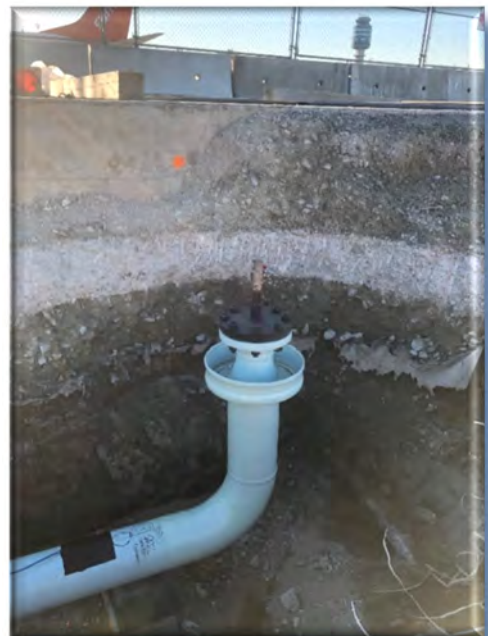
Background

VAFFC is a consortium of commercial airlines which owns the jet fuel infrastructure serving airlines at the Vancouver International Airport (YVR). FSM provides administration and management services for VAFFC's day-to-day operations, including client representation and contract administration for all professional and construction services related to its infrastructure. The Pier D Expansion Project extended hydrant fueling from an existing underground pipeline to hydrant positions on 4 new Code C, D and E aircraft stands constructed as part of YVR's Phase 2 of the International Terminal Expansion in 2019.

The project was awarded to WSN on a Time & Materials basis by VAFFC to allow coordination of resources being used on the RESA Pipeline Relocation Project occurring at the same time. Additionally, WSN's history and detailed knowledge of working requirements in proximity to aircraft terminal areas and other contractors made them a natural choice for this specific work.

The Project

The Pier D Expansion project occurred in two phases. The first was the South Side, consisting of 150mm fuel line lateral extensions to service 4 new hydrants and new low point drain and high point vent. The second phase was the North Side, consisting of additional lateral extensions to serve 6 new hydrants and one new low point drain. Each of the two phases required shutting down and draining a significant portion of the main fuel hydrant system serving the International Terminal. This entailed precise timing and specific hot work processes around active fuel systems to complete the mechanical installations. The remaining scope of work included pit placement, backfill, and handover to the apron contractor to complete concrete placement around each finished pit.



As General Contractor, WSN provided the following third-party services, sub-contracts and procurement:

- All piping, pits, valves and materials
- Survey and locating services
- Bulk excavation, disposal and backfill
- Pipeline coatings

WSN also provided the following self-performed activities of the Contract:

- Civil and concrete work
- Piping and shop fabrication
- Piping and Mechanical installation
- Pipeline flushing and commissioning
- Site Supervision and Coordination labour
- First Aid & Safety labour

Progress Photos



Project Challenges and Successes

This airside project was required to be completed in two phases, with the first phase being completed in the spring and the second in the fall to align with YVR's terminal and apron surfacing contracts. Each phase was a narrow window of opportunity to complete the shut-down, drain down, welding, civil work and flushing/commissioning while coordinating with other YVR contractors as part of the terminal development program. WSN's extensive experience with previous similar projects at YVR contributed to the successful completion of this project and meeting all schedule requirements.

Jet Fuel Storage Tank Farm Facility (TF-2)

Setting New Standards in Aviation Fuel Facilities

- Location: Richmond, BC, Canada
- Client/Owner: Vancouver Airport Fuel Facilities Corporation (VAFFC)
- Client Contact: Adrian Pollard, P.Eng - FSM Management Group Inc. (FSM)
- Project Dates: 2009 - 2012
- Project Value: \$40 Million
- Project Type: Bulk Storage Facility

Contractor Role: General Contractor. WSN was responsible for all construction under a Time and Materials contract subject to stipulated sub-contract tendering.

Owner Consultants: EBA Engineering, Argus Consulting, Golder Associates

Background

VAFFC is a consortium of commercial airlines which owns the jet fuel infrastructure serving airlines at the Vancouver International Airport (YVR). FSM provides administration and management services for VAFFC's day-to-day operations, including client representation and contract administration for all professional and construction services related to its infrastructure. The Jet Fuel Storage Tank Farm Facility (TF-2) project was required to serve growing demand at YVR and increase reserve capacity from 1-2 days to 5-7 days.

The project was a greenfield site situated in close proximity to an active runway. WSN was awarded a tendered lump sum contract for site preparation activities, and actively negotiated to complete the balance of the project on a Time and Materials basis following ground improvement work.

The Project

The project consisted of constructing a new 40 million litre tank farm with connection to the existing 12 million litre tank farm to allow the existing distribution pump system to draw from both facilities. The new farm consisted of four 10 million litre tanks each sized 100ft diameter x 48ft high. Innovative concrete foundations were introduced into the design to address seismic performance and differential settlement. The project also incorporated modern fire protection and fuel level monitoring systems, as well as low-maintenance piping supports and dyke coverings.

As General Contractor, WSN was responsible for the entire project, delivering on time and on budget. Major sub-contracts which WSN managed included:

- Bulk materials supply
- Tank base rebar supply and installation
- Tank erection
- Tank and piping internal/external coatings
- Tank floating roofs supply and installation
- Containment liners supply & installation
- Electrical systems

WSN also provided the following services under the self-performed provisions of the contract:

- Civil and concrete work
- Piping shop fabrication
- Piping and Mechanical installation
- Structural steel installation
- Storage tank hydrostatic testing
- Site Supervision and Coordination Labour
- First Aid and Safety labour
- Value engineering services

Progress Photos



*Tank Foundation
Formwork and Concrete*



Piping Systems



Completed Facility

Project Challenges and Successes

The TF-2 site, although considered greenfield, had been an area of differential loading due to periodic use for fill material storage. Geotechnical analysis revealed significant long-term challenges as a result of the use history in such a sensitive seismic zone. WSN was responsible for the careful removal and replacement of high quality backfill materials and helped develop the innovative tank foundations designed to address both long-term and differential settlement. Prior to tank construction, large metal mesh screens were constructed immediately adjacent to the tank surfaces facing the runway to mitigate effects on the airport's ILS radar system. Working around these structures required careful coordination by WSN's supervisory staff.

Facility Equipment Pre-Purchase Contract

An Integration and Logistics Triumph

- Location: Old Crow, Yukon Territory, Canada
- Client/Owner: Vuntut Gwitchin Government (VGFN)
- Client Contact: Randy Shewen (867-333-0669)
- Project Dates: 2013 - 2014
- Project Value: \$2.5 Million
- Project Type: Bulk Storage Facility Equipment Supply

Contractor Role: Design-Build Equipment Supply Contract. WSN was responsible for all engineering design, procurement, integration, and shipping logistics to deliver fuel facility components to a fly-in remote community. A Lump Sum contract was awarded from a competitive tender.

Sub-Consultants: Argus Consulting

Background

VGFN is a community of 167 members located in northern Yukon Territory in an area accessible only by aircraft. The community required a new fuel depot to modernize and consolidate the fuel needs of the community, from home heating oil to aviation fuel for their airport. This project resulted from a supply tender for the main components of the new fuel depot, which required the equipment to be modular and transported via ice road to this community located above the Arctic Circle. Following this contract, WSN was directly awarded the construction contract to perform the installation and commissioning of the supplied equipment.

The Project

The project consisted of supplying modular enclosures and tanks to support the storage and dispensing of heating oil, gasoline, diesel, avgas and jet A1 aviation fuel to support the communities fuel needs. The equipment included office enclosures, 5 double-walled ULC storage tanks, 5 separate unloading systems, 5 separate dispensing systems, and a bulk loading system. Fuel loading and dispensing skid assemblies were installed inside heated and insulated enclosures, complete with electrical, controls, and piping connections to facilitate installation in the field.



All fuel process equipment was commissioned and wet tested in our shop facilities prior to shipping. The voyage to Old Crow included transport on a temporary ice road imposing strict deadlines for completion and readying for shipment from the Lower Mainland.

As the Design-Build contractor, WSN was responsible for the entire project, delivering on time and on budget. Major sub-contracts which WSN managed included:

- ULC tanks shop fabrication
- Heated enclosure shop fabrication
- Structural steel skid frames shop fabrication
- Independent third-party weld inspection
- Electrical and Controls supply and installation
- Shop applied coatings for skid frames and tanks

Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical skid assembly
- Structure steel installation
- Equipment integration to all enclosures
- Complete commissioning and systems wet testing in our shop facilities

Equipment Photos



Project Challenges and Successes

A total of 8 truckloads of enclosures and tank systems were delivered from Vancouver to Old Crow. The efficient layout, robust construction, and detailed transportation plans made for a successful and incident-free project delivery.

Community and Airport Fuel Facility Supporting Canada's Remote Northern Communities

- Location: Old Crow, Yukon Territory, Canada
- Client/Owner: Vuntut Gwitchin Government (VGFN)
- Client Contact: Randy Shewen (867-333-0669)
- Project Dates: 2014 - 2015
- Project Value: \$4.3 Million
- Project Type: Bulk Storage Facility

Contractor Role: Design-Build Construction Contract. WSN was responsible for all engineering design, procurement, construction and supply logistics to build this project at a fly-in remote community. Terms of the contract were on a Time and Materials basis.

Sub-Consultants: Argus Consulting

Background

VGFN is a community of 167 members located in northern Yukon Territory in an area accessible only by aircraft. The community required a new fuel depot to modernize and consolidate the fuel needs of the community, from home heating oil to aviation fuel for their airport. Following successful completion of the Equipment Supply Contract (completed by WSN in 2013 - 2014), VGFN required Design-Build services to complete the difficult and complex site installation, integration and commissioning of the pre-purchased equipment.

The Project

The project consisted of completing the required site preparation, liner installation and civil work, placement of all new enclosures and fuel storage tanks, all piping and mechanical work, electrical systems and controls, systems testing and wet commissioning. Training in the Operation and Maintenance of the new facility was also provided to the client's personnel.

As the Design-Build contractor, WSN was responsible for the entire project, delivering on time and on budget. Major sub-contracts which WSN managed included:

- ULC tanks shop fabrication
- Independent third-party weld inspections
- Shop fabrication of MCC/office enclosure
- Electrical and controls systems
- Strategic airlift delivery requirements



Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil work and liner installation
- Structural steel installation
- On-site Operation and Maintenance training of the client's personnel

This fast-tracked project involved several unique challenges that were critical to the success of the project

- Transportation logistics - ALL equipment and piping materials were required to be designed and fabricated to be transported via C-130 Hercules aircraft (8 aircraft loads)
- Perma-frost ground conditions
- Restricted working area on site
- Limited construction season
- Very limited infrastructure and services available within the community
- Requirement to provide Operation and Maintenance training to the client

Site Photos



Piping Systems to Tanks and Enclosures

Project Challenges and Successes

The project presented a unique combination of challenges due to its extremely remote location above the Arctic Circle. Substantial preparation was needed to ensure the site work could be completed with the resources, materials, tools, and equipment airlifted to site. There was no room for error. Considering this facility is both a commercial supply point (serviced by aircraft) and a retail dispensing facility for the community, success in delivering the project within the short construction season was paramount.

The strategic airlift delivery requirements and perma-frost ground conditions created a unique and challenging undertaking. With WSN's attention to detail and excellent planning and coordination capabilities, the project was designed, built, and commissioned on time and within the projected budget.

Corporate Project History

Sewell's Marina West Vancouver, BC

- **Location:** West Vancouver, BC, Canada
- **Client/Owner:** Sewell's Landing / HB Nelson LLP
- **Client Contact:** Eric Sewell
- **Project Dates:** 2018-2019
- **Project Value:** **\$232,633**
- **Project Type:** Marine Fuel Storage and Dispensing System

Contractor Role: General Contractor. WSN was responsible for major equipment procurement and civil/mechanical construction services. Terms of the contract were on a Time and Materials basis.

Owner's Engineer: Parsons Corporation

Background

The client required major upgrades to fuel storage systems, transfer and dispensing systems at the dock facilities, and new drainage systems associated with fuel dispensing capability at its marina facilities in West Vancouver, British Columbia. The upgrades occurred over several years, commencing in mid-2018 with completion in late 2019.

The Project

The early phase of the project consisted of new Oil/Water Separator (OWS) and fuel storage tank supply and installation. The new double-walled fiberglass fuel tank was installed, anchored, backfilled and tested to confirm tank integrity and readiness for service. The new OWS was a coalescing type concrete vault complete with valving, discharge piping and sheet-pile wall penetration to the marine environment.

Mechanical services included extensive new double-walled piping along gangways and floating dock sections to serve new dispensers for gasoline and diesel. All supplied materials and workmanship were of the highest quality to endure conditions of the harsh and corrosive marine environment.

As the General Contractor, WSN was responsible for organizing marine delivery logistics and execution of this multi-faceted project over a six-month period. The project was delivered on time and within budget and included the following services:

- Equipment procurement
- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil and concrete work
- Commissioning services



Site Photos



Project Challenges and Successes

The confined work area between existing buildings, the marine environment and other infrastructure presented some challenges requiring careful planning, extra safety measures, and specific site training for all workers and subcontractors. WSN's extensive experience with projects of this nature facilitated a successful completion without incident.

Corporate Project History

Fuel Tank Replacement

Masset Airport, BC

- **Location:** Masset, BC, Canada
- **Client/Owner:** Village of Masset, Haida Gwaii
- **Client Contact:** Trevor Jarvis
- **Project Dates:** 2019-2020
- **Project Value:** **\$861,000**
- **Project Type:** New Jet Fuel Storage and Dispensing System

Contractor Role: Design-Build Contractor. WSN was responsible for engineering design, procurement, construction and supply logistics to construct and commission this project in a remote part of British Columbia. Terms of the contract were on a Time and Materials basis.

Sub-Consultant: Morrow Engineering Ltd.

Background

The client required the removal and replacement of an underground Jet-A1 aviation fuel tank to meet new regulatory requirements and to upgrade the facility to accommodate expanding flight service in the region. To maintain on-going Heli-Jet flight service, the new system was required to be constructed and in service prior to decommissioning and removal of the existing tank system and infrastructure.

The Project

The project included a new 30,000 litre double-walled aboveground storage tank with associated equipment and double-walled underground piping to serve a new fueling cabinet for helicopter refueling. The tank and pump equipment were placed on a new concrete containment pad protected by a new oil-water separator. Approximately 90 metres of underground piping including two transition sumps were installed to a new fueling cabinet located adjacent to two helicopter landing pads providing direct-to-aircraft fueling from the system.



The fueling cabinet was designed and constructed in-house using high quality aluminum and stainless-steel materials for durability. The tank, fueling cabinet, and transition sumps are equipped with electronic leak detection to monitor the system 24 hours/day.

Mechanical services included new double-walled underground piping to serve the new jet fuel cabinet dispenser, and aboveground stainless steel fuel offloading and pump discharge piping. All supplied materials and workmanship were of the highest quality to endure conditions of the harsh northwestern BC climate.

As the Design-Build Contractor, WSN was responsible for organizing marine delivery logistics and execution of all civil, mechanical and electrical work, including commissioning and testing of systems and components. Major sub-contracts managed by WSN included:

- ULC tank shop fabrication
- Marine delivery services
- Engineering services

Self-performed work disciplines on the project included:

- Piping shop fabrication (stainless steel)
- Piping and Mechanical installation
- Site civil work and demolition
- Structural steel installation
- Commissioning
- On-site Operation and Maintenance training of the client's personnel



Project Challenges and Successes

This project was undertaken during the early period of the Covid-19 pandemic. The islands of Haida Gwaii are of unique cultural significance with sensitivities to outside influences. WSN executed the project under strict protocols and reporting procedures to maintain a healthy working environment and to ensure the safety of indigenous and local residents.

Other logistics challenges included airside work and dedicated barge transport of equipment and materials to a remote location.

SECTION - 2.0

Sub-Section 2.9

Company References

Section - 2.9

Company References

WSN Western Construction (WSN) has included a list of (5) client references as requested. Please also refer to Section 2.8 of this proposal for details on the various related project histories that correspond to the listed client references.

CMH Heli Skiing Summer Adventures

- Contact Name: Patrick Moulday (Fuel Systems Manager)
- Contact Phone: (403) 869-6772
- Project Description: Cariboo Lodge Diesel Fuel System Upgrades (Design/Build)
- Project Description: Bugaboo Lodge Diesel Fuel System Upgrades (Design/Build)

World Fuel Services Canada ULC

- Contact Name: Daniel Walsh (Director - Americas)
- Contact Phone: (786) 479-0539
- Project Description: Victoria International Airport Tank Farm Upgrades (Design/Build)

FSM Management Group Inc.

- Contact Name: Adrian Pollard (Director of Engineering)
- Contact Phone: (604) 314-6194
- Project Description: Vancouver International Airport Tank Farm No. TF2 (General Contractor)

Vuntut Gwitchin First Nation (VGFN)

- Contact Name: Randy Shewen (Project Manager - Building Industry Consultants Inc.)
- Contact Phone: (867) 333-0669
- Project Description: Old Crow Community Fuel Tank Farm Facility (Design/Build)

Sewell's Ltd. (Sewell's Marina)

- Contact Name: Eric Sewell (General Manager)
- Contact Phone: (604) 921-3474
- Project Description: Marina Gasoline and Diesel Fuel System Upgrades and Gas Dock (Design/Build)

SECTION - 2.0

Sub-Section 2.10

Company Reference Letters

Pat Hunt

From: Patrick Moulday (CMH) <pmoulday@cmhheli.com>
Sent: Tuesday, September 15, 2020 1:58 PM
To: Pat Hunt; Brent Easter
Cc: Harry Kitzmann
Subject: CA Phase 1 Project Completion

Hi Pat and Brent,

I just wanted to express my appreciation for the quality work that WSN performed replacing the jet fuel day tank at CMH Cariboos Lodge from Aug 10 – 22nd. Jim, Josh, Steph, Elder and Clay were courteous, conscientious, and professional in all aspects of their job and worked hard to complete this project ahead of schedule and under budget. I should also mention that several of the Cariboos Lodge staff let me know how professional they also found the WSN team, while recognizing that they fit in exceptionally well with CMH's unique culture (ie: Josh's great sense of humour, and seemingly endless appetite was of genuine delight to our hospitality staff).

Jim and the team really impressed me and I would encourage you to assign any of them to future CMH projects.

Best,

Patrick

Patrick Moulday
Fuel Systems Manager

M: 250-919-2140
cmhheli.com | cmhsummer.com



World Fuel Services Canada, ULC
A subsidiary of World Fuel Services

June 5, 2021

To whom it may concern:

During my entire tenure at this company, I have had the good fortune to work with WSN Western Construction Company on a myriad of projects. During that time, they have provided many aspects of engineering design, construction, and decommissioning for us. Their ability to solve complex problems with a commonsense solution has been immensely helpful!! They have been very honorable in all aspects of their dealings with us and have worked within all financial constraints and timelines.

I would highly recommend them for any work in which they may have interest.

Sincerely,

A handwritten signature in black ink that reads 'Daniel A. Walsh'.

Daniel A. Walsh
Director Operations – Americas
Global Physical Operations (Aviation)



VUNTUT GWITCHIN GOVERNMENT

Government of Vuntut Gwitchin First Nation

P.O. Box 94,
Old Crow, Yukon
Y0B 1N0

Web: www.vgfn.ca

2015 05 25

Letter of Reference

W S Nicholls Western Construction Ltd.

As the Project Manager for the Vuntut Gwitchin Government Fuel Depot project, I am pleased to relate my experience with W S Nicholls (WSN) as the prime contractor for the manufacture and supply of the major equipment components, and subsequently as the design-build contractor to perform the on-site construction and commissioning of the facility.

As background information, it is significant to understand the unique nature of this project and the many challenges that are inherent in the success of the Old Crow fuel depot. Geographically, Old Crow is a remote Yukon community, located north of the Arctic Circle, and is over 250 kilometres from the nearest roadway. The community is located in the flood plain of the Porcupine River, and is underlain by permafrost soils. Without expanding on the implications of these facts, suffice to say each aspect imposes significant implications on the delivery, design and construction of critical infrastructure such as a fuel storage facility.

WSN was contracted, through an invitational Request for Proposal, to design, manufacture and deliver the major fuel handling/processing equipment in modular skid-mounted enclosures, and the fuel storage tanks, to meet a critical schedule that was dictated by the operation of a winter road to Old Crow in March 2014. **WSN delivered on time - on the delivery date stated the agreement**, and critically just in time to be included in the winter road freight haul. Failure would have resulted in a major airlift at significant cost and with major logistical challenges.

All dealings with the WSN personnel have been very satisfactory with no conflicts, disputes, or the slightest disagreement or disagreeable experience. The level of service and customer satisfaction is excellent. WSN is completely goal oriented, with the goal always being to deliver the project as promised and to the highest quality.

VUNTUT GWITCHIN GOVERNMENT

Government of Vuntut Gwitchin First Nation

As the site construction phase of the project is being performed presently, our experience continues to be very positive with the focus being on delivering the project on schedule with the high level of quality control and quality assurance that was demonstrated in the procurement phase. We anticipate a successful completion and commissioning of this very critical infrastructure for the Vuntut Gwitchin people in Old Crow, Yukon.

I remain available should a personal conversation with interested parties be desired.

Sincerely,



Randy Shewen
Building Industry Consultants Inc.
shewen@northwestel.net
867 333-0669



Morrow Engineering Ltd.

October 19, 2018

**Subject: Letter of Reference
W.S. Nicholls Western Construction Ltd.**

To Whom It May Concern,

Morrow Engineering Ltd. can without question recommend W.S. Nicholls Western Construction Ltd. based on their exemplarily service and expertise as consistently demonstrated on projects which both companies have been involved

All dealings with W.S. Nicholls' personnel have been professional and match with our team concept philosophy. The level of service and customer satisfaction is excellent and in keeping with Morrow Engineering Ltd.'s business approach. We have found WSN to be goal oriented, with the goal being delivering projects as promised, of the highest quality and workmanship.

We see the relationship between our two companies continue to grow and look forward to future working opportunities.

The following provides a summary one of the higher profile projects where W.S. Nicholls Western Construction Ltd. has provided their services and expertise:

Sewell's Landing - Horseshoe Bay West Vancouver, B.C.

This project has been broken down into 3 Phases by the Owner and includes design by Morrow Engineering Ltd. and installation by W.S. Nicholls. Phase 1, which is now complete, entailed installation of a 65,000 litre split compartment fiberglass underground storage tank, as well as all related piping, valves, transition and containment sumps for Marine Gas and Diesel supplying the marina fuel float dispensing system.

W.S. Nicholls played a large part in overcoming some interesting challenges posed by a very environmentally sensitive location, engineering considerations and the wishes for esthetics requested by the landscaping design group.

Future Phases 2 and 3 are currently being reviewed for design, Morrow Engineering Ltd. looks forward to once again working with W.S. Nicholls for the equipment supply and installation of these phases.

In conclusion, W.S. Nicholls Western Construction Ltd. sets the bar to a very high standard for others within the industry who are trying to attain the same standard. We would highly recommend them to clients who require their provided services and disciplines. We look forward to working with them again in the future.

Sincerely,

Mark Vaandering, P.Eng.
President – Morrow Engineering Ltd.

December 5, 2018

**RE: Letter of Reference
WS Nicholls Western Construction LTD.**

To Whom It May Concern:

I have had the distinct pleasure of working with WS Nicholls Western Construction LTD (WSN) on a number of projects over the last 12 years. They are truly in the upper echelon of contractors and one I compare all others too. I have not worked with a better, more professional contractor in my 26 years in the industry. This includes projects all across the United States, Canada, and South America.

The following provides a summary of the projects that we have worked together with WSN, both as the traditional design/bid/build and as a design/build partner.

Vancouver Airport Fuel Delivery Project, British Columbia

Argus Consulting was the lead design engineer for Vancouver Airport Fuel Facilities Corporation for the design of a \$250M CDN Marine Receipt, Fuel Storage, and Pipeline Facilities to serve as the new supply of Jet-A to Vancouver International Airport. WSN was involved during the design process and provided value engineering and constructability comments throughout the design process. WSN performed all ground improvement work and began the fuel storage tank foundation construction before the project was put on hold due to funding and regulatory delays. Their involvement in the design process helped provide the owner with a cost effective solution.

Old Crow Fuel Storage Facility; Pump Skid, Tank and Enclosure Fabrication, Yukon

WSN recently completed the construction of the fuel pump and filtration skids, associated electrical, fuel storage tanks, and enclosures for the community of Old Crow. Argus served as the engineer of record for the design of all the equipment which was procured for a later construction contract. The procurement schedule was expedited to allow for delivery of all the equipment on the 240km long Winter Road which was open for a two week period in March 2014. WSN fabricated five separate 200 gpm pump and filter skids for Jet-A1, Avgas, Mogas, ULSD, and Heating Oil. The skids were housed in heated enclosures. New tanks for each of the five products were also provided. WSN met an impossible fabrication and delivery schedule. The workmanship was impeccable.

YVR International Airport Pier C Hydrant System, British Columbia

Our first project with WSN was completed as a traditional design/bid/build project. This project included the construction of the Pier C Hydrant System at YVR. This new terminal was constructed

to support the increased domestic traffic associated with the 2010 Winter Olympics. This project included the construction of 10 new gates with hydrant fueling and Emergency Fuel Shut Off (EFSO) system as well as removal of existing piping and installation of a new fuel supply main and isolation valve chambers. WSN provided all construction of the underground piping, fuel hydrant pits, isolation valve chambers, electrical duct bank with pull boxes, and the EFSO system.

YVR - Tank Farm TF-2, Vancouver International Airport, British Columbia

WSN recently completed the construction of a new fuel farm at YVR. This fuel farm was constructed to provide additional fuel storage capacity at the airport. Argus was responsible for specialized fueling design for a new fuel storage facility which consists of four 10,000,000 liter API 650 Jet-A storage tanks. A three position truck unloading/loading rack was designed to allow for the unloading of transport delivery trucks and loading of refueler vehicles. WSN served as the prime contractor for the project. The Owner is completely satisfied with the project and has identified this system as the model for all other future tank farms across Canada.

YEG - Edmonton International Airport, Alberta

Argus Consulting prepared the design for the expansion of the fuel hydrant system for the 23 new gates associated with the Terminal Express and Terminal Expansion projects. WSN constructed all underground piping, hydrant fuel pits, isolation valves, and EFSO system. They also completed the removal of a portion of the existing hydrant system to allow for construction of the new terminal building.

YYC - Deerfoot North Cargo Apron, Calgary International Airport, Alberta

The project entailed the construction of a remote cargo apron and hydrant fueling system on the west side of the airport. This included in the installation of 1200 m horizontal directional drill under the main north south runway and 4 taxiways. WSN served as the prime contractor for this project and installed the hydrant fuel system piping, hydrant pits, wireless EFSO system and electrical ductbank. The directional drilling activities were subcontracted to a specialized directional drilling company.

YYC - Gasbar, Calgary International Airport, Alberta

Argus Consulting provided the design services for modifications to the existing Diesel and Unleaded Gasoline fueling systems. This project included piping modifications and installation of new self priming centrifugal unloading pumps, installation of new double wall flexible underground piping, leak detection sumps, and new dispensers. WSN served as the contractor for this project.

Vancouver Harbour Seaplane Base, British Columbia

Argus Consulting teamed with WSN on a design/build project for the installation of a new three position Jet-A fuel dispensing system for the new Harbour Air Seaplane Base in downtown Vancouver. The project included the Jet-A piping and controls system along with a new fire water and domestic water system.

Victoria Harbour Seaplane Base, British Columbia

Argus Consulting again teamed with WSN for the installation of a new underground piping and leak detection system for the Jet-A fueling system serving the seaplane dock. This project included installation of a double wall flexible underground piping system, containment sumps, and leak detection system. This project was completed as a design build project.

YVR South Terminal Seaplane Base, British Columbia

Argus Consulting again teamed with WSN for the installation of a new underground piping and leak detection system for the Jet-A and Avgas fueling system serving the seaplane dock. This project included the installation of a double wall flexible underground piping system, containment sumps, leak detection system, and new above ground stainless steel piping. This project is being completed as a design build project and is currently preparing for construction activities.

Whether we are working with WSN in a traditional design/bid/build process or are teaming with them on a design/build project, I know that the project will be completed to the Owner's satisfaction and will exceed the Owner's expectations. Argus and WSN have developed an excellent working relationship through the execution of the projects presented above. This relationship is built upon the trust that has developed due to the commitment to quality and service that WSN provides. This high level of service is rare in this industry.

WSN has always provided the most complete quality control documentation that I have seen on any project. This allows for full traceability of all components and piping provided on the projects to ensure the materials provided meet the project specifications and contract documents. The extra care taken provides an unquestionable amount of trust on a project.

With regards to safety, WSN executes their safety plan and puts the employees, Owners, and engineers safety ahead of cost. There has never been an instance where I have seen WSN want to cut corners on quality or safety. Their actions represent the utmost integrity. Along with safety, protection of the environment is paramount for WSN. They provide the necessary equipment and resources to prevent the possibility of a release to the environment. This is a sign of experienced individuals who take the time to plan for potential pitfalls during construction.

WSN has always provided delivered the projects in a timely manner. They are extremely experienced in preparing realistic construction schedules and always look for ways to remain off the critical path. Their attention to detail in the planning stages prevents construction delays while waiting on material deliveries.

We look forward to continuing our successful working relationship with WSN and always look for opportunities in which we can continue to serve one another. I can certainly attest to their quality, integrity, professionalism, and client satisfaction and would recommend them without reservations for any project you may have.

Should you have any questions or require additional information, please feel free to contact me at 816-874-8238.

Sincerely,

A handwritten signature in black ink, appearing to read 'Dan Frank', with a stylized flourish at the end.

Dan Frank, P.E., P.Eng.
Vice President of Engineering



A TETRA TECH COMPANY

April 3, 2013

Associated Engineering
Suite 300 – 4940 Canada Way
Burnaby, BC
V5G 4M5

Attention: Lewis Macrae

Subject: Reference Letter: **W.S. Nicholls Western Construction Ltd**
Project Completion: **Jet Fuel Tank Farm TF-02, Vancouver International Airport**

This letter of reference is provided for W.S. Nicholls Western Construction Ltd. (WSN) with respect to completion of the new Vancouver International Airport Jet Fuel Tank Farm No. 2 (YVR TF-02) project in its entirety as the Prime Contractor. EBA, A Tetra Tech Company was the prime consultant providing project management, civil design and site inspections, coordinating mechanical and electrical subconsultant design activities, and working closely with WSN on all aspects of design, construction and commissioning.

This Jet Fuel Tank Farm is state of the art in all respects and is the flag ship Jet Fuel Tank Farm installation in North America. YVR TF-02 includes 4 -100' diameter Jet Fuel tanks and all required infrastructure to safely and effectively operate this facility in an unmanned condition. Jet Fuel Storage capacity for this facility is over 40,000,000 litres. WSN successfully completed civil, structural, concrete/formwork, mechanical, piping, safety and first aid scopes of work with their own forces. Where WSN did subcontract work on the project such as tank construction, coatings and electrical installation; WSN managed their subcontractors successfully to the same high standards that they held for the work completed by their own forces.

The main project quantities included:

1. Concrete = 3676 m³
2. Rebar = 1,023,636 lbs
3. Excavation = 105,000 m³
4. Backfill and compaction of permanent imported engineered fill = 135,000 tonnes
5. Jet Fuel Tanks (4) each – 10,000,000 litre nominal capacity each; tanks 100' diameter by 48' high nominal; complete with full contact floating roofs with double wiper seals and integral foam dams; concrete raft slabs with ring beam foundations to all tanks
6. Project Value = \$40,000,000.00+

YVR TF-02 was designed as post disaster critical infrastructure for the entire Lower Mainland and is integral to any operations at YVR. WSN was therefore responsible for all aspects of construction to the highest standards in order to meet the stringent QA and QC requirements of Authorities having Jurisdiction.

EBA Engineering Consultants Ltd. operating as EBA, A Tetra Tech Company
PO Box 640, Unit 3, 5556 Manotick Main Street
Ottawa, ON K4M 1A6 CANADA
p. 613.692.1944 f. 613.692.3488

YVR TF-02 was also constructed on an environmentally sensitive area of the airport property. As the Prime Contractor, WSN was required to develop, implement and follow a detailed Environmental Protection Plan. WSN's environmental performance was closely and continually monitored/audited throughout the duration of the project (3 years) by ourselves and various stakeholders. WSN met the requirements of the project E.P.P. to ensure that the environmentally sensitive area of the Vancouver International Airport was protected in all respects.

As the Prime Contractor on this project, WSN successfully fulfilled their safety and security responsibilities throughout the duration of this project. Due to the public location and high profile nature of this project safety and security were of great concern to the Authorities having Jurisdiction. WSN satisfied all safety/security requirements without question.

YVR TF-02 was successfully completed on a "fast-track" hybrid Design/Build basis. WSN worked as an integral part of our project team of designers, consultants, sub-consultants, owner's representatives, facility operators and Authorities having Jurisdiction to meet the stringent project requirements to the satisfaction of all stakeholders. From concept through to completion and commissioning, WSN could always be counted on to promptly provide leadership in constructability and cost benefit analysis in support of our ongoing value engineering initiatives.

As the senior engineer responsible to the Owner's representative and YVR stakeholders, I was required to sign-off on the completed project for YVR's Facility Permit. I was confident to sign-off on these documents due to the open relationship we had with WSN over the course of the project, the professionalism of their team, and the high level of care taken during construction.

EBA designs and manages airport infrastructure construction activities at major Canadian international airports where a high level of commitment to design and construction solutions are important to our valued clients. EBA has successfully worked together with WSN on several airfield fuel hydrant system projects at the Calgary, Edmonton and Vancouver International Airports. Through their commitment to quality and service, WSN has built a long term relationship with EBA where we will continue to work together on client focused work and we would not hesitate to recommend WSN any project that they wish to undertake.

If you have any questions or comments, please contact the undersigned

Sincerely,
EBA, A Tetra Tech Company



Richard R. Kohler, P.Eng.
Vice President, Airports
Phone: 613.692.1944 x222
rkohler@eba.ca

cc: Brent Easter, WSN



Associated Engineering
Suite 300 – 4940 Canada Way
Burnaby, BC V5G 4M5

April 4, 2013

**Attention: Lewis Macrae, P. Eng.
Civil/Hyrotechnical Engineer**

**Re: W.S. Nicholls Western Construction Ltd.
Letter of Reference**

Dear Sir:

Hatch Mott MacDonald (HMM) has extensive project experience in the handling and distribution of petroleum products having supplied consulting services related to design, inspection and construction management of both new and existing storage facilities/distribution systems throughout Canada. This experience includes; design, drawing preparation, material specifications and site supervision for numerous airport hydrant systems across Canada, marine and truck loading/off-loading facilities including bulk storage tanks and piping systems for gasoline, diesel, stove, jet fuel and bunker 'C' product. We have specialist capabilities in aviation fuelling systems planning, design and installation gained through 30 years of airport project work including hydrant systems and /or new tank farms at all major Canadian Airports.

To this end, W.S. Nicholls Western Construction Ltd. (WSN) has successfully constructed and commissioned several large airport jet fuel distribution and infrastructure projects in Western Canada as the Prime/General Contractor for which HMM is the engineer of record. In this capacity WSN has worked as an integral part of our project team to deliver superior client services and project results. The following is a list of recent HMM projects for which WSN was the General/Prime Contractor:

• Calgary Airport, Jet Fuel Header Re-alignment 2011:	Approximate Value \$3,000,000
• Calgary Airport, Pier A Jet Fuel Hydrant System 2010:	Approximate Value \$3,200,000
• Calgary Airport Jet Fuel Tank Farm Expansion 2009:	Approximate Value \$3,200,000
• Calgary Airport, Airside Fuelling Gas/Diesel Bar 2009:	Approximate Value \$1,000,000
• Winnipeg Airport Jet Fuel Tank Farm Upgrades 2010:	Approximate Value \$ 600,000
• Edmonton Airport Jet Fuel Tank Farm Piping 2009:	Approximate Value \$1,100,000
• Edmonton Airport Jet Fuel Tank Farm Expansion 2009:	Approximate Value \$2,100,000
• Edmonton Airport Jet Fuel Tank Farm Expansion 2008:	Approximate Value \$1,600,000

As the Prime/General Contractor on these airport projects WSN has successfully completed the following tasks to the satisfaction of HMM, client, owner and facilities operations:

- Author and/or follow detailed Environmental Protection Plans (EPP) according to the requirements of the local Authorities Having Jurisdiction (AHJ) ensuring that environmentally sensitive areas are protected.
- Development and/or adherence to complex project schedules and sub-trades coordination at busy international airports within security sensitive areas.
- Successfully fulfilled all safety and Airside Operations security responsibilities throughout project duration.

WSN's work, on the above referenced projects, involves facilities and infrastructure critical to the successful operation of these airports. As such quality of the work is of utmost importance and WSN provides our projects with a high level of QA/QC significantly reducing potential risk for all parties involved (i.e., Airport Authorities, Airlines, Fuel Facility Owners/Operators). Further to this WSN has always supported our value engineering initiatives to give our clients the best value for their project budget.

In conclusion, due to WSN's exceptional quality of work, commitment to client satisfaction and uniquely qualified workforce HMM has developed a long term relationship with this contractor in which we anticipate continued success on future aviation fuelling related projects. HMM would recommend WSN as an experienced contractor/builder for any petroleum storage and distribution related projects that Associated Engineering may wish to undertake. They are fully qualified and have proven capable to successfully work in the demanding Aviation Fuel Industry. I trust this suits your present needs on this matter please don't hesitate to contact me should you require anything further.

Yours truly,



Patrick Cashin, P. Eng.
HMM Project Engineer



Stantec Consulting Ltd.
500-4730 Kingsway, Burnaby BC V5H 0C6

October 31, 2018
File: N/A

Attention: Mr. Harry Kitzmann
W.S. Nicholls Western Construction
851 Derwent Way
Delta BC
V3M 5R4
Canada

Dear Harry Kitzmann,

Reference: Letter of Reference, W.S. Nicholls Western Construction Ltd.

Stantec Consulting Ltd. (Stantec) can without question recommend W.S. Nicholls Western Construction Ltd. (WSN) based on their exemplary service and expertise as consistently demonstrated on projects that both companies have been involved.

All dealing with WSN's personnel have been professional and align well with Stantec's policies and procedures. The level of service and customer satisfaction has been excellent.

We have found WSN to be professional in every aspect of our interaction especially when it comes to delivering projects as promised, of the highest quality and workmanship.

The following provides a summary of one of the higher profile projects where WSN was retained by Stantec to provide their fuel system services and expertise.

YVR QTA Rental Car Fuel System Upgrades

This project design was completed by Stantec and the installation of equipment by WSN and included upgrades to fuel system for 5 separate clients all located in a common location at the Vancouver International Airport.

The scope of work was dictated in part by the regulations mandated by Environment and Climate Change Canada specific to fuel storage on Federal works and undertakings. WSN played a large part in overcoming difficult challenges posed by environmentally sensitive locations, engineering considerations and strict adherence to safety and permit requirements as set out by the Vancouver Airport Authority.

The project involved several disciplines including:

- Shop prefabrication and non-destructive testing of stainless steel pipe sections;
- Electrical;
- Civil;
- On-site pipe fitting;
- Ground locates;
- Permitting;

October 31, 2018
Mr. Harry Kitzmann
Page 2 of 2

Reference: Letter of Reference, W.S. Nicholls Western Construction Ltd.

- Safety

In conclusion, WSN proved to be a very valuable contractor and was successful in the delivery of the above-referenced project. Stantec would highly recommend them to clients who require their provided services and disciplines. We look forward to working with them in the future.

Regards,

Stantec Consulting Ltd.

Tyler Joyce C.Tech.
Associate, Environmental Services

Phone: 778-328-1041
Fax: 604-436-3752
Tyler.Joyce@Stantec.com

jt c:\users\tjoyce\documents\let_ws_nicholls_reference_10302018.docx

December 3, 2014

WS Nichols Western Construction Ltd
851 Derwent Way
Delta, BC,
604-521-2004

Dear .

After three years of heavy construction, the successful opening of the new Runway 17L-35R was achieved on June 28, 2014, marking a significant milestone in the history of Calgary International Airport. This new state-of-the-art infrastructure has already begun to help us better serve the city and region. Since the outset of the operation, we have seen improvements in our ability to serve the community with new capacity while maintaining safe and efficient air service.

We appreciate the role you have fulfilled as part of our team and the contribution you have personally made to our ultimate goal. Despite the trials and tribulations that come with large construction operations, the project persevered to become successful even through unpredictable weather circumstances, logistic challenges, hundreds of trades on site, as well as adjacent mega-projects such as the International Terminal expansion. It has been a privilege to work with such a dynamic team that was able take ownership of the project and collaborate to meet the RDP Team's tagline 'On Board... Let's Roll'. We are extremely grateful for the hard work and time you have invested into this project.

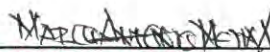
To mark this success and give everyone a token of our appreciation, we have compiled a book highlighting some of best moments in our journey together. We hope you refer to it many times over the years and are able to look back with pride on your role in helping create the most important 14,000 feet in Alberta.

Thank you,



SIG UNDHEIM

Director, Runway Development Program
Calgary Airport Authority



MARCO MEJIA

Vice-President, Planning and Engineering
Calgary Airport Authority



August 27, 2018

Subject: Reference Letter

To whom it may concern,

PD McLaren Ltd. has been associated with W.S. Nicholls Western Construction Ltd. for a period of 18-years, partnering on numerous projects to deliver quality installations in the aviation and petroleum sectors.

The quality of the work, along with the personnel W.S. Nicholls provides for our projects, can only be described as outstanding.

When evaluating our contractors, we affix a letter grade corresponding to a specific item which we feel best describes our vision of what is expected from contractors with whom we choose to partner. To that end, please find that W.S. Nicholls Western Construction Ltd. more than meets and exceeds our expectations.

SAFETY: A

- Attention to all aspects of safety as provided by the in house CSO is exemplary. Great effort is put towards assuring job sites are safe and employees have all the accreditation and training allowing them to return home after their work day is done.

ENVIRONMENTAL: A

- Very acute understanding of procedures and regulations relating to environmental safety complimented through outside contacts and consultants providing a complete solution.

QUALITY OF WORKMANSHIP: A+

- Quality of workmanship has never been an issue with completed projects delivered to PD McLaren; projects are always of outstanding quality.

SCHEDULING AND PLANNING: A

- We have always been kept abreast of project progress and milestones attained by way of e-mails, documentation and concise verbal communications.

BUDGET AND COSTS: A

- Projects have always come in on time and on budget. Should extra costs be incurred, they are made transparent and are fully explained.

DESIGN/BUILD SERVICES: A+

- W.S. Nicholls have provided us quality completed design/build projects that included all steps from concept, engineering, stamped IFC drawings, project management, construction services and close-out documentation, culminating in final handover and sign-off.



DEGREE OF WORKING COOPERATION: A+

- Team concept is a large part of the success formula with PD McLaren and W.S. Nicholls. They have made it easy to build a relationship based on trust, quality of workmanship and commitment to excellence. We expect that the relationship will remain and grow stronger as we continue to find new projects on which to partner.

PROJECT HISTORY OF W.S. NICHOLLS AND P.D. McLAREN LTD. PARTNERED PROJECTS:

- Good Hope Cannery / Salmon King Lodge

All equipment required for this project was barged to its location on the remote central coast of British Columbia, all of which required securing, marshalling, transporting and unloading of required parts, tools and construction crew support equipment. The project which took 6-months to complete entailed supply and installation of the following fuel systems and the related equipment:

- o Diesel storage and dispensing
- o Marine Gasoline storage and dispensing
- o Avgas storage filtration and dispensing
- o Jet Fuel storage filtration and dispensing
- o Fuel Systems for facility boilers, heating and back-up generators

- Hakai Beach Institute / Tula Foundation

This design/build project was sole sourced to W.S. Nicholls as the General Contractor and PD McLaren Ltd. supplying equipment as the result of references provided by the Owner of Good Hope Cannery.

Equipment required for this project was barged to its location on the remote central coast of British Columbia, all of which required securing, marshalling, transporting and unloading of required parts, tools and construction crew support equipment.

The project which took 4- months to complete entailed the supply and installation of the following fuel systems and the related equipment for same:

- o Diesel storage and dispensing
- o Marine Gasoline storage and dispensing
- o Fuel Systems for facility boilers, heating and back-up generators



- Harbour Air Vancouver - Harbour Float Plane Base

This design/build project, which required many disciplines, involved the extension of Jet Fuel and Avgas lines from the existing Vancouver Harbour Flight Centre at the Vancouver Trade and Convention Centre, and upon completion provided a dedicated dispensing refueling system for Harbour Air aircraft.

W.S. Nicholls and PD McLaren Ltd. were sole sourced based on recommendations from the Owner's of Salmon King Lodge and Hakai Institute, demonstrating the confidence and satisfaction of work based on past performance by W.S. Nicholls Western Construction Ltd.

The project required:

- o Design
- o Approvals
- o Permitting
- o Project Management
- o Safety
- o Dispensing Equipment
- o Aviation Fuel Filtration
- o Piping and Fittings
- o Piping and Mechanical Installation
- o Electrical
- o Flushing and Fuel Quality Assurances
- o System Commissioning

- Sewell's Marina

This project involved installation of a 65,000 Litre. split compartment double wall fiberglass underground fuel storage tank and related equipment in a very difficult and environmentally sensitive location.

The Challenges Included:

- o Proximity to ocean and tidal effects
- o Requirement for precision placement of the tank due to the very tight tolerances within the tank excavation
- o Installation of the associated pipe and fittings for a rare remote fill application
- o Supply and Installation of an oil water separator
- o Logistics and planning to allow for future product pipe and tank vent relocation

This phase of the project was completed on time and on budget to the satisfaction of the client, engineers and the site General Contractor



- Syncrude Canada

This W.S. Nicholls and PD McLaren Partnered project took place at the Syncrude Canada Base Plant in Fort McMurray/Wood Buffalo Alberta and involved modification to tank farms, construction, supply, and installation of fuel dispensing equipment for 3 stationary gasoline dispensing islands and 2 portable above ground horizontal steel tank remote fueling systems.

The work included providing all equipment, electrical and manpower to complete and handover a quality installation.

W.S. Nicholls carried this project on their shoulders by providing and following their usual professional road map for project success.

The Challenges Included:

- o Extreme winter working conditions
- o Following the ridged safety and work procedure guidelines as prescribed by Syncrude
- o Travel

In conclusion we are very appreciative of W.S. Nicholls and what they provide to PD McLaren Ltd. We would not hesitate to recommend them to clients, due in large part to the professional and consistent nature in which they conduct themselves.

Harry Kitzmann

National Petroleum Manager

Tel: (604) 371-3732

Cell: (604) 240-5086

hkitzmann@pdmclaren.com





October 31, 2018

Mr Harry Kitzman
W.S. Nicholls Western Construction Ltd.
851 Derwent Way
Delta B.C.
V3M 5R4

Dear Mr Harry Kitzman:

Subject: Letter of Reference W.S. Nicholls Western Construction Ltd.

Innovative Manufacturing Inc. manufactures a broad range of coatings, specialty cements, and tape for the roofing, concrete, automotive and maritime industries. We are the BC distributor of the AcromaPro line of industrial wood coatings as well as a selection of associated paint shop products including Binks and DeVilbiss spray finishing equipment.

During our growth since our establishment in 1949 we have had requirements for infrastructure and new manufacturing equipment to facilitate the addition of new products to meet our ever-changing client requirements. These changes and upgrades require us to partner with contractors that can provide the expertise and services to deliver these upgrade projects on time and on budget as well as reducing the impacts of interruptions to our manufacturing processes.

A contractor that we have enlisted to carry out numerous projects at our Annacis Island location is W.S. Nicholls Western Construction Ltd. chosen for their care to detail, quality of workmanship and the ability to deliver a project on time and on budget.

Innovative Manufacturing Inc. would not hesitate to recommend W.S. Nicholls to clients in need of a quality contractor with the ability to provide design-build, civil, environmental, electrical and overall project management capabilities.

In conclusion, we look to further build our relationship with W.S. Nicholls as we continue to add new product related process equipment and infrastructure to service our new and established clients' needs.

Please feel free to contact me should you require further information regarding W.S. Nicholls Western Construction Ltd.

Best regards,

A handwritten signature in black ink, appearing to read 'Dave Laskie', is written over the typed name.

Dave Laskie
Chief Operating Officer
Innovative Manufacturing Ltd

 **Innovative**
Manufacturing
861 Derwent Way Delta BC
Telephone 604-522-2811
Direct Line 604-549-6150
www.innovativemfg.ca

August 20, 2021

Brent Easter, ASCT
Vice President
W.S. Nicholls Western Construction Ltd.
851 Derwent Way, Delta, BC
V3M 5R4

Dear Mr. Easter

Re: W.S. Nicholls Western Construction Ltd. Reference Letter

It is with great pleasure that I am writing to recommend the services of W.S. Nicholls Western Construction Ltd (WSN).

Teranis Consulting Ltd. (Teranis) has worked with WSN on numerous Industrial Construction projects associated with fuel storage and distribution system upgrades and design/build turnkey operations that also involved environmental site assessments. WSN has demonstrated a high level of commitment to environmental protection and sustainable practices that is not yet common place in the construction industry. Our experience has been that WSN is very diligent in their efforts to enacted best practice procedures in accordance with both federal and provincial regulatory requirements/guidelines and industry standards, as exemplified during the following projects:

- **Vancouver Airport Fuels Facility Corporation** (July to September 2017) – Soil characterization for offsite disposal in support of the development and construction of the Vancouver airport fuel storage and pipeline distribution systems.
- **Campbell River Airport** (July 2018) – Soil characterization and remedial excavation in support of the replacement underground fuel storage tank (UST) and infrastructure with a new above ground fuel storage tank (AST)
- **Port Hardy Airport** (May to September 2020) – Soil characterization and remedial excavation in support of replacement of the fuel distribution system.
- **Victoria Airport** (October 2020) – Soil characterization and remedial excavation in support of fuel storage infrastructure upgrades.
- **Canadian Mountain Holidays Cariboo Lodge** (June 2020) – Soil, surface water and groundwater characterization in support of a fuel system and infrastructure upgrade, decommissioning of a bioremediation stockpile, and assessment and decommissioning of a water treatment system.

August 20, 2021

Page 2 of 2

Re: W.S. Nicholls Western Construction Ltd. Reference Letter

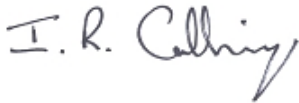
- **Canadian Mountain Holidays** (July 2021) – Pre-construction soil assessment to characterise excess soils for disposal during the construction of a new diesel fuel storage and dispensing system.

Teranis have found WSN staff to be highly knowledgeable, ethical and a pleasure to work with. It is also worthy of note that we see the same faces on WSN projects time and time again, which clearly indicates that staff turnover is very low and a testimony to the good working environment that WSN provides.

Should your clients have any questions or require any additional information, please do not hesitate to pass on my contact details and I would be more than happy to answer any questions they may have.

Sincerely,

TERANIS CONSULTING LTD.



Ian Collings, B.Sc., P.Chem.
Principal & Senior Chemist

SECTION - 3.0

Proposed Major Equipment



OSOYOOS AIRPORT AVGAS SYSTEM - EQUIPMENT SUPPLY LIST

ITEM DESCRIPTION	AREA	QUANTITY
AV-GAS 100LL FUEL STORAGE TANK		
15,000 LTR DW AG STORAGE TANK EXTERNAL POLYURETHANE WHITE PAINTED c/w •8" @ 18 I- BEAM SKID PACKAGE •8' SKID EXTENSION BAR GRATING BASE TO SKID •3" SS REMOTE TOP/BOTTOM FILL AND ASSOCIATED APPURTENANCES •3" MORRISON HP OVERFILL VALVE & MANUAL TEST MECHANISM INSTALLED ON FILL LINE •1.5 HP HIGH PRESSURE SUBMERGED TURBINE PUMP & SMART STP CONTROL BOX •PARALLEL STAIRS & 8' CATWALK, PLATFORM & SINGLE HANDRAIL •24" DIAMETER ACCESS MANWAY/BOLTED LID •3" PRESURE VACUUM VENT •TANK TOP LOW POINT MOUNTED MANUAL WATER DRAW OFF PUMP, DROP TUBE AND ASSOCIATED HARDWARE •PPG NOVAGUARD EPOXY INTERNAL COATING	TANK	1
1 1/2" MECHANICAL ANTI-SYPHON VALVE	TANK	1
MECHANICAL TANK GAUGE IN METRIC	TANK	1
ELECTRONIC OVER-FILL ALARM WEATHER RATED PANEL c/w •(2) CHANNEL & ADJUSTABLE TIMER •(2) OUT-PUT RELAYS •120 VC POWER •(2) POINT LEVEL SWITCH •EXP JUCTION BOX •STAINLESS STEEL FLOATS & SHAFT •2" MALE NPT BUNG CONNECTION	TANK	1
REFUELING CABINET		
48" x 72" x 42" STAINLESS STEEL FUELING CABINET	CABINET	1
1.5" AVIATION RATED POSITIVE DISPLACEMENT METER c/w •AIR ELIMINATOR •STRAINER •40 MESH BASKET •ATC •S.S. BACK-CHECK VALVE •W&M THERMOWELL & S.S. 1/4" x 1/8" •KRAUS MICON ELECTRONIC REGISTER c/w •CLASS1 DIV.1 RATING •BACKLIT DISPLAY •ATC •STAINLESS STEEL ENCLOSURE	CABINET	1
ON-SITE WEIGHTS & MEASURES APPROVAL	CABINET	1
1"x 50' MxM AVIATION FUEL DELIVERY HOSE CERTIFIED AND TESTED API 1529	CABINET	1
SPRING REWIND HOSE REEL c/w •1" x 50' HOSE CAPACITY •1.5 ALUM FLUID PATH •4 WAY TOP, BOTOM, SIDE ROLLER ASSY. •GREY PAINTED EPOXY PAINT	CABINET	1

ITEM DESCRIPTION	AREA	QUANTITY
VERTICAL FILTER SEPARATOR EFFULENT QUALIFIED TO EI-1583-6TH EDITION, CAT.M, TYPE S RATED @ 22 GPM c/w •EXTERIOR BLACK FINISH •GAMMON PEAK HOLD DP GAUGE •GAMMON SAMPLE PROBE SET KIT •WATER DETECTION PROBE •COALESCER ELEMENT (2) & 1 SPARE •VF MOUNTING BRACKET •VF GROUNDING CABLE ASSY. ****NOTE : NO EI CODE PLATE AVAILABLE FOR THIS VESSEL & FILTER COMBINATION AS CALLED OUT IN SECTION 3.4 (i) ****	CABINET	1
MANUAL REWIND GROUNDING REEL c/w •75' 3/32" POLY-COVERED S.S. CABLE •100AMP HEAVY DUTY CLAMP	CABINET	1
1.5" x 18" MxM SWIVEL STAINLESS STEEL FLEX CONNECTOR	CABINET	1
1.5" x 1" OVERWING AVIATION NOZZLE c/w •CHECK VALVE •SWIVEL •100 MESH S.S. NOZZLE SPOUT STRAINER	CABINET	1
RIDGID FLEX 1 1/2" ENTRY BOOT FOR STEEL PIPE	CABINET	1
STAINLESS STEEL SOLENOID VALVE 0 - DIFF. •1.5" FLANGED CONNECTIONS •2 STAGE •120V •EXP •NORMALLY CLOSED / ENERGIZE TO OPEN •VITON TRIM	CABINET	1
FUEL MANAGEMENT SYSTEM		
QTPOD - PETROLEUM ON DEMAND		
SELF SERVE FUELING TERMINAL c/w •CREDIT & DEBIT CAPABLE •RECEIPT PRINTER •PEDESTAL •(1) HOSE CONTROL •WIRED ETHERNET CAPABLE •CELLULAR MODEM COMMUNICION KIT •CELLULAR DATA PLAN •PIE OMEGA JR. INTERFACE •PIE DBOX •REQUIRED (1) YEAR SUPPORT & MAINTENANCE PACKAGE (MUST BE RENEWED ANNUALLY)	TANK SKID	1
MISCELLANEOUS ITEMS		
COMPOSITE FIBERGLASS FIRE EXTINGUISHER CABINET / RED / DECALS INCLUDED	TANK SKID	1
20 LB BC FIRE EXTINGUISHER, WALL MOUNT STYLE	TANK SKID	1
SITE SIGNAGE / DECALS (BASED ON MASSET)	TANK SKID	1



Site Preparation & Installation Guide

QT Petroleum on Demand (QTpod)

Model - M4000

Automated Fueling Terminal

Version 1.4a

Date: August 1, 2018





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Customer Service & Technical Support

GENERAL INFORMATION

Mailing and Shipping Address:

QT Petroleum on Demand, LLC.
4909 Nautilus Ct. N., Suite 100
Boulder, CO 80301

Office Phone Number: (303) 444-3590

Fax Number: (303) 444-8736

Email: techsupport@qtpod.com

Office Hours: 7:30 AM to 5:30 PM (Mountain) MON - FRI

To assist you better and to make the customer service call as efficient and effective as possible, please have the following information ready:

Troubleshooting Background:

Try to provide a detailed description of the problem(s). Including:

- 1) Can the problem or issue be repeated?
- 2) When did the problem or issue occur (and for how long)?
- 3) Has any related equipment been re-configured or changed recently (especially since the initial installation of QTpod hardware)?
- 4) What was the recent weather activity in the area (possibility of power spikes, brownouts or related weather phenomena affecting your equipment)?

Expertise Available on Site:

If necessary, have a computer or maintenance support person available.

- 1) Sufficient time to follow our support staff from problem to resolution (make appointments if necessary).
- 2) Depending on your warranty/service contract selections, the individual responsible for dealing with problems or issues related to QTpod software or hardware.



REPLACEMENT PARTS POLICY

If the problems or issues you are experiencing with your QTpod M4000 Automated Fuel Terminal require a permanent replacement of parts, the guidelines are as follows:

- 1) QTpod and the customer have discussed the issues and have mutually decided that a replacement module (or board) is required to keep the fuel terminal functioning while the original troubled module is returned, tested and then either repaired or scrapped at the QTpod facility.
- 2) The replacement modules will be shipped to your location as permanent replacements. These replacement modules are subject to having an invoice for the cost of the module shipped with them, and if the original is not returned within one week, you will be charged for the cost of the replacement module.
- 3) After the original module is fixed, QTpod will return it to our remanufactured parts pool.

RECOMMENDED PROCEDURES

Routinely review your transactions online to ensure that everything is operating normally and no suspect entries (several \$0.00 sales?) are visible.

Never leave your terminal shut off (esp. line power on the terminal block, located in the pedestal of the fuel terminal) if, for any reason not related to repair or maintenance, it will not be used. Leaving the terminal power off will shut off the heaters and in inclement weather the terminal will not ward off condensation and / or possible corrosion.

Consider your QTpod Automated Fuel Terminal to be like a personal computer; do not open the head or pedestal doors in inclement weather. Any parts replacement or maintenance outside the normal scope of operation (if needed) should be performed by qualified field technicians or under direct supervision by QTpod Service Technicians (this includes telephone technical support). If you are unsure about any operation of the terminal, call a QTpod Service Technician.



Part 1 – Site Preparation

Introduction

This Site Preparation guidance has been written to assist you in understanding how the M4000 automated fueling terminal functions and what site infrastructure is required for startup. Please take the necessary time to review this booklet. Many of the suggestions and recommendations contained in these pages are sincerely presented to help you avoid costly missteps.

To assure you have a smooth start up, there are specific requirements that must be met and recommendations, which, while not mandatory, will enhance overall operation. During startup, if requirements have not been met, the startup technician may require the owner/ operator to sign a warranty exemption.

Please note that these checklist items are not totally inflexible. There can be some variance but you must check with a QT Petroleum on Demand Technician before making any deviations from these recommendations. Two of the most frequent questions center on the pulser and two-stage valves. These are mandatory requirements since they directly affect the accuracy and precision of each fuel transaction. In credit card transactions, all pre- approved sales are “pre- set”. Accurate pre-set sales are not possible without a two-stage valve.

In addition, a pulser (an electric counting device that indicates how much fuel is flowing) with incorrect or insufficient resolution will result in inaccurate readings to your customers and to you, resulting in possible loss of revenue. It may also place you in jeopardy of failing local, state, and federal weights & measures inspections.

Bottom line: We want your M4000 Fuel Terminal to function 100% as advertised and the extra effort spent during the site Preparation Phase will go a long way to ensure a smooth and trouble free operating history.

Recommended Tools and Supplies:

The M4000 cabinet is manufactured from stainless steel, and therefore requires drill bits capable of making the conduit holes in that type of metal. Reference: <https://www.grainger.com/content/supplylink-greenfield-metalworking-drill-bit>



M4000 Components

The M4000 Automated Fuel Terminal consists of a terminal head that is attached to a pedestal. Most site preparation work centers around the running of conduit protected conductors into the mounting pad for connection within the pedestal.

The pedestal and head are shipped in separate 45" x 15" x 25" containers weighing 54 and 58 pounds.

The pedestal is designed with a single door and a shelf that is over 18" from the bottom (Figure 9). The shelf is to be drilled for conduit holes so that rigid, explosion-proof conduit can be stubbed up to the shelf. Once wires in the conduit are pulled and rung out, they can be terminated to the circuitry inside the pedestal. For Direct Pump interfacing that would-be the DPI Relay Module, which itself is mounted onto the Direct Pump Interface (DPI) board. For Serial Protocol Dispensers, it would be 3rd party interface hardware. The optional high visibility Multi-Line Display interface installs inside the pedestal and connects to the DPI board via a ribbon cable.



Figure 1 - M4000 Consists of the Terminal Head & Pedestal

System Requirements

The QT Petroleum on Demand M4000 Automated Fuel Terminal has been designed to directly control multiple mechanical and/or electrical dispensers. A maximum total of 32 dispensers can be controlled with up to eight of those being direct mechanical. The standard system comes equipped to handle a single dispenser or fueling point by default. Optional expansion DPI Relay-Module Boards provide support for additional dispensers for fueling points. The M4000 requires power in the range of 110 – 240 VAC, 50/60 Hz and is referred to as "Line Voltage" in the remainder of the documentation.

Note: The QT Petroleum on Demand M4000 may require a 3rd party serial interface for some electronic dispensers, such as the Wayne Select or Gilbarco Legacy models. Call QT Petroleum on Demand for guidance if you have an electronic dispenser.

The following list of items are required equipment to successfully interface a mechanical dispenser with the M4000 fuel terminal:

1. A fuel flow pulser must be fitted to each dispenser. The M4000 can be configured to work with a variety of pulser types and resolutions, including pulses derived from the penny wheel. When using the penny wheel, the pulser should provide one pulse per penny of fuel dispensed. The pulser may be either solid state or dry contact but it must switch a 12 Volt DC load at a frequency of up to 200 pulses/second. The Western Electronics and OPW model 500 and Veeder-Root solid state pulsers have been used with good success (Figures 2 & 3). The M4000 provides an isolated 12 VDC supply for each dispenser to power solid state pulsers.



Figure 2 - The OPW "Pipe Bomb" Pulser



Figure 3 - The Veeder Root 12v "Tuna Can" Pulser

2. A dry contact switch which closes when the mechanical register has been reset to zero AND opens when the pump handle is returned to the "OFF" position (Figure 4).
3. An electrically operated main flow valve that will allow full fuel flow when provided with a Line Voltage source.
4. An electrically operated slow flow valve which, when energized at Line Voltage, will restrict fuel flow to about 1-3 gallons per minute.
5. If an electric reset motor is used, it should also operate at Line Voltage (a separate signal is provided by the terminal to power each reset motor).

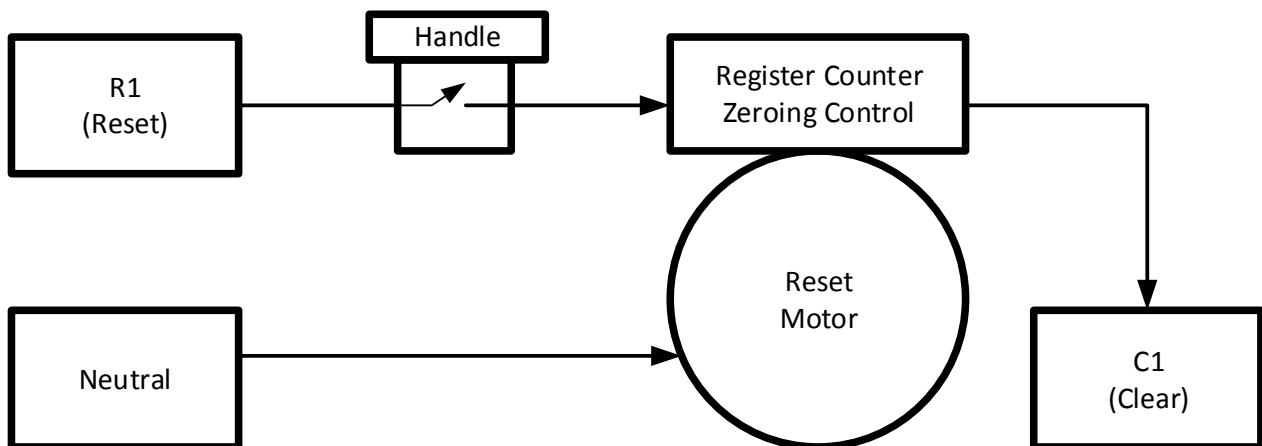


Figure 4: Reset Motor Circuit

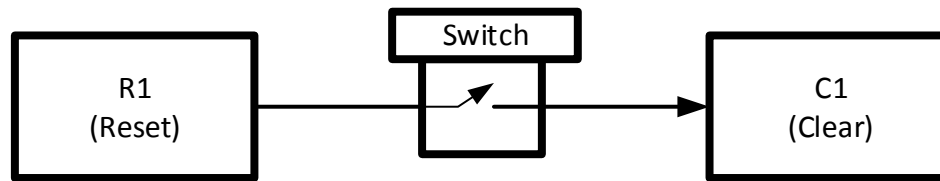


Figure 5: Mimic Switch Circuit

Two examples (Figures 4 & 5) of dry contact switch schematics. The reset motor circuit is typical for gas station style dispensers. The Mimic Switch Circuit is the minimum necessary for the M4000 direct dispenser interface.

6. The DPI board is not designed to directly drive pump motors. We require the use of high current relays (sometimes referred to as contactors) on the pump control output circuits (P1/P2, etc.) to keep the terminal electronics isolated from high current drawn by fuel pump motors. See Figures 7 & 8 for examples of relay placement. QTpod recommends using solid-state relays (SSRs) as they do not generate electrical arcing noise. They are required if the relays are located within the pedestal, where the electrical noise can adversely affect the digital electronics (Contact QTpod support for SSR recommendations).
7. A CAT5 or CAT6 Ethernet cabling is needed if a direct internet connection is used for card authorization & settlement as well as communication with the QTpod Cloud application. Cellular or Wi-Fi can be used depending on distance and site coverage.
8. The terminal and dispenser components are powered by Line Voltage line power. It is highly recommended that a large (10 AWG) ground wire is used in this conduit for lightening dissipation purposes.
9. Referring to the provided wiring guide & schematic ensure that all high voltage circuits are delivered through the appropriate underground conduit to the terminal location. Typically, 1/2" and a 3/4" rigid conduit is run from each dispenser directly to the pedestal. In addition, a 3/4" rigid conduit is typically run from the pedestal to the nearest electrical distribution box.
10. Be sure each high voltage line is labeled correctly with both the signal name and dispenser number. Do not mix high voltage and low voltage wires within the conduits (unless low voltage wire is shielded) as mixing may cause unreliable system operation. Minor variations may exist such as the location of the main pump motors. Contact QTpod for assistance if you are unsure about your application.



Space & Functional Considerations

The M4000 ships in two large (45" x 15" x 25") cardboard containers that weigh 54 and 58 pounds. The Terminal is not weather-proof until it is fully assembled, so the boxes and their contents should be protected from the environment until ready to install.

When selecting a location for your M4000 Automated Fuel Terminal, carefully study the dimensions of the pedestal (Figure 9) and terminal head and remember that adequate space must be maintained in front of the unit for installation and maintenance. This means that an area of several feet in radius in front of the pedestal and terminal head should be maintained.

It is also the responsibility of the person or persons doing the electrical site prep work (usually a licensed and bonded electrician) to comply with National Electrical Code (NEC). It is not QTpod's responsibility to enforce adherence to NEC but experience has shown that sometimes people design their fuel dispensing layout prior to carefully studying Article 30A – Code for Motor Fuel Dispensing Facilities and Repair Garages of the NFPA. Minimum distances between the pedestal and dispensing equipment must be maintained and rigid conduit employing seal-offs must be installed (However, please wait until after startup to pour the seal-offs, if possible). Failure to research and comply with these codes can result in costly reengineering along with delays. If you or your site prep team have any questions, consult the appropriate authorities. In some cases, your local fire marshal may add further requirements to what you find published in the NEC or NFPA.

Figure 6 is from the NFPA 30A, (2015 National Fire Protection Association), and is presented here for INFORMATIONAL PURPOSES ONLY. Local, state, and federal requirements at your site can vary and the appropriate authorities should be consulted.

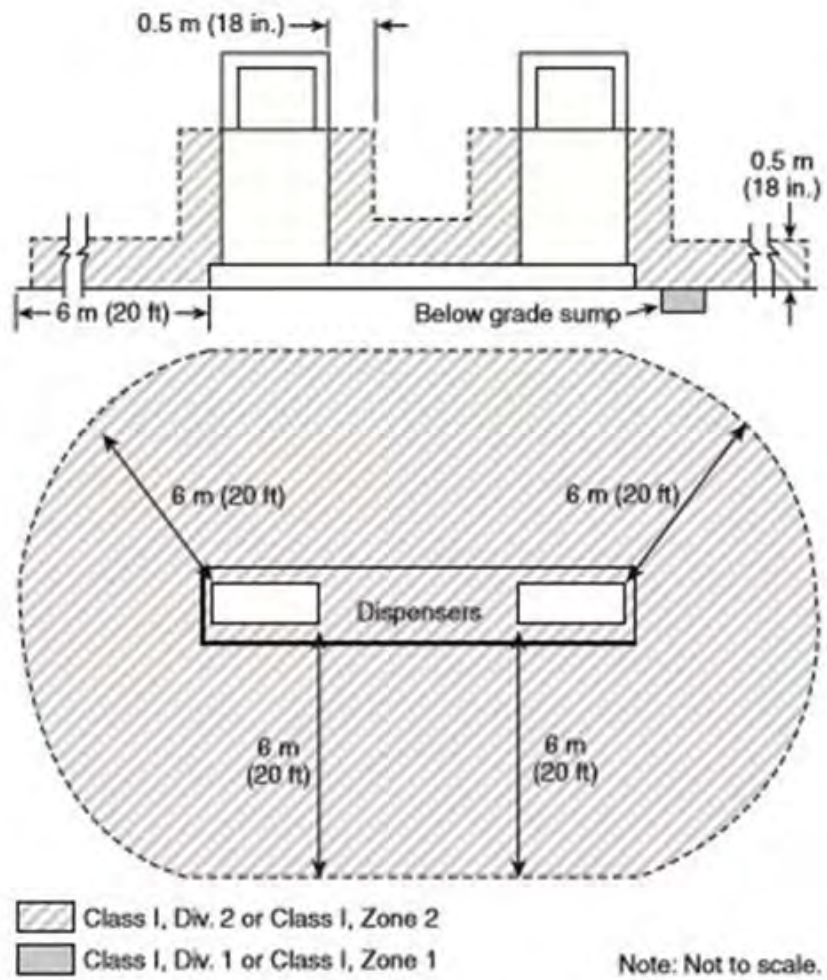


FIGURE 8.3.2(a) Classified Areas Adjacent to Dispensers.

Figure 6 - NFPA 30A Diagram reprint - For Informational Purposes Only

Wiring Requirements - Option A

The Field Wiring diagrams on this page and the next describes general requirements for conduits and wires. The actual number of wires ultimately depend on individual components, their location, power ratings, etc. In general, these are what is required;

1. Pulsar signal wires (Low voltage conduit from fuel dispenser to pedestal as shown in the drawing below as **Conduit A**). Each pulser circuit has two inputs plus an isolated ground and 12VDC. Refer to Section 3 for pulser wiring requirements.
2. Dispenser component signal wires (High voltage conduit from fuel dispenser to pedestal (**Conduit B**))
3. One Cat 5 or 6 Ethernet cable (if applicable) to pedestal. (**Conduit C**)
4. A source of local power (High voltage conduit from circuit breaker to pedestal. (**Conduit D**))
5. Pump control wiring (High voltage conduit from pedestal to pump control relay. (**Conduit E**))
6. Any other required conduit, typically for a tank mounted pump motor(s), hose reels, outdoor lighting, etc. (**Conduit F**).

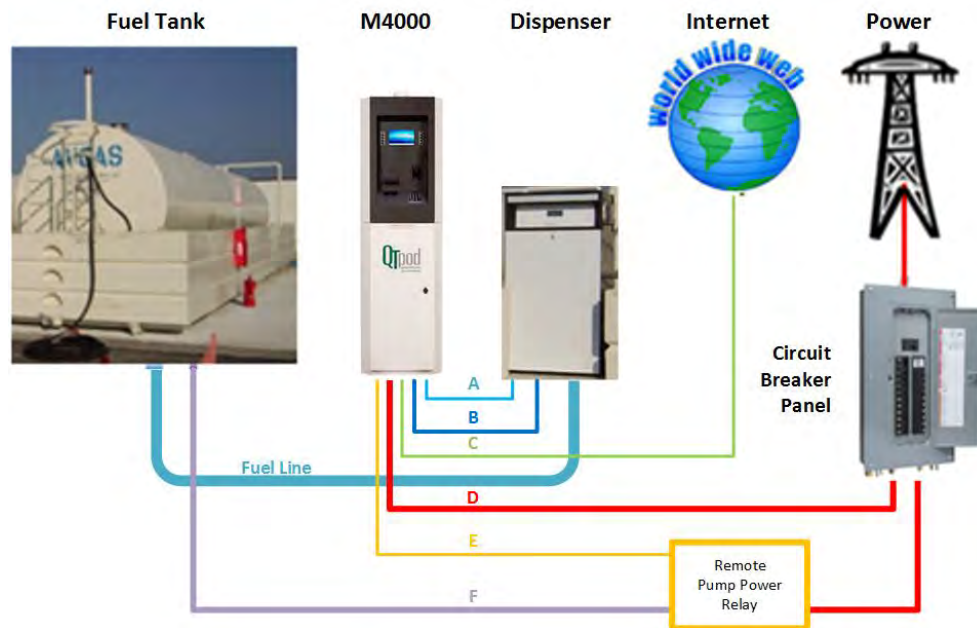


Figure 7 - Dispenser Field Wiring Diagram - Option A

<u>Rigid Conduit</u>	<u>Size</u>	<u>Description of wires inside conduit</u>
A	1/2"	Low voltage for pulser wires
B	3/4"	High voltage for dispenser signal wire (reset, clear, slow & fast valves)
C	1/2"	Low voltage for Ethernet Cable (if needed)
D	3/4"	High voltage for terminal and dispenser power
E	1/2"	High voltage pump control wiring
F	1/2"	Other required conduit

NOTE: This diagram is for a single dispenser setup. For more than one dispenser, add additional B & C conduits for each additional dispenser and add another pump relay control wire in conduit E.

NOTE: The low voltage conductors may be placed in the high voltage conduit if they are in shielded cable. This would eliminate the requirement for a separate conduit just for low voltage wires

IMPORTANT NOTES: Use stranded wire only. Each pump motor must be actuated through 30 amp relays. This applies to 120V and 240V motors. If you deviate from these requirements, please call QTpod at (303) 444-3590.

Wiring Requirements - Option B

An area of variation from site to site is the pump actuation circuitry. In general, it is necessary to wire the pump motor(s) through a relay so that the current draw required by the pump motor(s) does not pass through the DPI board (see Figure 8). The relay(s) can be located anywhere that is convenient (Electrical Service Panel or pedestal, for example) and the pump actuation wires can be routed directly to the pump or share conduit with the rest of the high voltage wires.

Typically, your conduit and wiring layout will look like either "Option A" or "Option B" depicted in (Figures 7 & 8). Use them as a starting point to map out your actual wiring requirements. Keep in mind, these are recommendations only. You are responsible for Electrical Code compliance. It is strongly recommended you consult and/or contract with a qualified electrician as you proceed with this work.

Note: When setting up electric hose reels, consider routing the hose reel circuit through the NC side of the pump relay so that while the pump is running, the hose reel is "dead" and thus presents no safety hazard.

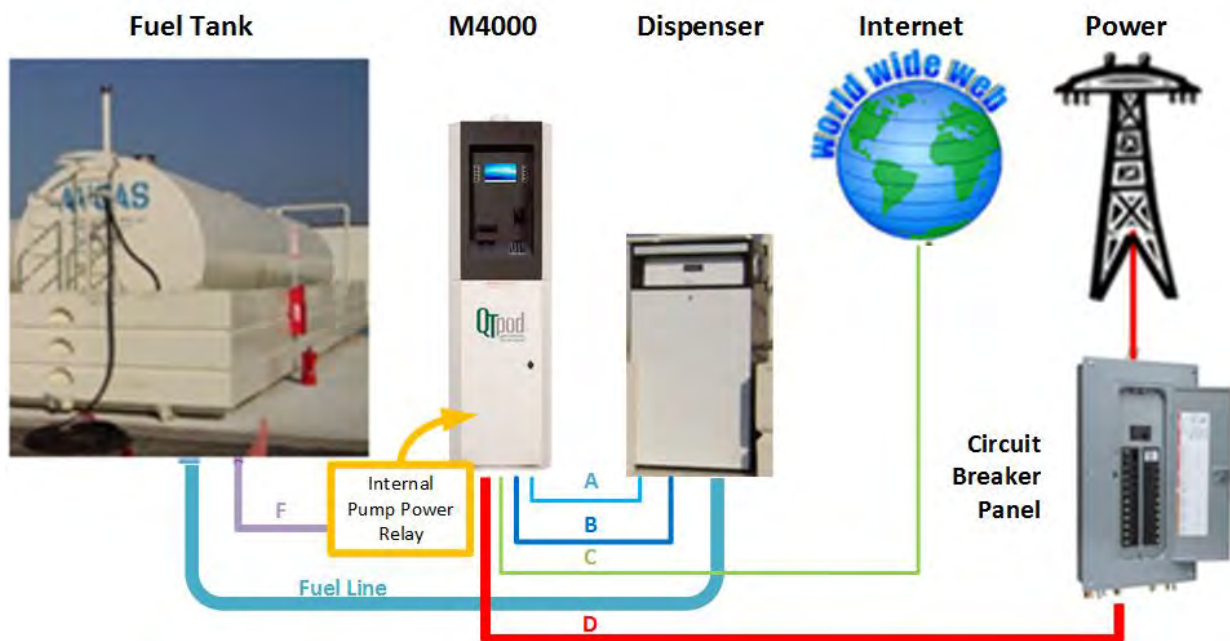


Figure 8 - Dispenser Field Wiring - Option B

<u>Rigid Conduit</u>	<u>Size</u>	<u>Description of wires inside conduit</u>
A	1/2"	Low voltage for pulser wires
B	3/4"	High voltage for dispenser signal wire (reset, clear, slow & fast valves)
C	1/2"	Low voltage for Ethernet Cable (if needed)
D	3/4"	Multiple High voltage for pump motor, terminal and dispenser power
E	1/2"	High voltage pump control wiring

NOTE: This diagram is for a single dispenser setup. For more than one dispenser, add additional B & C conduits for each additional dispenser.

NOTE: The low voltage conductors may be placed in the high voltage conduit if they are in shielded cable. This would eliminate the requirement for a separate conduit just for low voltage wires

IMPORTANT NOTES: Use stranded wire only. Each pump motor must be actuated through 30 amp relays. This applies to 120V and 240V motors. If you deviate from these requirements, please call QTpod at (303) 444-3590.

Special Wiring Recommendations for DPI

The Reset (R) and Clear (C) signals (see Figures 4 & 5) can sometimes be exposed to electrical noise caused by high voltage arcing across switch contacts. Because of this potential problem, it is advised to allow an extra length of 4" to both the Reset and Clear wires. This will allow the installation of optional ferrite filters to prevent this noise from affecting the DPI logic. In extreme cases of arcing and/or inductive kick-back noise, the addition of snubber circuits has proven effective. The snubber part installs with the black lead to the Reset (pin 2) or Clear (pin 6) and the white lead attaches to either pin 7 or 8 (both are Neutral) on the Relay Modules terminal strip.

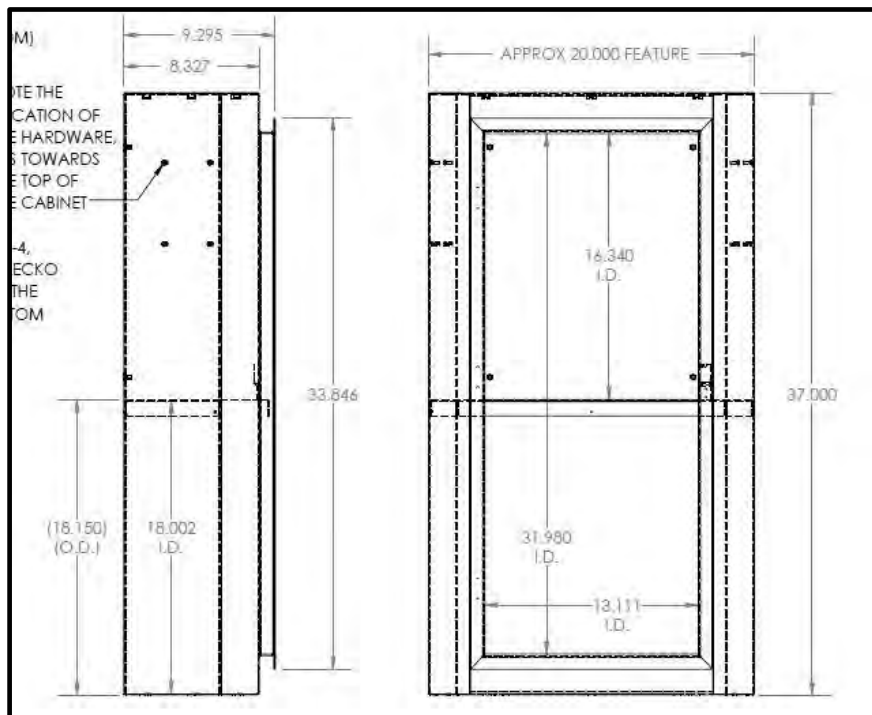


Figure 9 - Pedestal Dimensions

Preparing Terminal Wiring

1. Using the terminal pedestal as a guide, mark the location of the pedestal mounting holes.
2. Install conduit "B" as required for each dispenser. Allow room for at least 6 conductors FROM each dispenser for control signals PLUS any conductors needed for accessories such as lighting or hose reel motors.
3. Install conduit "A" for the low voltage pulser signal wires. Allow for 4 conductors from each dispenser (two for the pulsers and two for the isolated ground and 12VDC to power the pulser).
4. For direct Ethernet connections to the Internet, Route a CAT5 or CAT6 cable through the base of the pedestal. Direct burial cable is often the best choice. It may be strapped to the outside of the conduit. The Ethernet cable terminates into a RJ45 safety grounded coupler within the Terminal head unit so allow additional six feet of wire to reach.



5. The wiring guide calls for two legs of power (3 wires) from the breaker panel out to the pedestal. One circuit powers the Terminal's 12VDC supply, the other Line Voltage circuit provides for dispenser power (power for reset motors, electrically actuated valves, pulsers, etc.). Pump motors are powered from separate circuit breakers and require their own Hot (both L1 & L2 for 220 VAC motors), as well as neutral and ground wires.
6. Optional High Visibility Displays may require conduit containing shielded four-conductor low-voltage cable (See Appendix B).

IMPORTANT NOTE: ALL WIRING MUST BE DONE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL CODES.

The information contained in this guide is provided solely for planning purposes and so that appropriate professional personnel can gain familiarity with QTpod products. QTpod makes no guarantee or warranty that any of the recommendations or guidelines contained herein are accurate or correct regarding Fire and Electrical Codes. Compliance with local, state and federal codes are the responsibility of the owner/operator of the fuel delivery system.

Site Preparation Checklist

In Appendix E at the end of this manual is our standard Site Preparation checklist for the M4000 Self-Serve System. It is required that the customer and/or the contractor performing the installation signs off on each item as it is completed. Technical Support is always available to answer questions and clarify issues as they arise. Once the work has been completed, each item has been initialed and the completed checklist has been signed, the entire checklist should be scanned and emailed <jbroderick@qtpod.com> (or faxed: 303-444-8736) back to QTpod. This then coordinates travel to the customer's site to perform the system start-up, if such services are commissioned. QTpod does not book travel until the work has been completed and documented to avoid costly delays.



Part 2 – Installation

Section 1 – Installation Overview

SCOPE

This part of the guide covers all aspects of installing the QTpod M4000 Automated Fuel Terminal. This includes mounting the Direct Pump Interface Board (DPI) and DPI Relay Module(s), terminating Line Voltage control wires, connecting serial communication wires for specific dispensers, mounting the M4000 Terminal Head, connecting power to the pedestal, and running diagnostic operational checks. You should have on hand any supplementary manuals such as the one for Siteminder.

This part of the guide does not cover Site Preparation. Refer to Site Preparation (Part 1 of this guide) to complete all tasks and the checklist prior to beginning the installation. Use the completed checklist in the appendix at the end of this guide as a starting point for installing the M4000. Note: This step may not be necessary if upgrading from an older QTpod Self-Serve System.

TERMINAL HEAD

The M4000 terminal head should be mounted immediately after the pedestal is mounted to prevent any components from exposure to the elements. Section 2: Terminal Head describes the basic terminal head architecture and how to connect the appropriate cables for functionality. This section also covers installation of the printer and basic maintenance functions such as changing/installing printer paper.

DIRECT WIRE DISPENSERS

Depending on the complexity of the system being commissioned, different sections of this document will apply. The section on Pedestal Wiring explains how to connect dispensers which use Line Voltage control wires to interface with traditional fleet style electrical-mechanical fuel dispensers. Some of these traditional dispensers, however, have electronic pulsers and may require special electronic interface devices. Check with a QTpod Technician if you have any questions.

SERIAL DISPENSERS

Appendix A has specific information on wiring for certain electronic dispensers such as the Wayne Select series of dispensers. Section 5 Operational Check covers testing serial interface devices, the M4000 to verifying connection status, and common troubleshooting techniques. Special diagnostics that are available for serial dispensers are covered in Appendix A.

Multi-Line High Visibility Displays

Appendix B has specific information on installing interface circuit board and wiring to displays and the DPI.



SITEMINDER

Siteminder is QTpod's web-based fuel terminal control software. The functionality of the M4000 system is dependent on constant communication with QTpod's data center and the Siteminder application.

You must receive a terminal configuration download from Siteminder into your M4000 to fully test it and then place it into operation. The Siteminder section of this guide goes over the basic components of the terminal configuration and the options that must be made by the owners/operators of the fueling operation.

OPERATIONAL CHECKS

Once all equipment is setup and is fully connected, it is time to make comprehensive operational checks. Section 5 Operational Check covers comprehensive diagnostic and auto mode operational checks to ensure the system is ready for public use.



Section 2 – Component Assembly

The QTpod M4000 Terminal is thoroughly tested and inspected prior to packing and shipping. Carefully unpack the components and inspect them for any damage that may have occurred during shipping. If there has been damage, DO NOT ATTEMPT TO ASSEMBLE. Call QTpod as quickly as possible to discuss the situation and arrange for a replacement, if applicable. Once a terminal is placed into service, it will be too late to file a shipping damage claim.

NOTE: It is recommended to use the provided foam packaging to protect the finish of the terminal from chips and scratches while resting on the pavement prior to assembly.

MOUNTING THE PEDESTAL

At this point in the installation process you should be able to anchor the terminal pedestal using 3/8" anchors with either flat washers and nylon locking nuts or lock washers and standard hex nuts. It is recommended that stainless steel be used for this purpose. If you have any questions, please do not hesitate to call QTpod for assistance.

Drill holes through the 18" stainless steel barrier shelf to provide wiring pass-through. Use drill bits hardness-rated for stainless steel. Temporarily remove pre-mounted pump interface hardware as necessary to prevent damage during drilling. Clear all metal shavings, then reinstall any interface hardware removed earlier.

Wiring Notes: (for DPI systems refer to Figure 11: Sample Wiring Schematic)

- a) When using the Western Electronics model 500 pulser, be sure to connect the hot side of the pulser power (BLACK WIRE) to the Clear Signal. This insures that the pulser will begin at exactly zero and not part way through the first pulse.
- b) If a manual register reset mechanism is employed, a reset mimic switch must be installed for each dispenser (See Figure 5). This switch must be housed in an explosion-proof cover and simply connects the Reset (R) terminal lug with the corresponding Clear (C) terminal lug. This is required so that customers can signal the dispenser is ready to sell fuel (register has been reset to zero) and can terminate a transaction once they are done fueling, without having to wait for a timeout. In most cases, a customer depends on this switch since a typical sale involves overestimating the amount of fuel required

INSTALLING THE POWER SUPPLY

The Terminal and Pedestal digital hardware is powered by a single 12VDC power supply. The factory pre-wires the DC wiring and then after testing disconnects prior to shipping. The DC cables from the upper terminal area route through the opening to the pedestal for attachment to the DC supply's outputs on the top corner (see Figure 10). Likewise, if a DPI is present in the pedestal, its' power attaches there to the supply as well.

The Line Voltage is wired to the lower input terminals and comes from the left-most circuit breaker's top terminal and the wire distribution DIN terminal blocks. It is recommended to connect these wires prior to mounting. The supply is DIN rail mounted to the left of the DPI and circuit breakers. There is a spring-loaded clip on the bottom of the supply. Place the supply's mounting clip onto the top edge of the DIN rail then pivot down to snap in place. To release the supply, pull down the metal lever on the bottom rear to unlatch from the rail, then pivot the bottom up and lift off.

The Line Voltage line wire (Black) coming through the 10 Amp circuit-breaker. This functions as the main power switch to the M4000's electronics. Additional circuit breakers are added to control power to the dispensers and pump motors. AC Line Voltage wiring is covered in more detail in the first section on M4000 Site Preparation.



Figure 10 - Power Supply Mounted and Wired

SAMPLE WIRING SCHEMATIC FOR DPI

This diagram illustrates how the QTPod DPI Relay Module terminal strips should be connected.

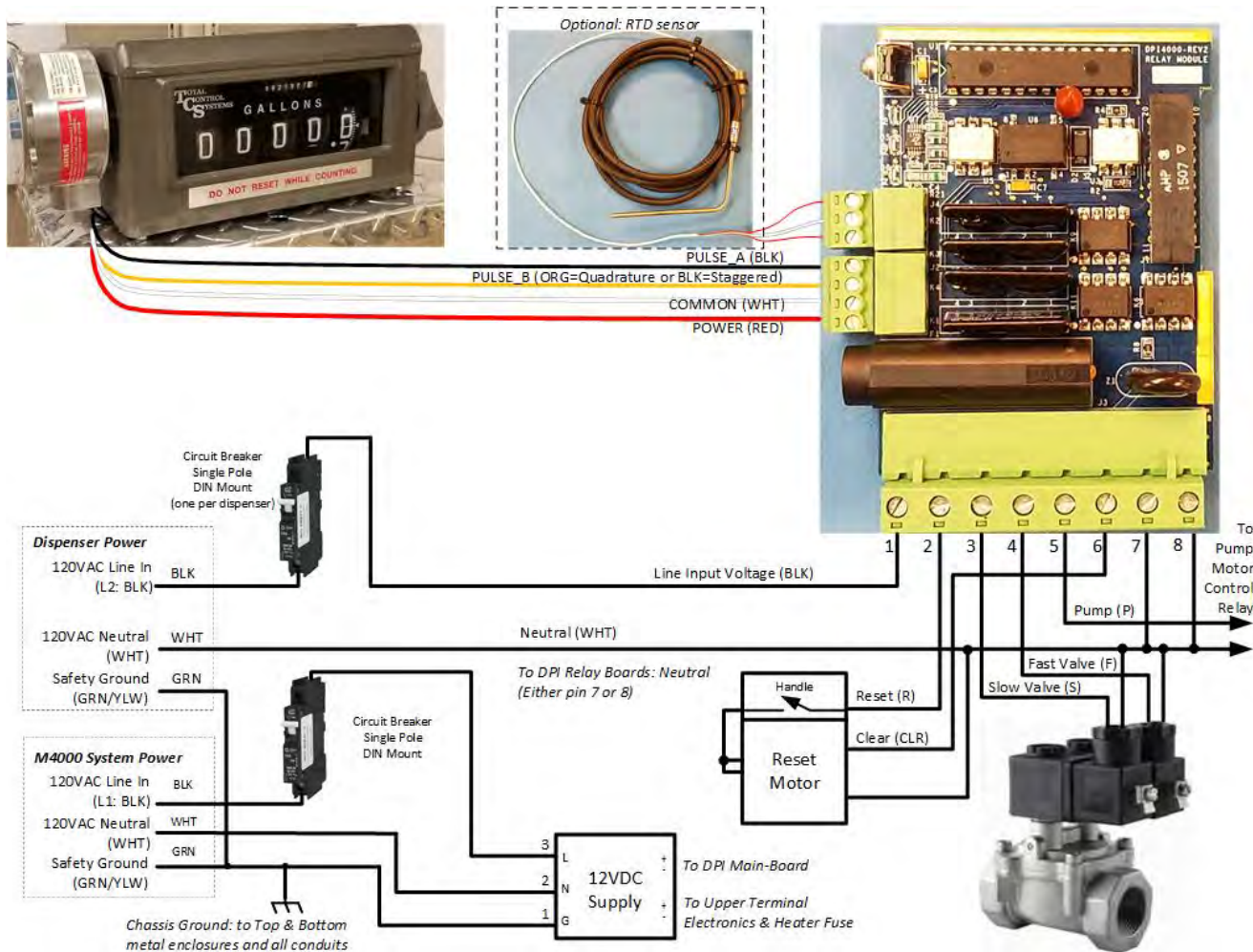


Figure 11 - Sample DPI Wiring Schematic



MOUNTING THE TERMINAL HEAD

Once the pedestal has been firmly mounted, the Terminal Head can be installed.

NOTE: It is important that all power is turned off inside the pedestal while working on assembly tasks.

Use the four large bolts and washers packaged in one of the smaller boxes to attach the Terminal head unit to the top of the Pedestal. Tighten bolts well enough to compress the gasket between the top and bottom sections to form a weather-tight seal.

Once the head is securely mounted, open the head door and expose the internal components.

WARNING

Never attempt to commission the QTpod M4000 in inclement weather without some sort of utility shelter that completely protects all electronic components from moisture contamination. The Limited Warranty does not cover damages suffered because of improper startup procedures.

Refer to accompanying diagrams while performing the following tasks. In most cases, the cables for each peripheral device are already connected at the factory. The following set of tasks need to be accomplished prior to performing the Operational Check.

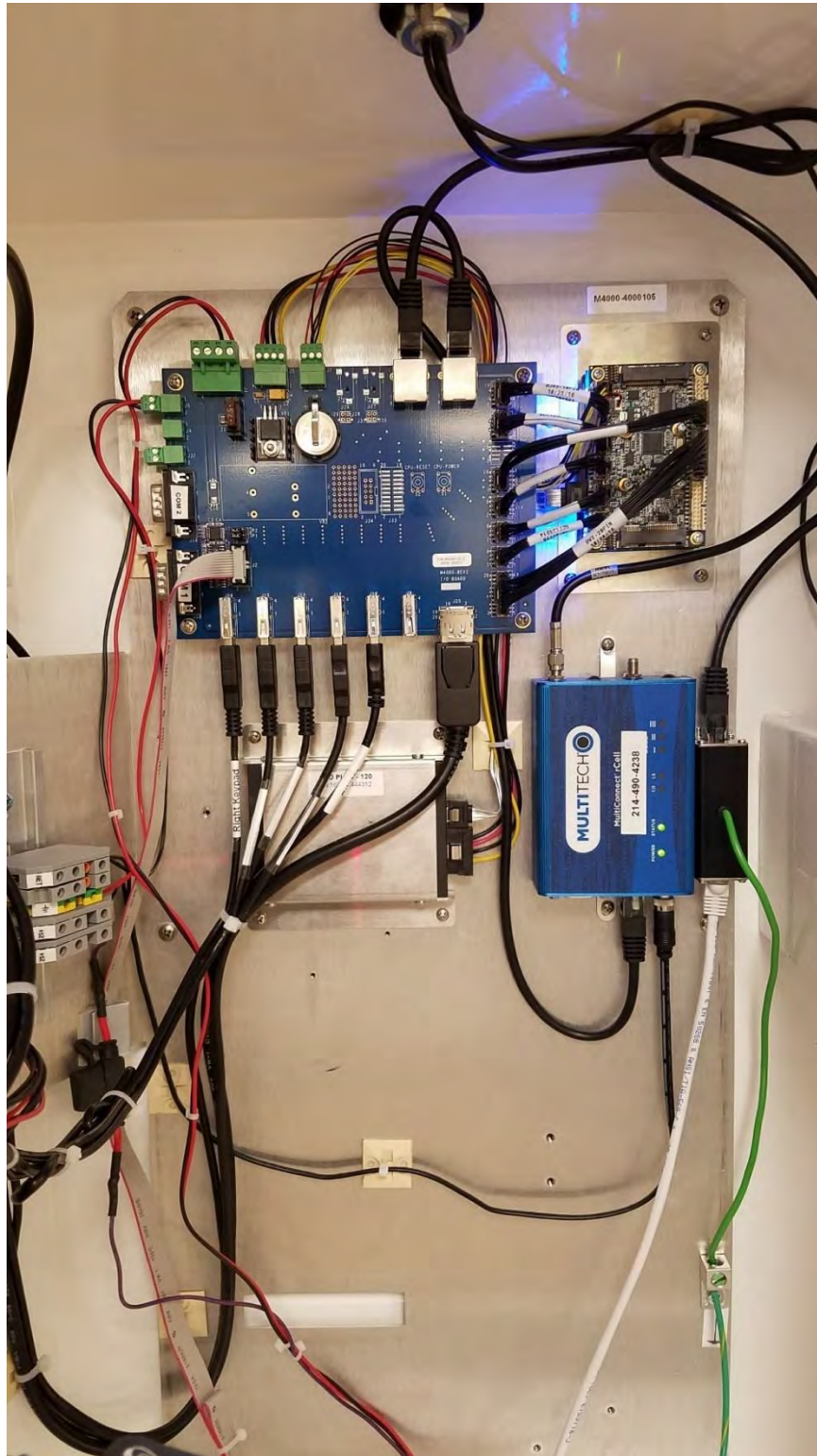


Figure 12 - Upper M4000 Component Wiring

CONNECT THE DPI RIBBON CABLE TO THE IO BOARD

Carefully identify and install the ribbon cable that connects the Terminal IO-Board J2 to the DPI J10 header. The connector headers and plugs are keyed so they can only be plugged-in correctly.

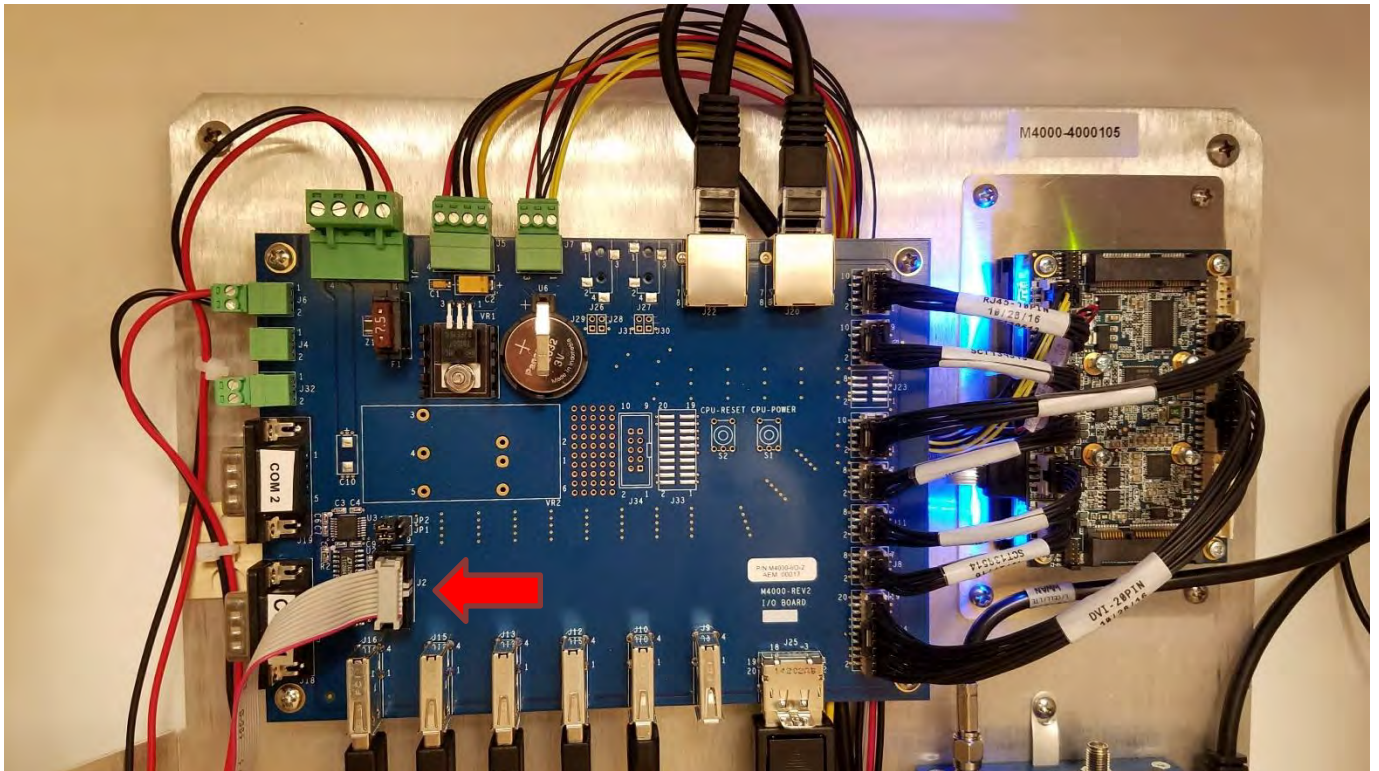


Figure 13 - Terminal IO Board and DPI

MOUNT THE PRINTER & INSTALLING PAPER

The printer is supplied in a separate box for safe transport. There are two blue retainers you pull out, to allow the printer to slide down into the mount. Pressing the retainers back locks the printer securely to the Terminal's front door. Power (Blue arrow) and USB connection (Red arrow) can then be made (see Figure 14).

Printer paper feeds from a spool that is placed in the holder just below the thermal printer. To install the paper: with power applied to the printer (should be a red LED glowing on its internal board), insert the paper into the slot marked on the back of the printer. The paper should automatically be fed and a test printout generated.



Figure 14 - Printer Mounting & Connections

Section 3 - Direct Pump Interface

The Direct Pump Interface (DPI) serves as the interface between high voltage signals routed to and from mechanical fuel dispensers and the digital control environment of the Terminal CPU and its associated peripheral devices. The DPI can be configured for the direct control of up to eight dispensers. The bottom-half has slots for the installation of Relay Modules.

The DPI Main-Board (Figure 15) has four status LEDs in the upper left corner (Refer to Section 5 for LED status definitions). In the middle is a CPU ribbon cable socket for connection to the terminal head electronics. The upper right corner is where 12VDC power is applied, and there is a 2 Amp fuse just to the lower right of the connector.

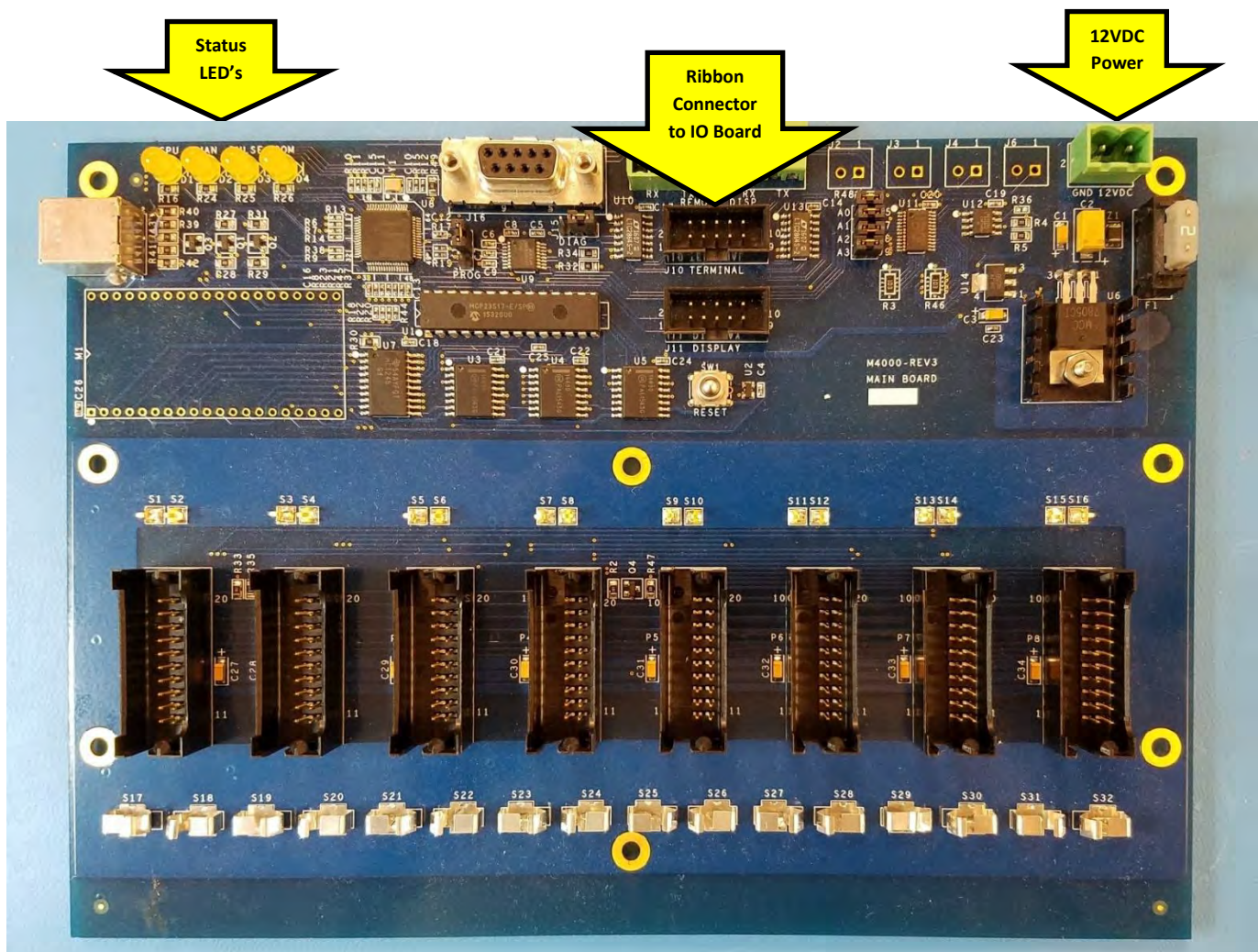


Figure 15 - Direct Pump Interface Main Board used for Mechanical Dispensers

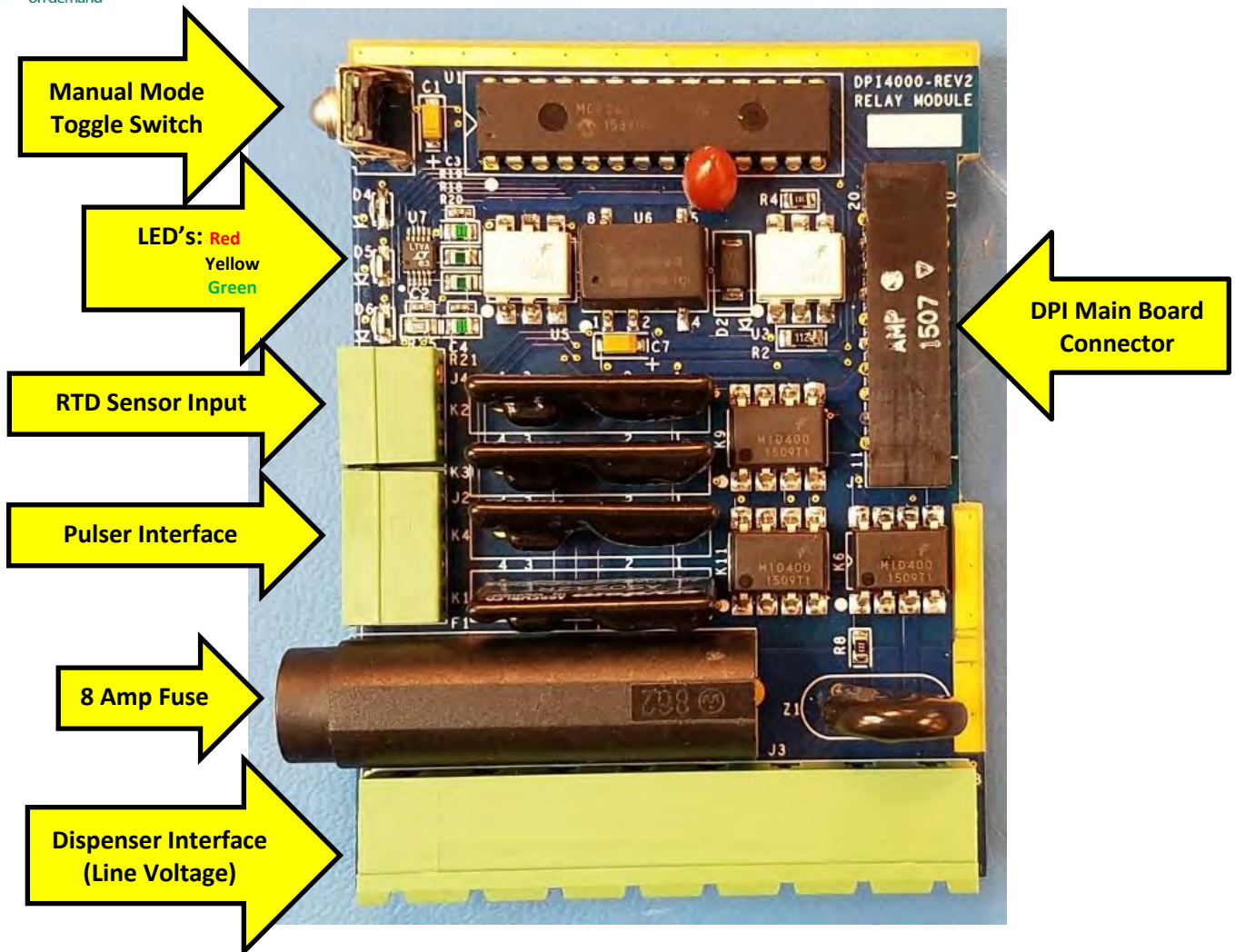


Figure 16 - Relay Module Interface Board (Rev 2 shown)

The DPI Relay Module (Figure 16) acts as an isolation device in that there is a bank of four solid-state relays for each dispenser (up to eight banks per DPI) which serve to isolate the digital portions of the DPI from the Line Voltage dispenser control signals. More protection exists in the form of 8 amp fuses located on each module. If any kind of short or voltage surge exists in any of the dispenser circuits, the fuses are designed to trip prior to further damage occurring. Take care to ring out control wires prior to applying power for the first time so you do not burn up a fuse.

The Relay Modules also contains interfaces to Pulsers and optional Resistive Temperature Detector (RTD) fuel thermal sensors. The four-pin connector below the three pin RTD connector is for attaching a pulser, a device that generates digital pulses in response to liquid flowing through the fueling system. There is an isolated 12VDC Supply and Ground per Relay Module for powering solid-state pulsers. The DPI is configurable for a variety of pulser types and resolutions on an individual dispenser basis. Two inputs are provided to support Quadrature, Staggered or Redundant versions of pulsers. Note that the Power and Ground is isolated and unique for each pulser, to prevent noise cross-coupling effects or system-wide damage if a dispenser's pulser has a problem.



Figure 17 – Minimal Pulser Connector Wiring for a mechanical pulser

Mounting and Wiring the DPI in the Pedestal

Note: The DPI ships pre-mounted in the pedestal but may need to be temporarily removed to drill conduit access holes into the metal barrier shelf. The DPI is mounted in the pedestal on the upper most set of integral standoffs. The center three mounting points are where a custom cut and drilled metal angle stiffener is attached. It is positioned to provide a top physical reference for the insertion of one or more Relay-Module boards and provides support for the top of the plastic safety shield. Once the DPI is mounted, and the Relay Module(s) installed, the control wires may be connected. Make certain all circuits are de-energized and each wire has been rung out and marked.

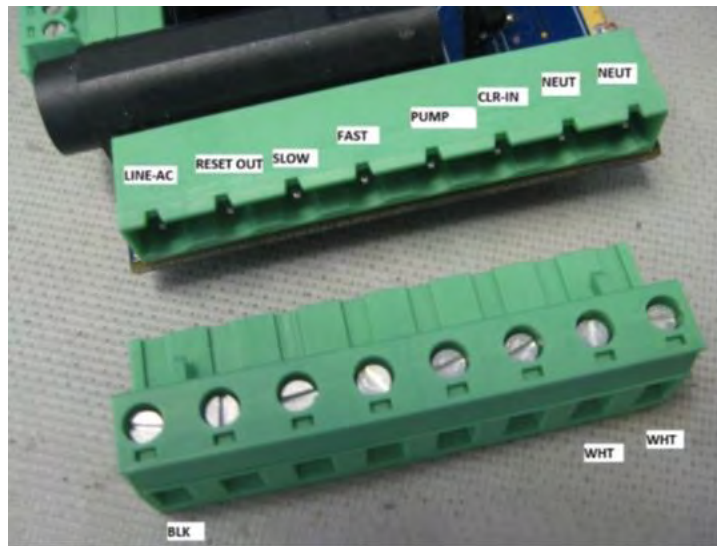


Figure 18 - Dispenser Control Wire Connections

As previously mentioned, if all work outlined in the Site Preparation Guide has been accomplished, the correct wires should be in place for termination to the DPI. Refer to Figure 11 for correct wire placement. Take a few minutes to examine such things as wire length and routing. The eight-screw terminal high voltage connector may be removed from the DPI Relay Modules if this makes wire termination easier but care should be taken not to cut wires too short. In particular, leave 4" of wire on Reset and Clear wires in case ferrite filters are deemed necessary to alleviate arc noise problems. In some cases where large current relays are present in the pedestal auxiliary 'snubber' parts are needed to be placed on the output circuit and neutral. QTpod recommends only Solid-State Relays (SSRs) to be used within the pedestal. QTpod can supply technical bulletin information for dealing with noise and high current relay issues.

Since the relay-boards power and control fuel pumping with Line Voltage signal levels, the lower section of the DPI is to be protected with a clear cover to prevent accidental contact. The top of the plastic cover is formed to rest against the board stiffener which provides mechanical support and prevents loose items (screws, washers, etc.) from accidentally falling into the high voltage area. The cover has access holes for fuse, connector and switch access for each relay-board location.

Extended-length corner standoffs are used to attach the cover at the lower edge with screws. Figure 19 shows the installation of the cover over the DPI.

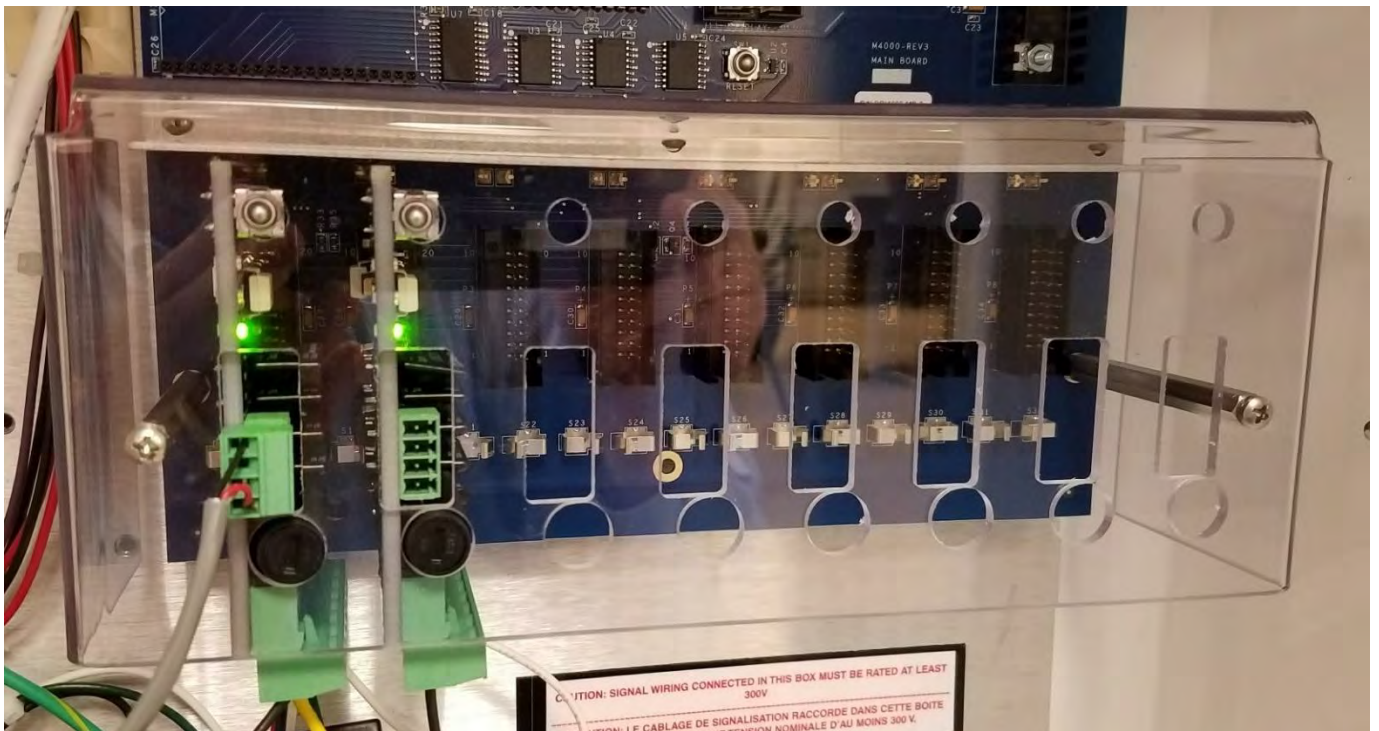


Figure 19 - Protective Cover Installation



CONNECTING INCOMING LINE VOLTAGE

In ideal circumstances, the line voltage (110 – 240 VAC) that powers the terminal 12VDC power supply is on a different circuit breaker than the line voltage provided to the DPI Relay Modules for activating dispenser components. It is highly recommended a separate circuit be utilized, one for the M4000 electronic components and a separate circuit for each dispenser. In ALL cases, these should be separated by high current relays (preferably Solid-State) from the voltage used to power motors.

Both green and green with yellow stripe are safety chassis grounds.

INITIAL SYSTEMS CHECK

The M4000 works with any combination of direct-wire and serial dispensers. In general, each type of dispenser operates the same during a customer transaction but the process of performing diagnostics varies from DPI (Direct Wire), and Serial Wire Dispenser Control Systems.

INITIAL POWER UP

Check to make sure all wires and connectors are in place and you are ready to apply power to the unit.

CONNECTING TO THE INTERNET

Utilizing the communication option selected during purchase (Ethernet, WiFi, or Cellular), connect to the Internet.

Connecting via WiFi will require additional steps done at the terminal to connect to a customer supplied wireless router. The external router will need to be pre-installed, connected to the Internet, and be located within connection range of the terminal. Refer to Appendix C for detailed instructions.

DOWNLOAD TERMINAL CONFIGURATION

Once finished booting, you can perform some rudimentary checks but before doing any actual dispenser tests, you'll have to download the terminal configuration from Siteminder.

If you are ready to receive your terminal configuration contact QTpod at (303) 444-3590 Option 3- 7:30 AM to 5:30 PM (Mountain) Monday through Friday. Be prepared with the following items (in most cases, QT will pre-configure the device's parameter's in Siteminder prior to shipment):

- 1) Number of and type of Dispensers
- 2) Price per gallon/liter and fuel types
- 3) Pulser resolution (number of pulses per gallon/liter/unit)
- 4) Receipt information (Business name and address)

The technician taking the info will guide you through the process and then attempt to send the terminal configuration over the internet you set up. Refer to Section 4 - Siteminder.

Once the Terminal Configuration has been successfully saved and sent to the Terminal, various tests need to be run to assure the M4000 is performing properly.



Section 4 - Siteminder

TERMINAL CONFIGURATION

In most cases, QTpod will set-up your configuration prior to delivery of the hardware.

In general, the terminal configuration provides the terminal with basic information about the number and types of dispensers controlled by the terminal, fuel prices, receipt messages, credit card account data, and other important information. Prior to commissioning your system, oil company account representatives and/or QTpod personnel may assist you in obtaining account data which allows your system to process credit cards. If you chose to set up your fuel terminal prior to obtaining credit card account information, your terminal can still operate in self-service operation but will be restricted only to private cards you issue to your customers.



Section 5 - Operational Check

The operational check phase is critical since this is the final check prior to placing the system into operation for public use. As you go through and test the system, think of it in terms of discrete sub-systems.

- 1) All aspects of the user interface need to be configured for ease of use.
- 2) All aspects of the dispenser control interface need to be wired and configured correctly.
- 3) All aspects of the credit card network and communications interface need to be configured correctly.

TERMINAL OPERATING MODES

While the Site Preparation Guide does a good job of describing mechanical dispenser operation, it is worth a quick review here. A fuel transaction, whether in auto or manual mode, always begins with the Reset Signal (R1, R2, etc.).

MANUAL MODE

In manual mode, Reset (R1 in our example) is always energized so that if a customer turns the handle/switch on the dispenser, a contact is closed, a Clear (C1) is detected back at the DPI, and all other pump signals are energized (S1, F1, and P1). The customer is now free to pump fuel in manual mode with no automated services operating. Manual mode is a great mode to use while testing the dispenser wiring into the DPI. Even if the technician has no way to actually dispense fuel, they can verify that all applicable circuits are energizing their appropriate dispenser components at the right time.

DIAGNOSTIC MODE

Using the Diagnostic Utility, you can monitor all the DPI's functions while performing a Manual-Mode operation. There are neon colored icons on the screen corresponding to Reset, Slow, Fast, Pump, and Clear.

TESTING DIRECT WIRE SYSTEMS

Direct Wire Systems are those systems that employ the DPI for dispenser control via Line Voltage wires. A total of eight (8) direct wire dispensers can be installed into a DPI within each M4000 pedestal.

MAIN-BOARD's FOUR (4) YELLOW LEDs

LED is short for Light Emitting Diode and are key to ensuring your equipment is operating correctly.



Figure 20 - Main Board LEDs

On Power-up or Reset:

The DPI does a self-test and configuration operation on every reset. The four LEDs will count up in a binary pattern as an indicator of progress. On any step that an error occurs on, the system will stop and the LEDs will be left indicating which step failed. (ON = 1)

Pattern Represents

- 0000: No LEDs, check power supply, fuse, DC polarity
- 0001: DPI application started
- 0010: I2C is connecting to Interface and non-volatile memory ICs
- 0011: SPI interfaces configured, scanning for installed Relay Modules
- 0100: Relay Module LED test, all three colored LEDs on (for 1 sec delay)
- 0101: NVMEM contents being verified
- 0110: NVMEM working contents loading back into system memory
- 0111: Serial Command Interface enabled

While Operational:

The four LEDs are labeled left-to-right as CPU, MAN, PULSE and COM.

- **CPU** will flash ON/OFF every second as an indication that the CPU is running the DPI application properly.
- **MAN** will light anytime one or more Relay-Boards are enabled for **Manual-Mode*** Pump operation.
- **PULSE** will flash on the detection of a valid pulse event on any of the Relay-Modules.
- **COM** will flash to indicate serial communication with the terminal. The flash will be longer on reception of a valid command addressed to this DPI.

RELAY MODULE LEDS

The modules are addressed by the DPI from left-to-right as slots 1 through 8. There are three colored LEDs along the top outer edge of each relay module board (Figure 21).

Red LED: (Located directly below the pushbutton switch)

- Flashes briefly on any valid command received for that Relay Module
- Stays constantly on when in **Manual Mode***

Yellow LED:

Flashes as an indicator of Pulser activity detection over a recent time interval

- Once = Pulse input A edge detected
- Twice = Pulse input B edge detected
- Thrice = activity on both A&B (Quadrature, Staggered, Redundant modes)

Green LED:

Indicates status of AC powered Pump

- Solid green when standing-by and ready
- 1 sec flashing when AC power not detected (check fuse, breaker or wiring)
- Solid green with brief off pulsing while waiting for Clear (nozzle handle removal)
- Medium speed flashing on/off when pumping with slow valve open
- Fast flashing speed on/off when pumping with fast valve open
- Solid green with brief off pulsing when waiting for nozzle handle's return



Figure 21 - Relay Module LEDS

****Manual-Mode** is available only when AC power is connected and the relay module is not already active with a pumping transaction. Pressing the button will light the red LED and immediately enable pump power, awaiting the Clear handle operation. Pressing the button again prior to the Clear Handle will abort the manual mode, turning off pump power and the red LED.*

Once the Clear-Handle event occurs and after pumping operation completed, the Manual Mode is terminated by returning of the Handle.

NOTE: Pumping activity under Manual-Mode is logged into non-volatile memory for eventual retrieval by the Terminal controller.



THE DIAGNOSTIC UTILITY

Starting from the Terminal's splash screen:

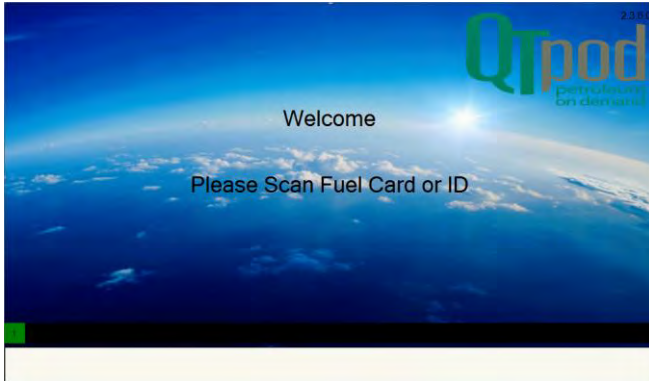


Figure 22 - Splash Screen

Swipe the Diagnostic card containing the manager's code or enter the site manager's code using the numeric keypad:

To enter the code by keypad, press the CLR key, enter the site manager's code, then press the CLR key.

If remotely connected, or using a PC keyboard:
substitute Backspace for the CLR keystrokes above.

NOTE: Each Terminal could have a unique code assigned via Siteminder. The "ManagerCode" key value can be found as the pvt card code.

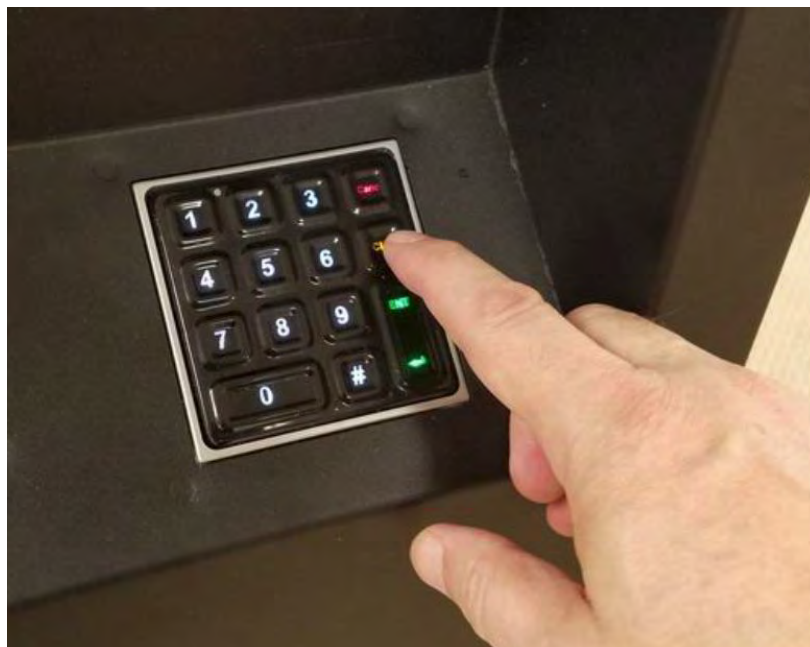
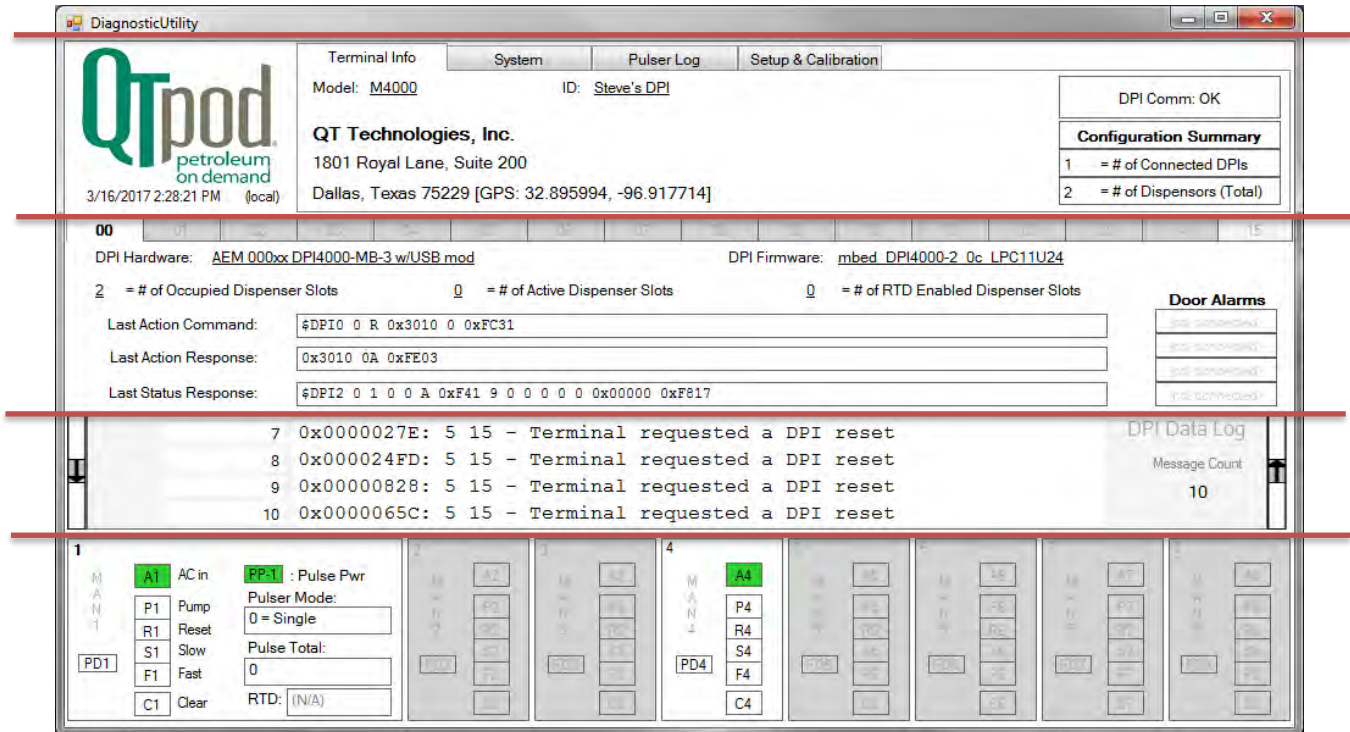


Figure 23 - M4000 Keypad

The Diagnostic Display Screen

The screen should briefly revert to the windows desktop as it loads the Utility. The screen should eventually be similar to that shown below:



The screenshot shows the 'DiagnosticUtility' window with the following sections:

- Terminal Info:** Model: M4000, ID: Steve's DPI, QT Technologies, Inc., 1801 Royal Lane, Suite 200, Dallas, Texas 75229 [GPS: 32.895994, -96.917714].
- Configuration Summary:**
 - 1 = # of Connected DPIs
 - 2 = # of Dispensers (Total)
- DPI Hardware:** AEM 000xx DPI4000-MB-3 w/USB mod, **DPI Firmware:** mbed DPI4000-2 0c LPC11U24
- Door Alarms:** Section with four status indicators (all showing 'not connected').
- DPI Data Log:** Message Count 10. Log entries:
 - 7 0x0000027E: 5 15 - Terminal requested a DPI reset
 - 8 0x000024FD: 5 15 - Terminal requested a DPI reset
 - 9 0x00000828: 5 15 - Terminal requested a DPI reset
 - 10 0x0000065C: 5 15 - Terminal requested a DPI reset
- Control Panel:** Divided into four sections (1, 2, 3, 4) with various buttons and indicators.
 - Section 1:** A1 AC In, P1 Pump, R1 Reset, S1 Slow, F1 Fast, C1 Clear, PP1 Pulse Pwr, Pulse Mode: 0 = Single, Pulse Total: 0, RTD: (N/A).
 - Section 2:** A2, P2, R2, S2, F2, C2.
 - Section 3:** A3, P3, R3, S3, F3, C3.
 - Section 4:** A4, P4, R4, S4, F4, C4.

Figure 24 - Diagnostic Screen

The screen is divided vertically into four sections (red lines added) that correspond to the location of the Terminal display's side switches. The following instructions detail the information contained within the four sections.

NOTE: If accessing the Terminal remotely (via SOTI) or using wireless keyboard mousepad, then the selection process simplifies to using mouse clicks. The following instructions are tailored for use when at the M4000 Terminal.



Figure 25 - Option Keys to the left of the Display

The upper switch pair allows selection of labeled tabs. The left-side switch increments selection to the right and the right-side switch moves back to the left.

Likewise, the remaining three switch pairs apply to the selections for DPI, Messages log, and Slot expanded view.

At any time, you can use the <CLR> keypad button to revert to the M4000 Terminal program.

NOTE: *Inactivity over 5 minutes will cause the Diagnostics Utility to quit and restart the Terminal Application.*

Top Tabs, First Section:

The keypad is used to select numbered options from the upper tabbed section:

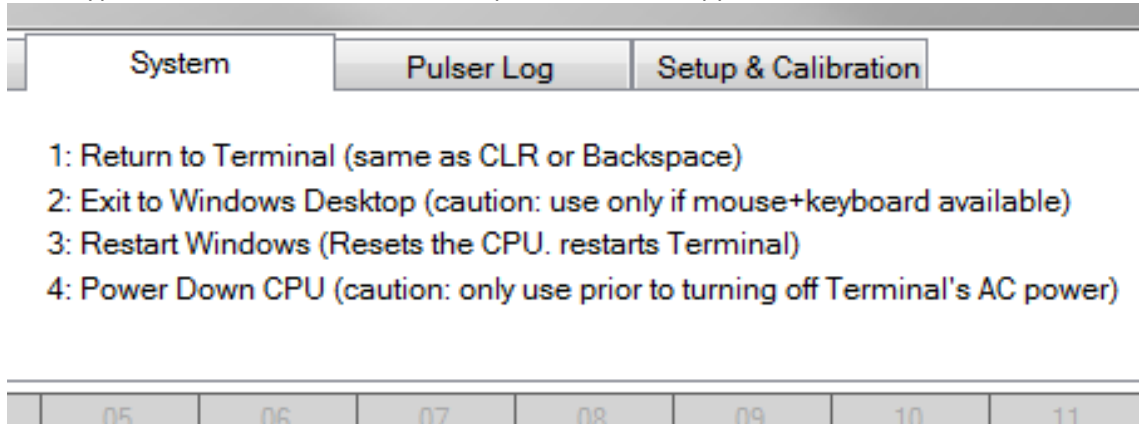


Figure 26 - System Tab in First section

For the 'System' tab, Options #2 and #4 should only be used if there is unlocked enclosure access as it could require full power cycling to return the Terminal to operation.

The 'Pulser Log' tab is there for Weights & Measures conformance and will allow the generation of either a printout or screen display of timestamped changes to the pulser resolution settings. Refer to Appendix D for more information, including a list of the letter code meanings.

The 'Setup & Calibration' tab is intended for use during factory functional testing.

Second section:

The second level of switches allows selections of one to fifteen (addresses 0 - 14) connected DPIs. The last address (15) is reserved for special initialization and calibration steps to be done at the factory. The selection of a DPI affects the information shown in the bottom three zones of the display.

The first couple lines of information presented is derived from the Siteminder-generated "Terminal.xml" data file as well as information retrieved from the DPI's non-volatile memory. The 'Last Action / Status' lines are there predominately for engineering development use. They show the communication to-and-from the DPI over the serial port.

Third section:

The currently selected DPIs data log section is generally intended for engineering development use, but the messages are also retrieved by the Terminal when online, and some are included in the Terminal's system log.

Bottom, Fourth section:

Graphical representation of the eight slots on the currently selected DPI board. Grayed slots are considered empty and the white ones are present and selectable. When selected, there is additional detail information present in the widened area.

The upper left corner is the slot number; the font is in **bold** when that slot is selected. The green blocks represent power status; the AC power into the relay module, and the 12VDC isolated supply provided for external pulser use.

The RED section indicates when a slot is being used in Manual Mode, the YELLOW block indicates when pulse activity is detected on that slot. The ORANGE blocks represent the status of the Line Voltage relays and signals connected to the bottom eight-pin connector of the relay module board.

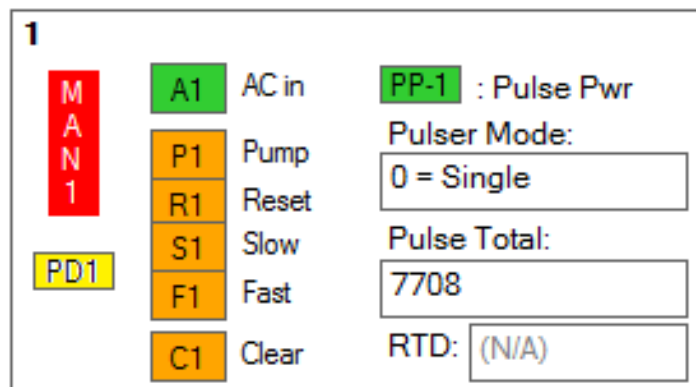


Figure 27 - DPI Board Slot Graphic

The orange indicators are a functional throw-back to the neon bulbs used on legacy products.

Pulser mode is defined in Siteminder, which generates the "Terminal.xml" file and is defined as follows:

- 0 = Single input
- 1 = Quadrature or Overlapping pulses, both inputs used
- 2 = Staggered or non-overlapping pulses, both inputs used
- 3 = Redundant, both inputs used, having same signal

Note: The DPI only deals with counting pulse edges; therefore, totalizer values, pulser resolution, temperature compensation are all handled by the Terminal program.

The DPI auto-detects when a Relay-Board has the RTD (temperature) hardware present and will update the value in that field during fueling operations.



INITIATE TEST SALE IN AUTO MODE

If the M4000 is functioning properly in Diagnostic Mode, it is time to see if all is well in Auto Mode. It is best to use a private (or proprietary) card for testing so that you are not introducing the added issue of communicating out for approvals and possibly being charged for fuel being pumped for test purposes. There will be a specific test for credit card approvals later.

Make sure you have somewhere to pump the fuel. It is ideal if you can pump back into the tank since this allows you to circulate a large amount (for greater overall accuracy) but if this is impossible, arrange for a vehicle with an approved container.

With the Unit in Auto Mode:

- 1) Swipe your test card and follow the prompts - make note of prompts which may need modification in the Terminal Configuration.
- 2) Select one gallon and press <enter>. Press <enter> again to confirm.
- 3) The Pump Motor should come on, and on the bottom section of the screen the prompt will read (in effect), "Turn Pump Handle on". The small numbered square green blocks on the lower section of the screen will turn yellow indicating that the dispenser is busy. If you look at the DPI at this point, you will notice that the appropriate Relay-Module's Green LED is briefly pulsing OFF to indicate it is waiting for the Clear Handle switch to be activated.

NOTE

The pump motor comes on prior to the 'pump handle' being lifted due to a feature called 'Hose Prime Duration' in which the hose is primed by running the pump motor and cycling the valves for a second (this is configurable). This is a popular and necessary feature at airports which typically have long, large diameter hoses that accumulate air between fueling events. It is also useful at any sort of retail fueling facility but can cause confusion if the sound of the motor makes customers think the handle is already lifted.

NOTE

For every discrepancy you find in the Terminal Configuration, the correct parameter must be modified in Siteminder and then pushed to the terminal. To save time, look for several discrepancies which need to be corrected before downloading and retesting.

- 4) Lift the pump handle and a switch closes, sending a Line Voltage signal from 'Reset' to 'Clear'. The program logic now also turns on the slow valve ('Slow') and waits for the customer to begin pumping fuel. The DPI Relay Module's Green LED should now be moderately flashing to indicate the Slow valve is activated.
- 5) You may now begin to pump fuel and you will notice it flows slowly since the fast valve is not yet on. As the first bit of fuel passes the meter, pulses are generated and the 'Pulses Before Fast Flow' parameter is satisfied. Once the system registers pulses, the 'Fast' circuit energizes and fuel should flow at full flow. The Green LED on the Relay-Module will flash faster to indicate this.
- 6) As the sale approaches the end of its preapproved amount, the 'Fast' circuit will cut off per the parameter, 'Slow Flow Engage Pulses'. This assures the flow of fuel slows for precise metering. As the fuel 'creeps' up to the targeted amount (in this case, one gallon), note whether the 'creep' is way too long or missing. If too long, decrease the number of 'Slow Flow Engage Pulses' set in the terminal's Siteminder configuration and do another test. If there seems to be no 'creep' at all, add more 'Slow Flow Engage Pulses' and do another test.
- 7) After the test sale terminates, compare the receipt to the actual amount dispensed and note any discrepancies. If the amount on the receipt differs from the amount displayed on the meter, you may need to contact QTpod support. There are other Siteminder parameters, Overshoot pulses and Completion delay that can help if a dispenser runs past the expected value.

NOTE, recommended additional tests: You can also repeat the above test but stop fueling prior to reaching the target. Returning the handle should immediately complete the transaction. In another test you can repeat the above but rather than returning the handle, you wait for an inactivity timeout to complete the transaction.

Glossary of Terms

(suggested **web** resource for further information: https://en.wikipedia.org/wiki/Main_Page)

BIOS: an acronym for Basic Input / Output System. The fundamental purposes of the BIOS are to initialize and test the system hardware components, and to load (**boot**) an operating system from a mass memory device.

Boot: In computing, it is the initialization of a system and the loading of an **OS** (operating system).

CPU: an acronym for Central Processing Unit. The electronic circuit within a computer system that carries out the instructions of a computer program.

DIN (rail): A DIN rail is a metal rail of a standard type widely used for mounting circuit breakers and industrial control equipment inside equipment racks. The term derives from the original specifications published by Deutsches Institut für Normung (DIN) in Germany, which have since been adopted as European (EN) and international (IEC) standards.

DisplayPort (DP++): a digital display interface used to connect a video source (computer) to a display device (computer monitor). A Dual mode version also known as DisplayPort++ (DP++) allows connections through passive adaptors to displays with **DVI** input interfaces.

DPI: an acronym used by QTpod for the Direct Pump Interface. It is the hardware circuitry mounted within the terminal's pedestal that interfaces the terminal controller with the fueling equipment's valves, pumps and measurement hardware.

DVI: an acronym for Digital Video Interface. An interface for connecting a video source, such as a computer's video display controller to a display device, like a computer monitor.

Ethernet: is a family of computer networking technologies commonly used in local area networks. The most common forms used are 10BASE-T, 100BASE-TX, and 1000BASE-T. All three utilize twisted pair cables and 8P8C (**RJ45**) modular connectors. They run at 10 Mbit/s, 100 Mbit/s, and 1 Gbit/s, respectively.

FLASH: A type of electronic memory that is solid-state and non-volatile (**NVMEM**). A computer storage medium that can be electrically erased and reprogrammed.

HVD: an acronym used by QTpod for the High Visibility Display, a metal enclosed circuit board with large 7-segment arrays of red **LEDs** arranged to display numbers and limited characters that can be viewed from a distance. One or more of these can be wired to a single QTpod Terminal as the individual panels have selector switches for assigning unique addresses (1 – 15).

I²C (I²C): pronounced I-squared-C, is a multi-master, multi-slave, packet switched, single-ended, serial computer bus. Master and Slave devices communicate over a two-wire interface.

IDE: The term Integrated Drive Electronics refers not just to the connector and interface definition, but also to the fact that the drive controller is integrated into the drive, as opposed to a separate controller. Developed by Western Digital as an interfacing method between Hard drives and computers.

IO: an acronym for Input / Output, typically referring to data ports that transfer binary (logical) signals into and out from computers and their peripherals.

Internet: is the global system of interconnected computer networks that use the Internet protocol suite to link devices worldwide. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (**WWW**), electronic mail, telephony, and peer-to-peer networks for file sharing.

Latency: The time delay between a triggering event and the start of the system reaction to the stimulus.

LED: A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when electrical current flows through it. Often used as indicator lamps for electronic devices, replacing small incandescent bulbs, due to their lower power and longer life.

NVME: an acronym for Non-Volatile Memory, a type of computer storage device that can retrieve stored information even after having been power cycled (turned off and back on).

OS: An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs.

PCIe: Peripheral Component Interconnect Express, officially abbreviated as PCIe is a high-speed serial computer expansion bus standard, designed to replace the older bus standards. A reduced form factor variant named mini-PCIe (mPCIe) is sometimes available for adding peripheral hardware to smaller-sized systems.

PIE: Progressive International Electronics is manufacturer of electronic interfaces to a variety of fuel dispenser hardware. Website link: <http://www.pie-corp.com/products.html>

Quadrature: Regarding pulse counting on fueling systems, pulsers with the two signal quadrature outputs can represent both quantity and the direction of flow.

Relay: A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays (**SSR**). Relays are used where it is necessary to control a circuit by a separate low-power signal.

Relay Module: The M4000 **DPI** consists of a mainboard with eight slots for the addition of expansion modules that use **SSRs** to convert logic-level control signals to high voltage outputs to control valves and pumps used in fuel dispensers.

RJ45: The 8 position 8 contact (8P8C) connector is a modular connector commonly used to terminate twisted pair cable. These connectors are commonly used for **Ethernet** over twisted pair. Commonly referred to as an RJ45 in the context of Ethernet and category 5 & 6 (CAT5 & 6) cables.

RS232: is a standard for serial communication transmission of data. It formally defines the signals connecting between a DTE (data terminal equipment) such as a computer terminal, and a DCE (data circuit-terminating equipment or data communication equipment), such as a modem. The RS-232 standard is commonly used in computer serial ports.

RS422: is a technical standard that specifies electrical characteristics of a digital signaling circuit. Differential signaling can transmit data at high rates over very long cable runs.

RTD: Resistance temperature detectors, also called Resistance thermometers, are sensors used to measure temperature. Many RTD elements consist of a length of fine wire wrapped around a ceramic or glass core but other constructions are also used. The RTD wire is a pure material, typically platinum, nickel, or copper. The material has an accurate resistance/temperature relationship which is used to provide an indication of temperature. As RTD elements are fragile, they are often housed in protective probes.

SATA: abbreviated from Serial AT Attachment, an interface standard for the connection of storage devices such as hard disk drives to computers. The ATA interface itself evolved in several stages from Western Digital's original parallel **IDE** interface. The Serial ATA interface was introduced in 2003.

SQL: Structured Query Language is a domain-specific language used in programming and designed for managing data held in a relational database management system. It consists of a data definition language, data manipulation language, and data control language. The scope of SQL includes data insert, query, update and delete, schema creation and modification, and data access control.

SOTI: A company known for software tools for Enterprise Mobility Management (EMM). website: <https://www.soti.net/products/mobicontrol/overview/>

SPI: The Serial Peripheral Interface bus is a synchronous serial communication interface specification used for short distance communication, primarily in embedded systems. SPI devices communicate in full duplex mode using a master-slave architecture with a single master. The master device originates the frame for reading and writing. Multiple slave devices are supported through selection with individual slave select (SS) lines.

SSD: A solid-state drive (SSD, also known as a solid-state disk) is a solid-state storage device that uses integrated circuit assemblies as memory to store data persistently. SSD technology primarily uses electronic interfaces compatible with traditional block input/output (I/O) hard disks. SSDs have no moving mechanical components.

SSR: A solid-state relay is an electronic switching device that switches on or off when a small external voltage is applied across its control terminals. SSRs consist of a sensor which responds to an appropriate input (control signal), a solid-state electronic switching device which switches power to the load circuitry, and a coupling mechanism to enable the control signal to activate this switch without mechanical parts. The relay may be designed to switch either AC or DC to the load. It serves the same function as an electromechanical relay, but has no moving parts.

Taskbar: A taskbar is an element of a graphical user interface which has various purposes. It typically shows which programs or applications are running on the device, as well as provide links or shortcuts to other programs or places, such as a start menu, notification area, and clock.



URL: A Uniform Resource Locator, colloquially termed a **web** address, is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it.

USB: short for Universal Serial Bus, is an industry standard that defines cables, connectors and communications protocols for connection, communication, and power supply between computers and electronic devices.

WiFi: Wi-Fi or WiFi is a technology for wireless local area networking with devices based on the IEEE 802.11 standards. Wi-Fi most commonly uses the 2.4 gigahertz and 5 gigahertz radio bands. Wi-Fi technology may be used to provide Internet access to devices that are within the range of a wireless network that is connected to the **Internet**.

WWW(Web): The World Wide Web (abbreviated WWW or the Web) is an information space where documents and other web resources are identified by Uniform Resource Locators (**URLs**), interlinked by hypertext links, and can be accessed via the **Internet**.

Write caching: A cache's sole purpose is to reduce accesses to the underlying slower storage. Fundamentally, caching realizes a performance increase for transfers of data that is being repeatedly transferred. This performance increase is due to buffering occurring within the caching system. Since buffered (cached) data is held in standard computer memory, there is a danger of data loss during power failures. With the high transfer speeds provided by **SATA** connected **SSD** devices, the risk of data loss may outweigh any advantage of write caching.



Appendix A – Serial Protocol Dispensers

NOTE: QTpod will forward the documentation provided by the 3rd party equipment that is installed for a customer site.



Appendix B – Multi-Line High Visibility Displays

Note: Reference M3000 documentation (T0139) with the only change being that the ribbon cable now plugs into J11 on the DPI board.



Appendix C – WiFi Setup Instructions

The following steps are for those customers who purchased the WiFi connection option for their M4000.

Reference: Link for setting up WiFi router that connects to Internet:

<https://support.microsoft.com/en-us/help/17137/windows-setting-up-wireless-network>

It is recommended that installation technicians first attempt connecting to WiFi at the terminal's location with their cell phone or other WiFi enabled equipment. This will acquaint them with the procedural steps and verify they can correctly identify the router's name and enter the correct secure password. Signal strength can also be evaluated by the device's strength meter, if provided.

Difficulty in reliably connecting during the above operation will indicate serious connectivity problems for the M4000 as well. Contact QTpod regarding other options for connecting the M4000 to the Internet.

Terminals with the WiFi option include a small keyboard-touchpad accessory that connects to the Terminal via a small USB transmitter. Install the USB interface into one of the available USB connectors along the bottom edge of the IO-Board. If no connectors are available you can temporarily unplug one of the other connectors during this setup procedure.

The terminal will always powerup and/or reset to run the QTpod terminal application. To change WiFi settings you will need to exit that default application. Methods to exit the application are: Go to the QTpod Diagnostic-Utility by swiping a special managers code card, or by entering the code via either the terminal's front keypad or using the newly connected keyboard. The code is entered by first pressing the CLR (backspace) key on the keypad first, then the code numbers followed by another CLR (backspace) keypress.

Once the Diagnostic-Utility starts you can abort to the windows desktop by either clicking the upper right red "X" or by tabbing the Diagnostic-Utility's top section to "System" and then pressing option "2".

Continue configuring WiFi connectivity once the terminal is at the Windows 10 desktop.

1. Go to "Settings > Network & Internet > Wi-Fi > Show available networks"
2. Click on the network name (SSID = service set identifier) you are to connect to
3. Check the box to always "Connect automatically"
4. Enter the network security key
5. Decline sharing of the M4000 by selecting "No", or closing the Settings screen.

Use the lower left windows icon to get to the option to "Restart Windows"

This will reboot and reload the application

Helpful links for setting WiFi connectivity on the terminal.

<https://www.wikihow.com/Connect-to-WiFi-in-Windows-10>

<https://support.microsoft.com/en-us/help/4000432/windows-10-fix-wi-fi-problems>



Appendix D – Accessing Change Log

Weights and Measures Change Log

The M4000 maintains a log file containing all changes made to parameters that could affect pricing and the measured quantity of fuel dispensed.

Log file location

On the terminal, the log file is typically named PulserResolution.txt and is stored in the c:\PCITrace folder (the file name is based on what is configured in the Nlog.config file).

Log File Display and Printing

The contents of the log file can be accessed from the terminal screen by means of the Diagnostic Utility. The terminals have a site manager's keypad access code or a Diagnostic card that will suspend the terminal program (if no transactions are in process) and start the utility.

Use the top left terminal screen button to highlight the "Pulser Log" tab. From there you can use number keys on the keypad to print or display the file's contents.

Log File Codes

Each parameter change is time and date stamped with a code and parameter. **The codes are as follows:**

- PT:** Pulser Type [0 = Single, 1=Quadrature, 2=Staggered, 3=Redundant]
- PR:** Pulser Resolution, number of pulses per gallon
- PC:** Price Change, the new value in dollars per gallon (*dollars.cents*)
- SF:** Slow Flow pulses before the FAST valve is opened
- OS:** Overshoot compensation, number of pulses prior to reaching end target to stop flow
- HP:** Hose Prime duration (seconds)
- CD:** Completion Delay, number of seconds before timeout if clear-handle is not returned

Refer Section 5 for additional instructions on the use of the diagnostic utility.



Appendix E – SITE PREPARATION CHECKLIST

The terms of this site installation (as agreed) are for an authorized factory technician to be on site for start-up and training. The following items must be fully completed prior to our technician booking travel to site. Additional charges may be incurred if site preparation is not completed as stated. Please initial each item, sign form, then scan and email all pages to techsupport@qtpod.com (or fax to QT Petroleum on Demand @ (303) 444-8736). An installation cannot be scheduled until this checklist is received, fully completed.

Terminal / Dispenser System Related Requirements

1. A low voltage conduit (or shielded cable in conduit B) going from each dispenser Junction Box to the terminal pedestal with at least five #16 AWG (See Figure 7 or 8 — Dispenser Field Wiring Diagram, conduit A). If LEVEL 2 grounding is desired, a conduit going from the low voltage J-Box to the ground reel with two # 16 AWG wires is needed. The wire size may have to be increased on long distances or runs.

Completed on ___/___/___ by_____

2. A high voltage conduit going from each dispenser J-Box to the terminal pedestal with at least six #14 AWG wires (See Figure 7 or 8 — Dispenser Field Wiring Diagram, conduit B). Other wires such as 220v pump, hose reels, etc., would need extra wires for their support needs. The wire size may need to be increased on long distances or runs.

Completed on ___/___/___ by_____

3. (for direct connect systems) A low voltage conduit going from the terminal pedestal to the site's Internet access point (Router or Switch). This conduit has at least one Cat5 or Cat6 Ethernet cable. (See Figure 7 or 8 — Dispenser Field Wiring Diagram, conduit C)

Completed on ___/___/___ by_____

4. All wiring to run the pump is completed (See Figure 7 or 8 — Dispenser Field Wiring Diagram, conduit E or F). One wire per pump control relay is required in conduit E if the relay(s) are located at or near the Breaker Panel.

Completed on ___/___/___ by_____

5. A high voltage conduit going from the terminal pedestal to the breaker box (See Figure 7 or 8 — Dispenser Field Wiring Diagram, conduit D). The conduit will contain a dedicated neutral & hot for the terminal computer and fuel dispensers (NOT Pump Motors). Electricians should determine the wire



size. Include a ground wire of 10 AWG. [Note: this requirement is for terminal and dispenser power ONLY, accessories such as 220V pumps, hose reels, lighting, etc. need their own circuits.]

Completed on ___/___/___ by_____

6. The terminal pedestal has been mounted with all appropriate conduits stubbed up to the shelf. Check clearances for installation & maintenance access.

Completed on ___/___/___ by_____

7. Each dispenser has a 2-stage electric solenoid valve. This type of valve has a fast valve for full flow and a slow valve (2-3 GPM) for pre-set sale amounts. This item is NOT OPTIONAL. You must have this for the fuel terminal to function correctly. Call QT Petroleum on Demand if you need to order a 2-stage valve.

Completed on ___/___/___ by_____

8. Each dispenser has at least a 100:1 resolution pulser for gallon only meters, or a 1 pulse per penny pulser for a dollar dispenser. Pulsers with less resolution WILL NOT WORK, since they will fail weights & measures inspections.

Completed on ___/___/___ by_____

9. Each dispenser has an electric reset or a way to mimic the electric reset. This is done through a lever-actuated switch in an explosion proof housing (See Figure 5).

Completed on ___/___/___ by_____

10. Each tank has fuel in the tank for testing purposes. We will also need somewhere to pump the fuel within the reach of the hose. Usually back into the tank, a fuel truck, vehicle, boat or plane. It may require pumping 100 gallons or more for testing.

Completed on ___/___/___ by_____

11. The system has been pressure tested for leaks all the way to the end of the hose.

Completed on ___/___/___ by_____



The site preparation has been completed in compliance with the above checklist.

Signature

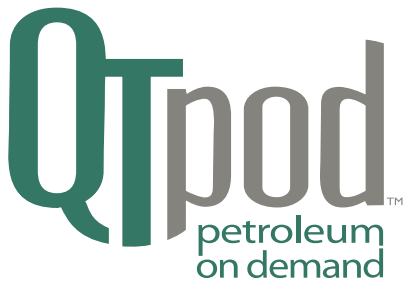
Date

Name (Please Print)

Company

Phone Number

Site Name



M4000 NextGen Self-Serve Fueling Terminal

Software Service Subscription Plans for 2018

Protect your investment and lock in savings of up to 20 percent with a multi-year *Premium Access Plan* from QTpod, the leader in self-serve terminals.

Premium Access Plan

- Access/use of Siteminder Fuel Management Software
- Cloud-based M4000 database hosting
- 24/7 telephone technical support
- No-charge software updates
- No-charge for repaired or replacement parts*
- Expedited shipping on replacement parts

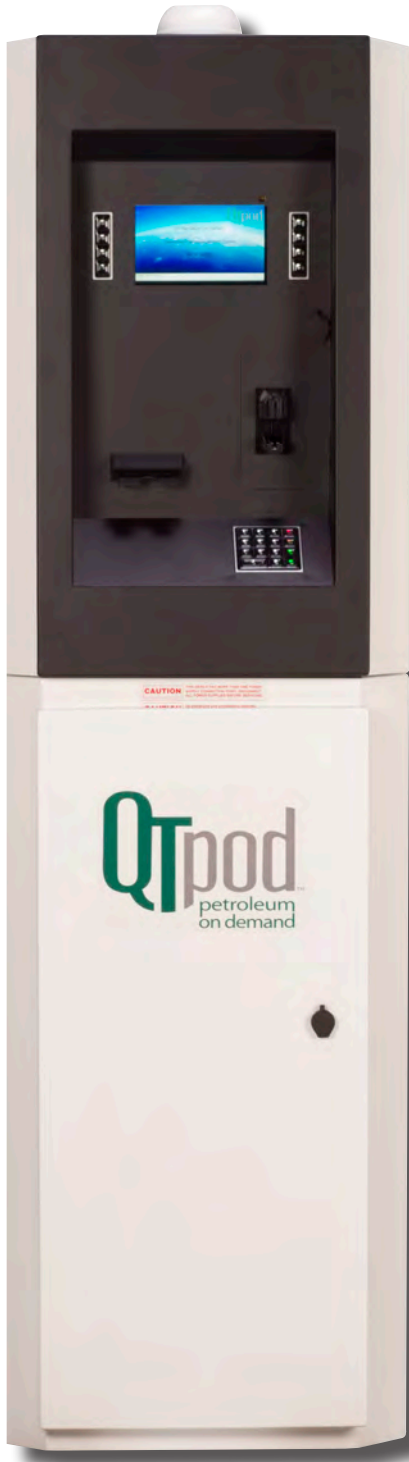
Premium Access Plan*	Cost	Total Savings	Cost Per Year
One-year prepaid	\$1,995.00	-	\$1,995.00
Three-year prepaid	\$5,386.50	\$598.50	\$1,795.50
Five-year prepaid	\$7,980.00	\$1,995.00	\$1,596.00

Base Access Plan

- Access/use of Siteminder Fuel Management Software
- Cloud-based M4000 database hosting
- 24/7 telephone technical support
- No-charge software updates
- Replacement parts at list price

Base Access Plan*	Cost	Total Savings	Cost Per Year
One-year prepaid	\$945.00	-	\$945.00
Three-year prepaid	\$2,551.50	\$283.50	\$850.50
Five-year prepaid	\$3,780.00	\$945.00	\$756.00

*All plans require prepayment for service to be activated. All multi-year plans require prepayment of plan amount to receive discount. Total savings are calculated over the term of the plan contract compared to one-year plans. Base Access Plans may be upgraded only on the anniversary of the contract renewal. Premium Access Plan subscriptions include replacement or repaired parts with expedited shipping at no charge, but customer is responsible for shipping charges of damaged or faulty parts when returning them to QTpod. See Subscription Services Agreement for complete terms and conditions of the Plans. Prices are subject to change without notice.



SECTION - 4.0

Description of Expected Maintenance Requirements/Costs

Section - 4.0

Description of Expected Maintenance Requirements/Costs

As requested the expected yearly maintenance costs for this facility over a 20-year service life are expected to be minimal as described below. Note that these estimated costs are representative of 2022 costs and do not include for yearly inflation over the next 20 years. These estimated costs do not include applicable taxes.

Annual Tank Cleaning and Fuel Polishing

Annual internal tank cleaning and associated fuel polishing is recommended, the approximate cost for this is \$5,175.00 per year.

Meter Proving for Weights and Measures Requirements

Meter proving for Weights and Measures Canada is required every two (2) years, the approximate cost for this is \$4,600.00 per year.

Annual Filter Changes

Annual filter changes are recommended, alternately filter elements should be replaced when a 15 PSI or greater pressure differential is experienced, the approximate cost for the replacement filter material is \$490.00 (labour not included).

Annual Hose Certification

Annual fuel hose re-certification is required, the cost to have the existing hose re-certified would be excessive due to the location of the airport, the approximate cost for a new 1" x 50'-0" hose material is \$1,015.00 (labour not included). *Hose 1"x 50' MxM Certified and Tested to API 1529 and EI 1540 as Specified in Section 3.7 Appurtenances (a.) Hose shall be of continuous length smooth bore synthetic rubber compliant with the requirements of EI 1529, Grade 2, Type C or CT. They shall be installed within 2 years of manufacture and have a minimum 10-year service life.*

POS System Annual Subscription Fee

The QT-Pod M4000 self-serve POS fueling terminal included in WSN's proposal has an annual software service subscription, the approximate cost for this is \$945.00 per year (this is based on the Base Access Plan, optional Premium Access Plan is \$1,995.00 per year).

Consumable Items

The following is a list of recommended consumable items that may be required over the course of each year:

 Aviation over wing nozzle	= \$1,470.00
 POS printer receipt paper (each roll)	= \$9.00
 POS card reader head cleaning cards (50 per box)	= \$42.00

SECTION - 5.0

Proposed Schedule



Section - 5.0

Proposed Schedule

Construction Schedule

While WSN's preliminary project construction schedule durations are realistic, the overall project completion time frame will be very challenging and requires successful early activities in order to minimize project delays and overruns. Expedited completion of the various design drawings, shop drawings, technical equipment submittals for True/OAS's review and approval and long-lead equipment procurement are also extremely crucial.

The proposed preliminary schedule as presented is based on completing the project by working 10.0-hour day shifts Monday to Friday, excluding statutory holidays. Through adaptive scheduling and continuous monitoring, WSN will help ensure the project will be started and completed in a time frame derived from efficient construction sequencing and experienced resource loading. Please refer to the attached preliminary project construction schedule included as part of this section for further details.

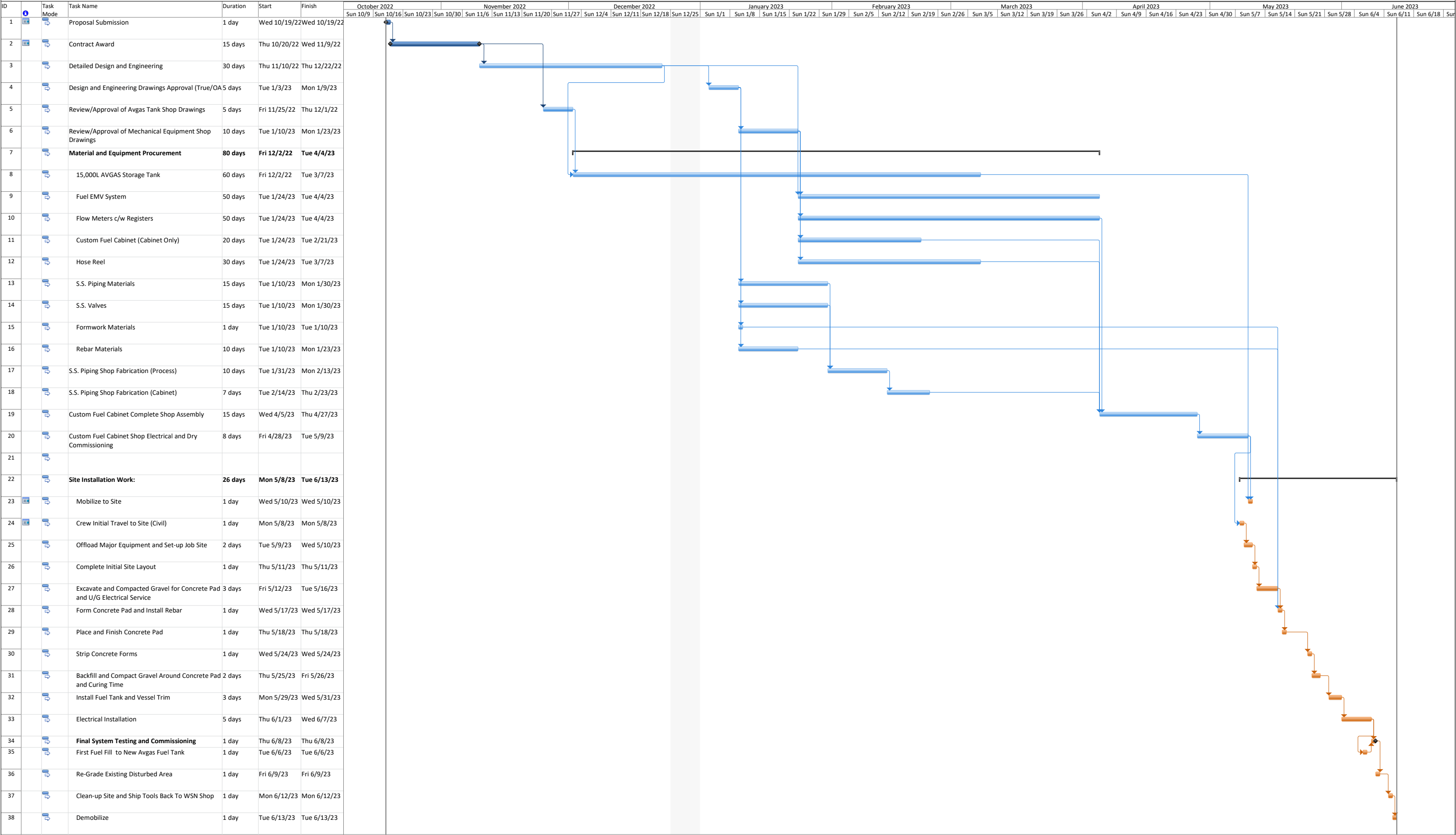
Project Approvals and Permits

WSN Western Construction's (WSN's) attached preliminary project construction schedule included as part of this section, demonstrates that the overall project completion time frame will be very challenging and requires successful early activities in order to minimize project delays and overruns. It is expected that True/OAS will facilitate an expedited review and approval of the various design, technical and shop drawing submittals. It has been assumed by WSN that the Owner required permits aspect of the project is already well in hand and that all the permit approvals are in place.

Section 5.0 Attachments Included

- *Preliminary Proposed Construction Schedule*

W.S. NICHOLLS WESTERN CONSTRUCTION LTD.



Project: M-001-943
Date: Wed 10/19/22

Task

Split

Milestone

Summary

Project Summary

External Tasks

External Milestone

Inactive Task

Inactive Milestone

Inactive Summary

Manual Task

Duration-only

Manual Summary Rollup

Manual Summary

Start-only

Finish-only

Deadline

Progress

Manual Progress

SECTION - 6.0

Proposal Clarifications

Section - 6.0

Proposal Clarifications

The following are a list of general clarifications, inclusions and exclusions that must be taken into account when reviewing WSN Western Construction's (WSN's) Proposal:

General Proposal Clarifications:

1. Due to the ongoing outbreak of COVID-19 globally, WSN cannot absolutely guarantee the availability of our various trades people, equipment and materials for this project, in turn this may affect our proposed preliminary construction schedule. Unfortunately, WSN, as with everyone, are in the same predicament and are proactively trying to limit the spread of infection in the workplace. WSN's main priority is the health, safety and welfare of our employees, subcontractors, clients and the general population. Although the Public Health Agency of Canada has assessed the public health risk associated with COVID-19 as low for the general population, we must all remain vigilant in order to protect public health.
2. PST is included, GST is extra.
3. Price is in Canadian funds.
4. Proposal is valid for a period of 15 days.
5. Standard terms of payment shall be net 30 days from date of invoice, "Pay When Paid" clauses will not be accepted.
6. Any additional change order work shall be completed on a Time and Materials basis as per WSN's standard labour charge-out rates plus a fee of 15% on all materials, equipment, rentals and subcontractors.
7. Contract Terms and Conditions to be mutually agreed on prior to any Contract Award.
8. Work will be progressively invoiced on a monthly basis with applicable holdback amounts.
9. No allowance has been made for any pricing escalation. Should material and commodity prices escalate over the duration of the project, these changes will be managed through Change Order processes.
10. US Dollar conversion for certain material supply items is based on the USD at approximately \$0.73, CAD to USD conversion date of October 19, 2022. Any changes to the conversion rate prior to award will be reflected in the Awarded Contract Value. WSN cannot be expected to bear the impact of costing for changes in USD pricing; we have not included any allowance for dollar conversion impacts.
11. No Liquidated Damages of any kind will be accepted.
12. Price is based on working 10.0-hour dayshifts, Monday to Friday, to complete the required site work, excluding statutory holidays, with no allowance for any additional overtime work. Should additional overtime be required for any reason, it will result in additional costs.
13. Adequate on-site storage laydown space shall be made available to WSN during construction.
14. WSN will require True/OAS to provide survey benchmarks and pre-construction condition survey at no cost to WSN.



15. Any stoppages in work, or delays as a result of: Operations, weather, fire restrictions, local authorities having jurisdiction, pandemics or other contractors working on site, may result in additional costs.
16. WSN has based our proposal on having unobstructed, free and clear access within the project work areas.
17. All Owner permits, funding and verification shall be in place before proceeding forward with any construction.
18. WSN has included for attending (1) only virtual coordination meeting on a bi-weekly basis (1.0-hour per meeting) during the course of the Project.
19. WSN has based our proposal on providing Monthly schedule updates/look-a-heads only.
20. WSN has not included for any project progress reporting activities or documentation.
21. Proposal does not include for an independent third-party Environmental Monitor (EM), all environmental monitoring shall be the responsibility of True/OAS, if required.
22. Proposal does not include for a full-time Construction Safety Officer (CSO) on-site, our site Superintendent will be responsible for safe operations on-site.
23. Proposal is based on having the various technical and material submittals reviewed and approved by True/OAS within a maximum of five (5) days of receipt due to the fast-track nature of this project.
24. All construction water requirements shall be provided by True/OAS.
25. All temporary construction power requirements at the project location shall be provided by True/OAS, including consumption costs.
26. Our Proposal includes cost for the supply of pipe, fittings and valves; however, these are budgetary only due to the volatility of the current market conditions as suppliers will not honor their pricing for more than 5 days.
27. Price is based on supplying all stainless steel above ground piping for the AVGAS system. It is WSN's recommendation that stainless steel piping be utilized for this project as the cost difference is negligible and it offers a far superior system with considerably less ongoing maintenance requirements.
28. Please refer to the attached preliminary project schedule which outlines the basis of WSN's proposal. The actual project schedule can be mutually agreed upon and amended to avoid any sitework during the Airport's peak season.
29. The initial AVGAS fill shall be completed by the Owner. Any environmental spill issues shall be handled by the Owner.
30. Price is based on any native excavated overburden materials being disposed of on-site.
31. All land use agreements and/or development permitting shall be handled by Others, WSN can assist by providing any pertinent construction information that may be required.
32. Please note that WSN has not included for any contingency allowance, this should be carried by the Owner as required.
33. Proposal is based on providing a 1-year warranty on all WSN supplied materials, equipment and installation commencing from the date of installation. Note that the Avgas Tank will have a 2-year manufacturer's warranty on the internal and external coatings.



34. This entire proposal is Confidential Information: This Proposal for Work and all drawings, specifications, reports and copies thereof furnished by W.S. Nicholls Western Construction Ltd. (WSN) are and shall remain the property of WSN. Such documents are to be used only with WSN's permission and with respect to this Project and are not to be disclosed to any other parties or be utilized for any other Project. All such documents are to be returned to WSN upon request within (7) days. No copies of any of the subject documents are to be made without the prior written consent of WSN and all such copies shall be accounted for and returned to WSN upon its request within seven (7) days. WSN will not be held responsible or liable for the use of any and all information that is furnished to other parties outside of this agreement.

Proposal Includes:

1. Detailed design and engineering of the piping, mechanical and electrical systems.
2. WSN's standard day-to-day insurance coverage (including Airside coverage).
3. Detailed, project specific Health and Safety Plan (HASP) for site construction activities.
4. Provision of all required construction equipment to complete the work.
5. Final Quality Control turnover package (2 hard copies, plus digital copy).
6. Project management and indirect costs associated with completing the work.
7. Costs to and from Osoyoos for crew travel requirements.
8. Lodging and meal costs for the crew in Osoyoos.
9. Electrical permit for our anticipated scope of work.
10. Existing U/G services locates (self-performed by WSN).
11. Shop fabrication of stainless-steel pipe spools, including localized weld passivation.
12. Shop non-destructive weld testing (10% as per ASME B31.3, normal service).
13. Shop assembly of new AVGAS fuel cabinet enclosure equipment and piping, complete with associated electrical, including dry shop commissioning prior to shipment.
14. Mobilization and demobilization to/from job site.
15. Supply and installation of all new stainless-steel piping complete with all required pipe supports.
16. Supply and installation of new stainless-steel API-607 fire-safe valves.
17. Supply and installation of (1) custom stainless steel single AVGAS Fuel cabinet enclosure. Please see the attached detailed equipment list for a description of items included in Section 3.0.
18. Supply and installation of (1) new 15,000L above ground double-walled ULC S-601-14 steel AVGAS Fuel storage tank complete with: external painted finish, internal epoxy lining, non-seismic design saddles, integral I-beam skid frame mounted c/w 8'-0" skid extension for fuel cabinet, 1.5 HP submerged-turbine pump (STP) with smart controller, (2) lifting lugs, (1) grounding lug, (1) 24" access manway with lid, (1) 2" lockable gauge hatch dip port, 6" primary emergency vent, 3" vent with PV vent cap, 3" overfill protection valve with test mechanism, 3" remote top/bottom fill piping with check valve, ball valve, spill canister and camlock adapter with drip tray, (2) spare 4" connections with plugs, (1) spare 2" connection with plug, (1) 2" secondary containment inspection port, (1) combination emergency vent/normal vent, parallel stairs c/w full length catwalk platform to access top of tank with secondary fall arrest railing on opposite side of fittings and tank ends, manual water draw-off hand pump.

19. Provision of all required civil concrete works, including: (1) 900mm x 1800mm x 200mm thick concrete electrical cabinet equipment pad and (3) pre-cast concrete protective highway barriers, painted yellow with reflective conspicuity tape.
20. Supply and installation of main electrical feed to the new facility.
21. Supply and installation of all required electrical components, including (1) EFSO push-button station.
22. Supply and installation of POS cardlock card reader system and software (credit and debit cards capability).
23. Supply and installation of decals and instructional signage/placards.
24. Final fuel systems flushing utilizing the new storage tank STP, flushing into Owner supplied fuel trucks or barrels.
25. Final system testing and commissioning, including Weights and Measures Canada meter proving on-site.
26. Training of Operations personnel.
27. 1-Year support for the POS cardlock card reader/software system (Base Access Plan, remote 24/7 support only).
28. In-service inspection/testing of newly installed piping systems during flushing and start-up.
29. Supply and installation of new adhesive tank and piping flow arrows and ID labels.
30. Supply and installation of (1) 20lb ABC fire extinguisher, complete with mounting enclosure.
31. (1) task light located on the AVGAS Tank platform and (1) XP task light located within the fuel cabinet.

Proposal Does Not Include:

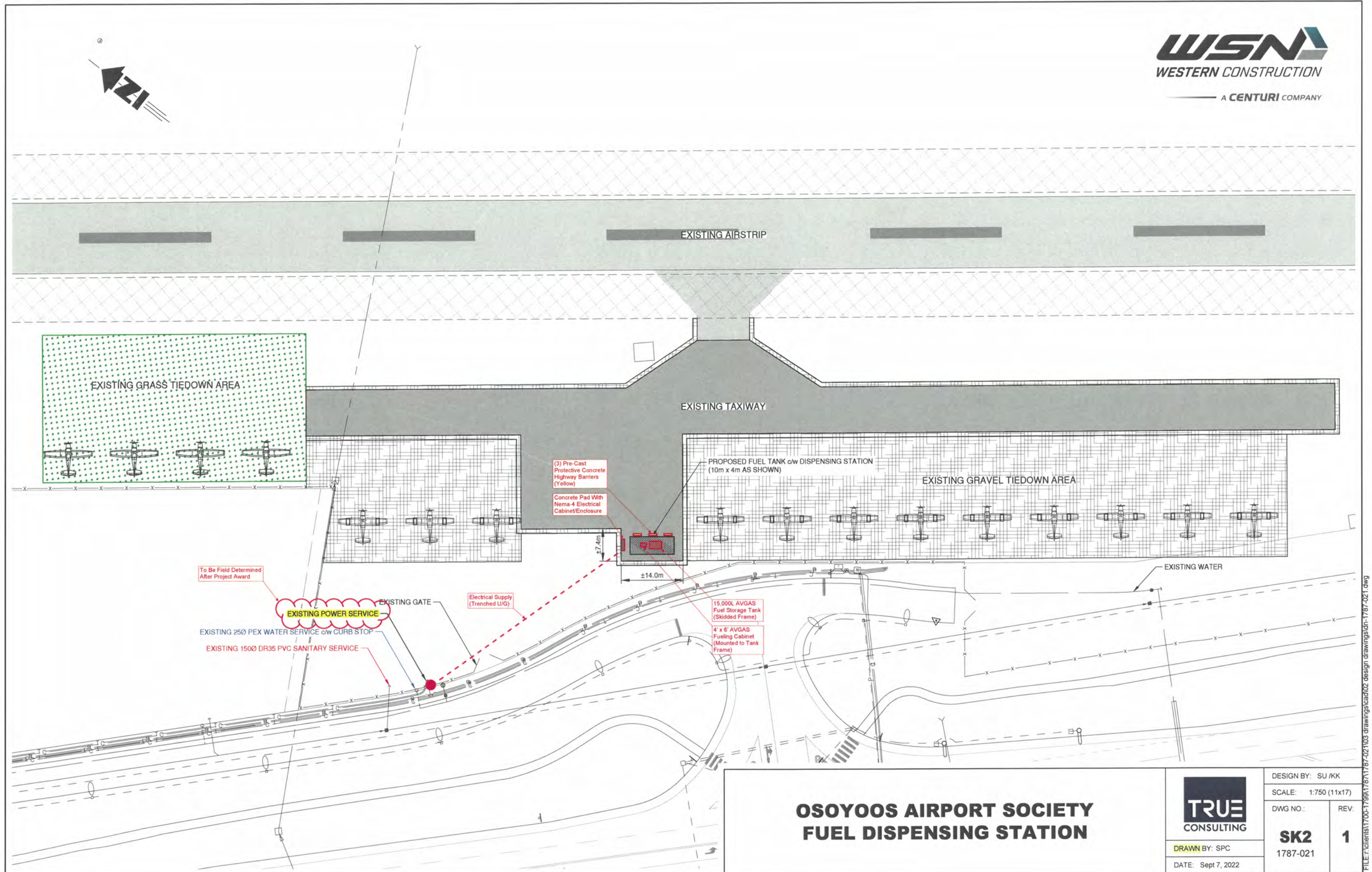
1. Project special insurance and bonding costs.
2. Independent third-party Environmental Monitor.
3. Full-time on-site Construction Safety Officer (CSO).
4. Temporary construction fencing.
5. Dust control measures.
6. Contaminated site assessment.
7. Contaminated soil handling, remediation, testing and disposal.
8. Off-site disposal of any native excavated overburden materials.
9. Any underground piping.
10. Geotechnical investigations or design.
11. Ground improvements.
12. Nesting bird survey or impacts due to nesting birds.
13. Any Archaeological Protection or Investigation related work.
14. Any internal swabbing/cleaning of the piping system.
15. Permanent fuel offloading delivery tanker inlet filtration system to tanks.
16. Supply of fuel for commissioning and start-up.
17. Fuel testing requirements (by Others).



18. Temporary fuel trucks storage, handling and/or disposal of fuel from the new piping systems flushing activities (by Owner).
19. Field non-destructive weld testing (shop only).
20. Dry-break hoses adapters on fuel delivery truck offloading hoses (by Others).
21. EI 1596 data plate for fuel cabinet 22 GPM filter (not available on smaller filter housing units).
22. Caged escape ladder on upper tank access platform.
23. Contained concrete tank pads, complete with underground oily water drainage system and coalescing oil/water separator system.
24. Secondary Containment liner.
25. Concrete tank foundation(s); note that the tank will be installed directly on the existing Asphalt Surface.
26. Apron lighting.
27. Obstruction lighting.
28. Concrete strength testing.
29. Soils compaction testing.
30. Aggregate materials sieve and proctor testing.
31. Any asphalt paving or asphalt repairs.
32. Hydroseeding, or hand seeding, of existing surrounding area.
33. Any line painting.
34. Formal surveying (WSN self-performed).
35. Any land lease issues (i.e., amendments/revisions) with lessor and any potential associated fees and/or expenses.
36. Inspections, permits, fees, etc... for local inspections by Authorities Having Jurisdiction.
37. Provision of any spare parts.
38. Registration of the new fuel tanks with the Federal Identification Registry for Storage Tank Systems (FIRSTS) to obtain tank identification EC numbers and labelling of the tanks with the EC number decals.
39. Proprietary Fuel Cards (WSN will provide source contact information upon request).
40. Bill C69 permitting costs or associated potential schedule impacts.
41. Fire Detection/Fire Alarm system.
42. Large digital fuel display sign/stand.
43. Spill response materials/equipment.
44. Operation's procedures, ERP's or manuals.

SECTION - 7.0

Proposed Conceptual Sketches



OSOYOOS AIRPORT SOCIETY FUEL DISPENSING STATION

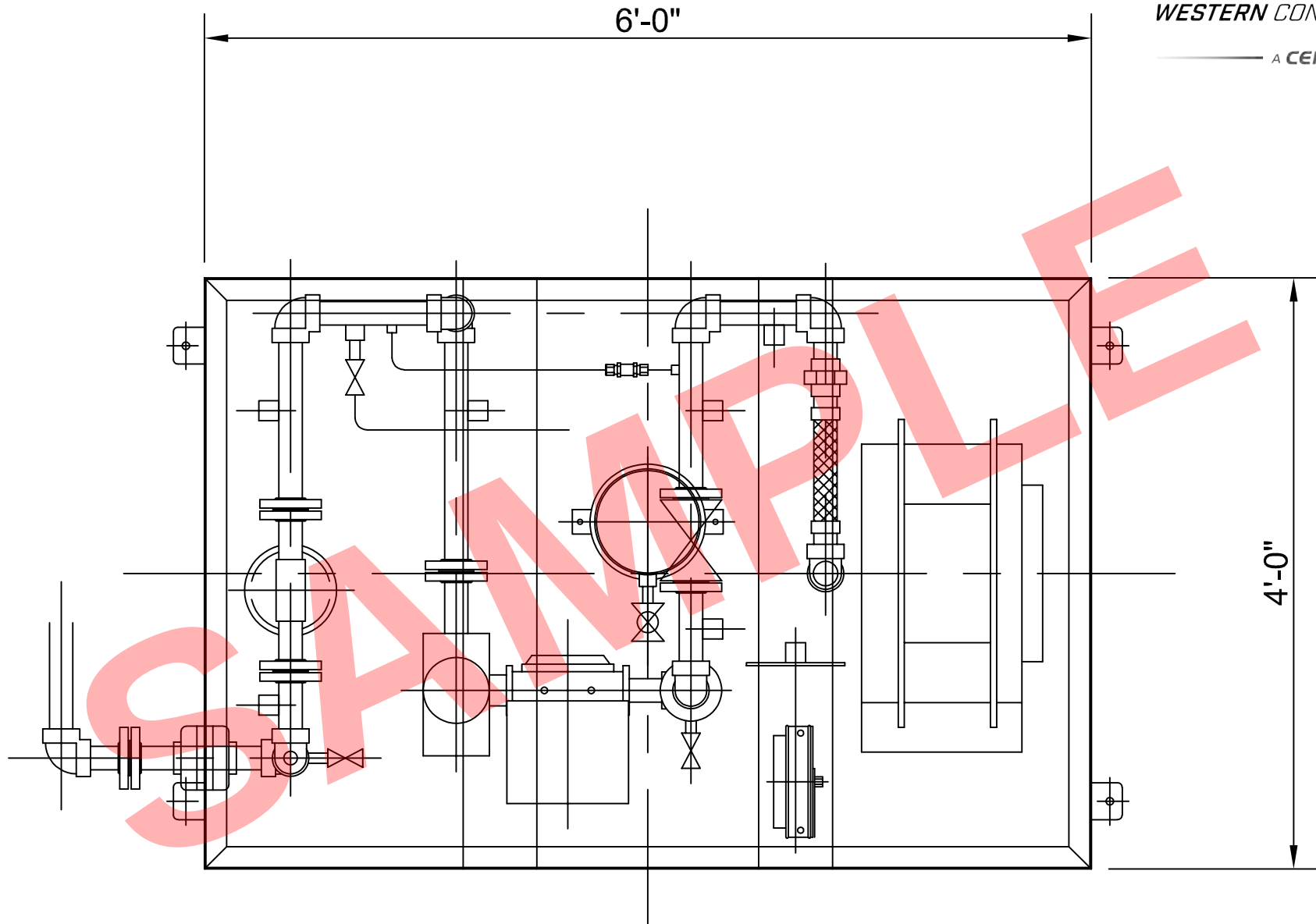


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CABINET PLAN VIEW

ULC

LISTED

NO.

SINGLE WALL

DOUBLE BOTTOM

DOUBLE WALL VACUUM-MONITORED

INTEGRAL CONTAINED

X

PRIMARY TANK NOMINAL CAPACITY

15,000 L

REQUIRED VENTING CAPACITY

127 m³/min.
(NORMAL + EMERGENCY)

YEAR MFD.

MAXIMUM OPERATING PRESSURE

7 kPa

MAXIMUM TEST PRESSURE

30 kPa

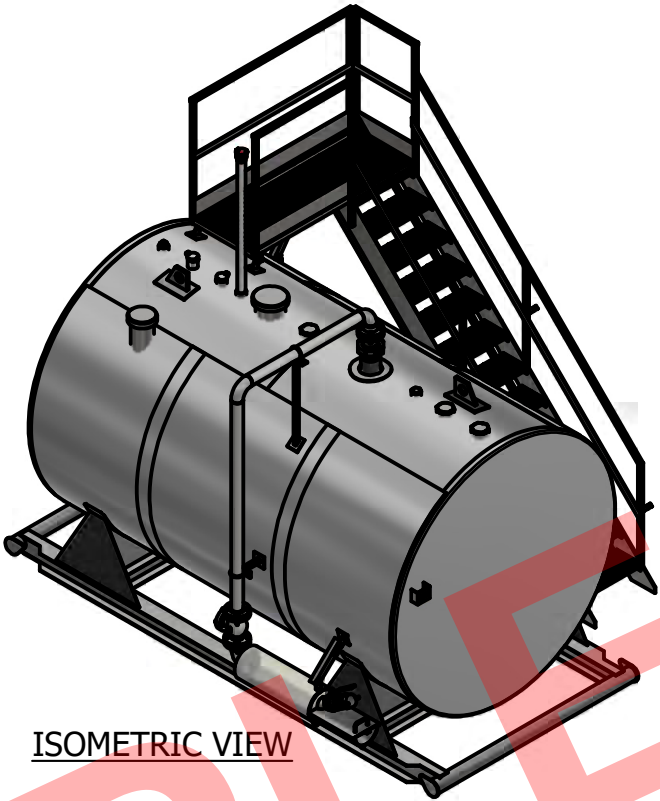
MAXIMUM OPERATING VACUUM

300 Pa

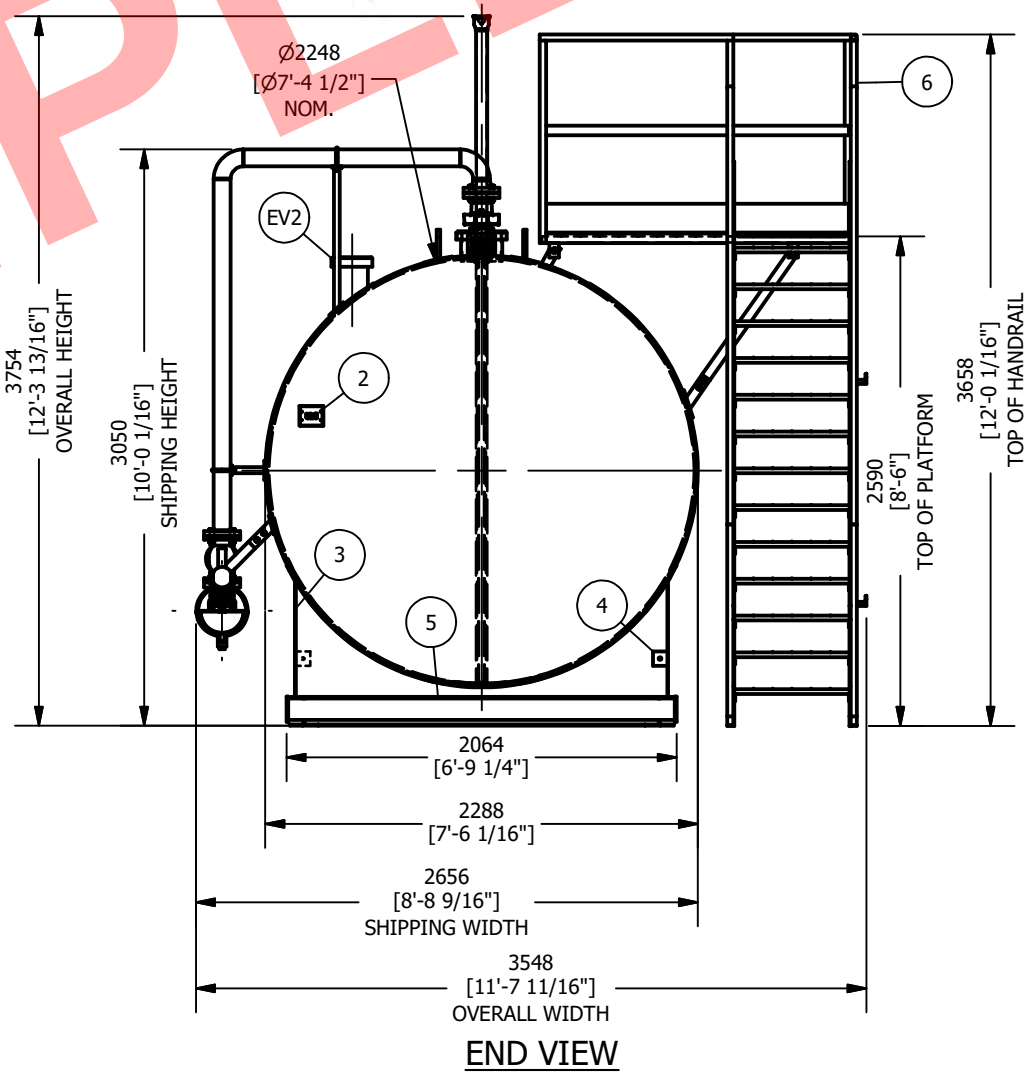
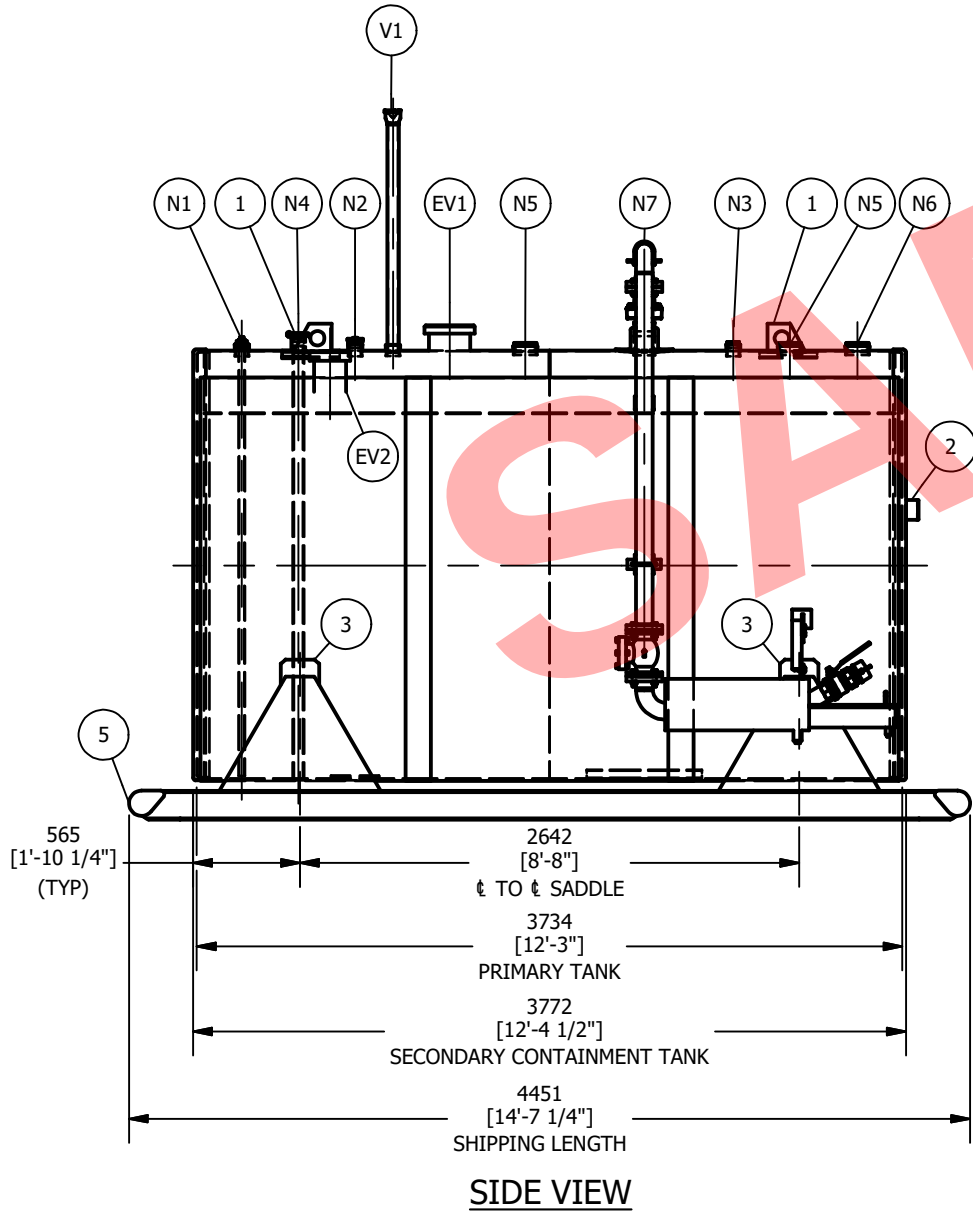
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LLOYDMINSTER, AB

MH63253 VOL. 1



ISOMETRIC VIEW



CAGST HORIZONTAL FUEL STORAGE TANK	
MODEL:	100% INTEGRAL CONTAINED DW STORAGE TANK
CAPACITY(L):	15,000
STRUCTURAL PLATE:	SA36/A1011
TANK:	ULC-S601-14
CONTAINMENT:	ULC-S601-14
EXTERNAL FINISH:	BLAST TO SSPC SP6, FINISHED WITH 5-8 MILS DFT PPG SPECTRACRON
COLOR:	WHITE
INTERNAL SANDBLASTING:	N/A
INTERNAL FINISH:	AS WELDED
TANK WEIGHT (LBS):	7,200
SHIPPING ENVELOPE:	175 1/2"LG x 105"W x 120 1/2"H

MK	QTY	DESCRIPTION
N1	1	NPS 2 w/REDUCING BUSHING 2 x 1 x 1 AND DROP TUBE(WATER DRAW)
N2	1	NPS 2 w/LOCKABLE GAUGE CAP (DIP PORT)
N3	1	NPS 2 w/PLUG (SPARE)
N4	1	NPS 2 CONTAINMENT MONITOR PIPE w/LOCKABLE GAUGE CAP
N5	2	NPS 4 w/PLUG (SPARE)
N6	1	NPS 4 w/PLUG (PRODUCT DRAW)
N7	1	NPS 6 REMOTE BOTTOM FILL PORT w/NPS 3 MORRISON 9095A SERIES OVERFILL PREVENTION VALVE, DROP TUBE, NPS 3 FILL PIPING, CHECK VALVE, FILL / SPILL PREVENTER w/NPS 3 BALL VALVE, NPS 3 CAMLOCK AND DRIP TRAY
V1	1	NPS 2 w/NPS 2 VENT PIPE AND UPDRAFT VENT CAP (NORMAL VENT)
EV1	1	NPS 6 EMERGENCY VENT (PRIMARY)
EV2	1	NPS 6 COMBINATION NORMAL / EMERGENCY VENT (CONTAINMENT)
1	2	LIFT LUG
2	1	ULC NAMEPLATE AND BRACKET
3	2	SADDLE ASSEMBLY
4	2	GROUNDING LUG
5	1	SKID ASSEMBLY
6	1	STAIR AND PLATFORM ASSEMBLY

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DWG TITLE 15,000L CAGST 100% INTEGRAL CONTAINED DW STORAGE TANK GENERAL ARRANGEMENT				
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SECTION - 8.0

Health, Safety and Environment

- 8.1 Company Reference Guide to Health and Safety Activities
- 8.2 Company Safety Certifications (ISNetworld, Comply Works, Avetta, COR)
- 8.3 Company Sample Environmental Protection Plan

Section - 8.0

Health, Safety and Environment

This section will outline WSN Western Construction's (WSN's) continuous commitment to the Health and Safety of its employees and subcontractors, as well as maintaining a Safe workplace.

WSN prides itself as a leader in the Industrial Construction industry providing consistent, safe, reliable and quality service to our many clients. Focused, professional, diligent, experienced and skilled personnel make up the WSN's industrial construction team with an excellent, impeccable safety record. Our ongoing commitment to safety is evident in our day to day operation. WSN has been rewarded by the WorkSafe BC - Worker's Compensation Board of British Columbia by receiving discounts to our assessable WCB rate. These discounts allow WSN to provide one of the lowest WCB premium rates in our industry. This does not only mean that we are safe, it also translates into actual cost savings when WSN is on the job. This top tier of excellence cannot be achieved without the active participation of everyone, therefore our core people, and the people we hire, can be classified as the best in the industry.

Through continuous improvements with respect to Health and Safety such as: registration and certification with ISNetwork, and COMPLYWORKS, COR and POST, we are always up to date and in the lead when it comes to safety.

Attached are copies of our various certifications, our current WorkSafe BC information and our Reference Guide to Health and Safety Activities.

Our goal at WSN is to take whatever measures are necessary to ensure that all our employees and subcontractors are able to work in a safe and healthy environment, free of injury and occupational disease. Having a safe and healthy workplace is a goal that is shared between management, supervisory staff, employees, clients and subcontractors.

WSN is committed to providing the safest and healthiest workplaces achievable. This commitment is not exclusive to WSN employees; it extends to our clients and their employees, the public, subcontractors, visitors, consultants, regulatory inspectors and all other persons who may be affected by WSN activities, or the hazards inherent to the project sites. To fulfill this commitment to health and safety, WSN is committed to:

- Developing and communicating clear health and safety related responsibilities, accountabilities and lines of communication for every person/position,
- Thoroughly evaluating projects for health and safety hazards, and developing controls to protect personnel,
- Providing adequate levels of professional supervision on every project,
- Ensuring all persons working/visiting WSN projects receive project specific health and safety information, and are knowledgeable of the controls that will keep them safe,
- Developing and maintaining a competency-based employee education and training program,
- Foster a culture that makes the health, safety and wellbeing of our employees our number one priority (more important than production, profits and serving our clients) and provides every employee the absolute right and obligation to question, stop and correct any unsafe act or condition,



- Providing appropriate and well-maintained tools, equipment and personal protective equipment,
- Regularly auditing the company's and individual's health and safety performance, and
- Regularly communicating and reinforcing the company's health and safety goals and objectives

WSN recognizes that safety excellence cannot be achieved without the active participation of everyone. For this reason, WSN will only retain the services of those employees, supervisors, managers and subcontractors that through the completion of their work, continuously demonstrate excellence in compliance with WSN and legislative safety requirements.

WSN has never had any reportable environmental incidents, infractions or charges during our twenty-two (22) years in operation. Our record with respect to environmental compliance is exemplary.

The overall environmental objective is to reduce the environmental risk of the project. Risk, broadly defined, is comprised of two (2) component factors: 1) the probable frequency that an event will occur; and 2) the consequence of that event. Environmental protection measures to be incorporated into the project are designed to reduce one, or both, of these risk factors. Probability of occurrence can be reduced by increasing the reliability of components of the system and of the system as a whole. Consequence can be reduced through protection of sensitive environmental areas, early detection of an occurrence, and advanced preparation for mitigation measures. Project specific objectives consider the geology and sensitivity of areas on the site, and the characteristics of the materials in use. A detailed, site specific Environmental Protection Plan (EPP) will be developed for this project.

SECTION - 8.0

Sub-Section 8.1

Company Reference Guide to Health and Safety Activities



Reference Guide to Occupational Health and Safety Activities





Reference Guide to Occupational Health & Safety Activities

July 2021
Revision No. RDCL30

Introduction

This “*Reference Guide to Occupational Health & Safety Activities*” has been developed to assist W.S. Nicholls Western Construction Ltd. (WSN) in meeting a variety of health and safety obligations. The goal is to take whatever measures are necessary to ensure that all our employees and subcontractors are able to work in a safe and healthy environment – free of injury and occupational disease. Having a safe and healthy workplace is a goal that is shared between management, supervisory staff, employees, clients and subcontractors.

The contents of this guide are intended to complement WSN's overall health and safety efforts. This guide must be used in conjunction with Federal, Provincial, Municipal and client safety requirements, as well as any additional rules, procedures, programs and written instructions developed by WSN.

NOTE: *As this document has been developed to assist with compliance in multiple provincial jurisdictions simultaneously, specific provincial authorities and regulations have been named generically, rather than independently.*

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Section - 1. Policy & Responsibilities

A Commitment to a Safe Workplace

Policy Statement

W.S. Nicholls Western Construction Ltd. (WSN) is committed to provide the safest and healthiest workplaces achievable. This commitment is not exclusive to WSN employees; it extends to our clients and their employees, the public, subcontractors, visitors, consultants, regulatory inspectors, and all other persons who may be affected by WSN activities, or the hazards inherent to the project sites.

Management

Management is responsible to provide adequate resources in the areas of health and safety. Management provides direction to our employees and contractors and develops and communicates clear health and safety related responsibilities, accountabilities, and lines of communication for every person/position. Foster a culture that makes the health, safety, and wellbeing of our employees our number one priority (more important than production, profits and serving our clients) and provides every employee the absolute right and obligation to question, stop and correct any unsafe act or condition. Providing appropriate and well-maintained tools, equipment, and personal protective equipment, regularly auditing the company's and individual's health and safety performance, and Regularly communicating and reinforcing the company's health and safety goals and objectives all areas of health and safety through training, audits, reviews, instruction, and promotion to provide and maintain a safe and healthy working environment.

Supervisors

Supervisors are responsible for orientation and training of new and young workers. Participation in regular or periodic safety meetings, reviews, evaluations. Thoroughly evaluating projects for health and safety hazards, and developing controls to protect personnel, providing adequate levels of professional supervision on every project, ensuring all persons working/visiting WSN projects receive project specific health and safety information, and are knowledgeable of the controls that will keep them safe.

Employees

All employees are responsible to perform assigned tasks safely and not endanger themselves or others. They are responsible to cooperate with all persons carrying out occupational health and safety duties. Employees are responsible to learn and follow all safe work procedures. Employees are expected to be alert to hazards, and report hazards or problems to the supervisor or management.

WSN recognises the right of all employees to a healthy and safe workplace and recognizes that safety excellence cannot be achieved without the active participation of everyone. For this reason, WSN will only retain the services of those employees, supervisors, managers, and subcontractors that through the completion of their work, continuously demonstrate excellence in compliance with WSN and legislative safety requirements.



Pat J. Hunt
President

January 13, 2021

Health & Safety Compliance

Compliance Requirements

All persons employed by WSN are accountable for their actions in regard to health & safety and conduct in the workplace. It is the desire of the company to employ and retain top quality personnel. The cooperation of everyone is therefore required in order to achieve this through the process of ensuring a safe and healthy workplace.

Compliance with all health and safety requirements (WSN, Federal, Provincial, Municipal, and Client) is mandatory. Disregard or negligence in complying with these requirements may result in unnecessary injury and will therefore be cause for disciplinary action.

Disciplinary Procedures

If any person engages in hazardous activities that are in contravention of health and safety requirements, they will be subject to disciplinary action. Examples of unacceptable hazardous activities include, but are not limited to the following:

- Operating equipment without authorization,
- Abuse of equipment or lack of maintenance by the operator,
- Being under the influence of drugs or alcohol,
- Non-compliance with safety rules and/or procedures, and
- Endangering (or threatening) the health and safety of others.

Personnel that do not follow the prescribed standards will subject to the following disciplinary actions:

- First offence: verbal warning
- Second offence: written warning
- Third offence: 1-day suspension without pay
- Fourth offence: 5-day suspension without pay
- Fifth offence: termination of employment

Special circumstances, such as behaviour and practices where there is blatant disregard for the health and safety of any person or regulatory compliance, may require immediate, more serious action. These circumstances may result in one or more of the disciplinary sequence steps being bypassed and may result in immediate termination.

WSN Management

WSN (Senior) Management are responsible:

1. Establishing and maintaining an effective and regulatory compliant Occupational Health & Safety Program
2. Establishing, communicating, and enforcing safety related roles and responsibilities, including those for: (1) Supervisors, (2) Employees, and (3) (sub)contractors.
3. Ensuring WSN sites and equipment are maintained and that equipment is appropriately safe guarded.
4. Completing regular inspections of the workplace (*including equipment, grounds, and work activities*),
5. Thoroughly investigating all safety related incidents (*including employee concerns, employee injuries, property damage incidents and near misses*),
6. Promptly remedying any and all safety related deficiencies,
7. Developing and maintaining an employee education and training program, (*including new employee orientations, on-the-job training, safety specific training and weekly crew meetings*),
8. Ensuring all employees are versed on the hazards inherent to the site, the activities that are performed, and the required controls,
9. Ensuring employees are versed on and comply with applicable regulatory requirements, as well those rules and procedures developed and implemented by WSN or its clients,
10. Ensuring copies of the applicable legislation and WSN rules and procedures are readily available for reference by all employees,
11. Cooperating with the regulatory officials when such are carrying out their duties,
12. Providing professional and adequate levels of supervision,
13. Ensuring those with supervisory responsibilities are trained and supported,
14. Establishing, maintaining, and supporting employee elected project safety representatives,
15. Ensuring adequate emergency response equipment, personnel and procedures are available and effective,
16. Holding regular management meetings specifically for the purpose of reviewing WSN's safety performance,
17. Conducting a thorough review of WSN's safety performance on (at least) an annual basis.

Supervisory Personnel

Every person with supervisory responsibilities is responsible for:

1. Knowing and complying with “supervisory” related responsibilities as detailed in the WSN *“Reference Guide to Occupational Health & Safety Activities”* and applicable legislation.
2. Ensuring all new employees successfully complete necessary “orientations” before starting work,
3. Ensuring all new employees receive on the job training/mentoring, and ensuring such is conducted before new employees are permitted to work “unsupervised”,
4. Regularly evaluating their employee’s safety related knowledge and skills,
5. Immediately investigating all employee safety related injuries, incidents, and concerns, and subsequently taking appropriate corrective measures.
6. Conducting regular inspections of WSN sites and equipment, including the activities/equipment of subcontractors,
7. Immediately rectifying all noted safety related deficiencies,
8. Reporting to WSN Management, all safety related incidents, concerns and suggestions in an appropriate period of time,
9. Conducting toolbox talks and crew safety meetings as prescribed,
10. Supporting elected employee health and safety representatives by: (1) allowing such person’s adequate time to complete assigned task, (2) regularly consulting with such persons on their respective projects/sites and (3) versing themselves on activities and initiatives assigned to such persons,
11. Consistently enforcing WSN, client and legislated safety requirements, and
12. Setting a good example for other workers.

Employee Responsibilities

Each employee is responsible for:

1. Knowing and complying with all applicable health & safety requirements,
2. Reporting hazards to the supervisor and taking corrective action to eliminate hazards. This includes participating in a process of on-going informal inspections. ***NOTE: If hazards cannot be corrected without putting personnel at risk, temporary measures (i.e., signs, barricades, postings, etc...) should be used temporarily until a solution can be determined.***
3. Operating equipment only if authorized and trained to do so, all safeguards are in place and functional, and no person will be endangered by the operation of the equipment. Operators of mobile equipment must also maintain any requirement equipment logs.
4. Reporting immediately to a supervisor and the designated first aid attendant all work-related injuries and health problems, and co-operating in the investigation of such incidents.
5. Informing the supervisor of any physical or mental impairment that may affect their ability to work safely (*i.e., back problems, illness, health condition, etc...*), and to refraining from work where impairment may create an undue risk to themselves or others.
6. Staying away from the workplace if under the influence of alcohol or illegal drugs.
7. Staying away from the workplace if under the influence of prescription drugs that may impair their ability to do their job safely.
8. Avoiding any improper activity or behaviour (*i.e., harassment, bullying, horseplay, scuffling, fighting, practical jokes or similar conduct*) that may endanger them or others (Refer to Appendix 1 "Harassment, Intimidation and Bullying" and "Improper Conduct" for further information).
9. Maintaining good housekeeping.
10. Entering/leaving the work area using safe routes.
11. Wearing appropriate PPE and clothing and maintaining it in good working order.
12. Refusing to carry out, or cause to be carried out, any work process or operate or cause to be operated any tool, appliance, or equipment if there is reasonable cause to believe that to do so, would create an undue hazard to the health or safety of any person.
13. Using, transporting, storing, and disposing all hazardous materials in accordance with applicable safety requirements and training, such as those outlined by WHMIS/WHMIS training.
14. Participating actively in toolbox talks and crew safety meetings.
15. Cooperating with elected employee health and safety representatives.
16. Setting a good example for other workers.

Sub-Contractor Responsibilities

Each contractor/contractor employee is responsible for:

1. Submitting all required/requested information necessary to satisfy subcontractor "pre-qualification" requirements. Information may include, but it not necessarily limited to:
 - "Letters of Clearance" from WCB authorities,
 - General Liability Insurance certificates (*subcontractors will generally be required to have between \$2,000,000 and \$5,000,000 coverage*),
 - Relevant Safety Statistics (*i.e., # of first aids, # of medical aids, # of medical treatments, # of lost times, man-hours worked, incident rates, severity rates, etc...*) for the previous 3-year period,
 - Copies of inspections reports issued by regulators, including particulars on relevant non-compliance.
 - Current OHS Manual, and
 - Relevant resumes, curriculum vitas and training records

NOTE: *Such information will be requested through WSN's Accounts Payable Department, then reviewed, and must be deemed acceptable before a (prospective) subcontractor's services will be retained. Incomplete information or otherwise unacceptable* information will result in a prospective contractor's name not being added to WSN's list of approved vendors. Contractors who are not added to WSN's approved vendors list (as well as those that are removed) will be advised of such and may be given an opportunity to resubmit or otherwise further explain (to WSN's satisfaction) the information submitted.*

**Unacceptable Information may include, but is not necessarily limited to: (1) outstanding, repeat, or high-risk non-compliance noted on inspection reports issued by regulators, (2)*

In the event that a subcontractor does not have an established Health and Safety Manual, the subcontractor will follow WSN's Health and Safety Manual.

2. Completing relevant orientations (*i.e., client/site and WSN*) before starting work,
3. Attending and/or participating in all pre-job/activity meetings, hazard assessment reviews, work procedures reviews, etc....,
4. Preparing suitable written safe work procedures for the tasks/activities that will be performed,
5. Training (their) workers on applicable safe work procedures (*or otherwise ensuring suitable training is provided*),
6. Providing knowledgeable and experienced supervisors,
7. Designated a person to act as the contractor's Safety Representative,
8. Ensuring supervisors regular inspect (or otherwise assess) the contractor's activities, tasks, and employees,
9. Ensuring rules, procedures and instructions are enforced,

10. Completing regular (*preferably daily*) documented toolbox talks with their crews (*or participating in WSN's toolbox talks*),
11. Reporting to the WSN representative (*usually Site Superintendent*) safety related incidents, concerns or suggestions, and assisting with the investigation of such incidents,
12. Participating in a post-job safety review with WSN management, and
13. Setting a good example for other workers.
14. WSN ensures that subcontractors are aware of the Owner's/Client's Drug and Alcohol policy. Subcontractors must adhere to the requirements of the Drug and Alcohol policy in force at all times while at the work site.
15. WSN ensures that subcontractors are aware of incident reporting requirements. Subcontractors must report all incidents to the contractor. If a subcontractor is involved in an incident, the contractor is responsible for reporting the incident to the Owner/Client. WSN must ensure the incident is investigated and must participate in the investigation.
16. WSN ensures that all subcontractors follow the W.S. Nicholls New and Young Worker Program.

Section - 2. Safety Rules and Written Instructions

Safety Rules and Written Instructions Policy

All WSN employees will be instructed in, and provided with, written rules and supplementary instructions as necessary to minimize accidents. WSN will determine which rules and written instructions are needed by:

- Reviewing inspection, accident investigation and first aid records,
- Observing employees performing their work activities,
- Evaluating elected employee health and safety representative recommendations,
- Reviewing regulatory requirements/amendments, and
- Analyzing new work processes and contract specifications.

Supervisory staff is responsible for ensuring worker understanding of, and compliance with, general safety rules and instructions.

Rules, Specific Instructions and Supplemental Programs will be enforced as detailed in Section 1. Compliance is mandatory. Wilful or negligent non-compliance with good health and safety practices by any employee may result in injury or damage and will result in disciplinary action as detailed in Section 1.

This guide will not attempt to cover all the written instructions that have been developed to assist employees in the safe completion of assigned tasks. While not an exhaustive list, specific work procedures and safety related information are located in the following documents:

- Appendix 1: General Rules and Written Safe Work Procedures,
- Appendix 2: Confined Space Entry Program,
- Appendix 3: Respirator Protection Program, and
- Site/Task Specific Documentation: (*i.e., Health & Safety Plans (HASPs), Fall Protection Work Plans (FPWP), Safe Lift Plans, Confined Space Entry Procedures, Exposure Control Plans, etc...*)

Section - 3. Education & Training

Worker Education & Training Policy

WSN recognizes that the training and education of workers is a vital part of our health and safety program. Our employees must have the knowledge and skills to do their work in a safe manner. Safety instruction will be provided to all workers, and workers are required to comply with these instructions. WSN's program of worker education and training will consist of:

- Orientations: All WSN employees receive a thorough orientation before starting work,
- Job/Task Specific Instruction: All WSN employees receive thorough job/task specific instruction whenever they are assigned a new task (permanent or temporary),
- Specialized Safety Training: All employees will receive specialized training (*i.e., WHMIS, Fall Protection, Confined Space Entry, Ergonomic/MSI Prevention, Lockout Tagout training etc...*) as required,
- Daily "Toolbox" Talks: On a daily basis, all employees will participate in a pre-job safety meeting, and
- Crew Safety Meetings: On a weekly basis, all employees will participate in a crew safety meeting

General Employee/Subcontractor Orientations

Employees of WSN (and subcontractors) will typically receive two distinct orientation sessions for the vast majority of projects. The first will normally be completed by the client and will review such items as: general site hazards, general personal protective equipment requirements, general site safe work procedures, and the location of first aid and emergency evacuation procedures.

Whereas the client's orientation will normally cover general site hazards, and the requirements to control or minimize exposure to those hazards, the WSN orientation will review the WSN project specific hazards as detailed in the site HASP. In addition to the hazards and work procedures detailed in the HASP, the WSN orientation will:

- Review employee responsibilities (and subcontractor/subcontractor employees) as detailed in Section 1, as well as related behaviour expectations (*i.e., "Harassment, Intimidation and Bullying", "Improper Conduct" "Reporting of Incidents" and the "Right to Refuse Unsafe Work"*) and applicable legislation,
- Identify worksite hazards, and the safe procedures for dealing with these hazards (*i.e., complete review of site/project specific HASP*),
- Review how to report hazards, injuries, accidents and near misses,
- Review the "Right to Refuse Unsafe Work" process,
- Review information regarding current site-specific safe work procedures in use,
- Review the requirements for personal protective equipment to be used generally on sites, and for specific tasks,
- Review ergonomic/musculoskeletal injury prevention strategies,
- Review the location of applicable reference materials (*i.e., regulations, SDS, etc...*),
- Review the location of first aid facility(s), services, and emergency equipment,
- Review the means of summoning aid, including emergency signals,
- Review total mill and applicable departmental evacuation signals and mustering stations,
- Review of other applicable emergency response procedures (as detailed in the HASP and/or Job Site Emergency Preparedness Information Worksheet),
- Clearly name supervisory staff, including the site/project superintendent, and how to contact them,
- Clearly name all elected employee health & safety representatives and how to contact them,
- Clearly name the site WSN health & safety coordinator and contact information,

- Conduct a question and answer period to provide workers with additional information, and
- Provide an opportunity for workers to complete required employee start forms

A record of this orientation needs to be kept on site. A copy will also be placed on the employee's personnel file as a permanent record. The "New Employee Orientation Checklist" form will be used for this purpose (*Refer to Figure 1*).

W.S. Nicholls WESTERN CONSTRUCTION LTD.	
New Employee Orientation Checklist	
For complete employee orientation requirements, refer to Section 2 (Education and Training) of the "Reference Guide to Occupational Health & Safety Activities"	
Employee Name: _____	Date of Hire: _____
Name of Supervisor: _____	Date of Orientation: _____
Orientation Topics Reviewed	Reviewed
New/Young Workers (statistics, definitions, identification method, supervision/evaluation process)	☐ Yes
Company Health & Safety Policy	☐ Yes
Employee Safety Responsibilities	☐ Yes
Compliance Expectations and Disciplinary Procedure	☐ Yes
Emergency Procedures	
⇒ Fire (i.e. what to do if you notice a fire, how to use available fire-fighting equipment and when to evacuate when risk is too great)	☐ Yes
⇒ First Aid (i.e. location of first aid, how to obtain first aid (emergency and non-emergency) and how to identify first aid attendants)	☐ Yes
⇒ Evacuation (i.e. evacuation scenarios (power outage, earthquake, fire, chemical release), evacuation signals, muster stations and head counts)	☐ Yes
Training Process (i.e. orientation, CWP reviews, on-the-job training/mentoring and specialized training)	☐ Yes
Right to Refuse Unsafe Work	☐ Yes
Reporting Hazards/Concerns (reporting to supervisor, elected employee safety representatives, client, regulator)	☐ Yes
High Risk Construction Hazards and Controls	
⇒ Mobile/Heavy Equipment	☐ Yes
⇒ Confined Spaces	☐ Yes
⇒ Fall Protection	☐ Yes
⇒ Lift Plans	☐ Yes
Personal Protection Equipment (PPE) and Clothing/Attire Requirements	
⇒ Suitable Clothing (sleeved shirts, long pants, no "hoodies", no "nylon" pants, no "baggy/loose" clothing)	☐ Yes
⇒ Jewellery and Hair (no loose/long hair, no dangling or otherwise loose/dangling piercings, no rings)	☐ Yes
⇒ Safety Footwear (CSA approved, steel-toed, steel shanked, ankle supporting, good tread, securely tied)	☐ Yes
⇒ High visibility clothing	☐ Yes
Employee Orientation Checklist February 2010	

W.S. Nicholls WESTERN CONSTRUCTION LTD.	
⇒ Safety Eyewear	☐ Yes
⇒ Gloves	☐ Yes
⇒ Hard Hats	☐ Yes
⇒ Respiratory Protection	☐ Yes
⇒ Protective Clothing	☐ Yes
Workplace Hazardous Material Information System	
⇒ Hazard Symbols	☐ Yes
⇒ Labelling Requirements	☐ Yes
⇒ Material Safety Data Sheets	☐ Yes
Topics reviewed during the course of the orientation are not limited to those on the checklist. Other topics covered must however be documented.	
Other topics/materials:	Reviewed
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
	☐ Yes
Employee Acknowledgment:	
I acknowledge that the above topics have been reviewed with me by my supervisor.	
Date: _____	Employee Signature: _____
Supervisor Comments:	

Date: _____	Supervisor Signature: _____
Employee Orientation Checklist February 2010	

Figure 1: New Employee Orientation Checklist

New/Young Worker Assessments

WSN recognizes that “new” (less than a year of experience) and “young” (less than 25 years old) workers) are a “higher risk” group of employees and will take appropriate steps to help ensure their safety, including performing regular/regimented documented assessments of new/young workers. The new employee’s immediate supervisor is responsible for conducting assessments/evaluations of the new worker in accordance with the following:

- Daily for one (1) week,
- Weekly for five (7) weeks,
- *Monthly for ten (10) months, and*
- *Quarterly thereafter until the employee is no longer “Young”*

The “New/Young Worker Assessment Checklist” (Refer to Figure 2) will be used to assist the supervisor representative performing the assessment, and to act as a permanent record of such.

New/Young Worker Assessment Report

Employee Name: _____ Date of Hire: _____

Daily Evaluations (conducted for first 7 shifts (i.e. one week))

	Shift 1	Shift 2	Shift 3	Shift 4	Shift 5	Shift 6	Shift 7
PPE, Clothing and General Attire							
Safety HAZOP							
CSE Knowledge and Compliance							
Fall Protection: Knowledge and Compliance							
Working Around Mobile Equipment							
Emergency Procedures							
Right to Refuse Unsafe Work							
General Knowledge of Work Process							
General Knowledge of Equipment							
Can Identify/Recognize Hazards							
Other:							

Specific Comments/Concerns:

Shift 1: _____

Shift 2: _____

Shift 3: _____

Shift 4: _____

Shift 5: _____

Shift 6: _____

Shift 7: _____

New/Young Worker Assessment February 2010

Weekly Evaluations (conducted for 5 weeks (following completion of daily evaluations))

	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
PPE, Clothing and General Attire							
Safety HAZOP							
CSE Knowledge and Compliance							
Fall Protection: Knowledge and Compliance							
Working Around Mobile Equipment							
Emergency Procedures							
Right to Refuse Unsafe Work							
General Knowledge of Work Process							
General Knowledge of Equipment							
Can Identify/Recognize Hazards							
Other:							

Specific Comments/Concerns:

Week 2: _____

Week 3: _____

Week 4: _____

Week 5: _____

Week 6: _____

New/Young Worker Assessment February 2010

Monthly Evaluations (conducted for 10 months (following completion of weekly evaluations))

	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
PPE, Clothing and General Attire										
Safety HAZOP										
CSE Knowledge and Compliance										
Fall Protection: Knowledge and Compliance										
Working Around Mobile Equipment										
Emergency Procedures										
Right to Refuse Unsafe Work Process										
General Knowledge of Process										
General Knowledge of Equipment										
Can Identify/Recognize Hazards										
Other:										

Specific Comments/Concerns:

Month 3: _____

Month 4: _____

Month 5: _____

Month 6: _____

Month 7: _____

Month 8: _____

Month 9: _____

Month 10: _____

Month 11: _____

Month 12: _____

New/Young Worker Assessment February 2010

Figure 2: New/Young Worker Assessment Checklist

New/Young Worker Identification

All “New” (i.e., less than 1-year experience) and “Young” (less than 25 years old) workers will also be visibly distinguishable from their peers as such these employees will be required to wear a “Green Hands for Green Hands” sticker affixed to their hard hat.

Job/Task Specific Instruction

Prior to being assigned specific tasks, task specific instruction and training will be provided. The extent of training will vary with individual employees (and subcontractors) and their experience in the construction industry. However, as a minimum, any/all developed safe work procedures related to the job or task will be reviewed with the employee/subcontractor by their immediate supervisor.

Safety Specific Instruction

If determined that transferable and general safety related skills are not adequately clarified in the safe work procedures, employees/subcontractors may receive safety specific instruction for various tasks. This training could include, but is not limited to:

- Specific types/pieces of PPE (*i.e., respirators, hearing protection, fall protection, etc...*),
- Specific Emergency Response/Situation procedures,
- Confined Space Entry,
- Fall Protection,
- H₂S Alive,
- Ergonomic and Musculoskeletal Injury Prevention, and
- WHMIS
- Electrical Awareness Training

As with other training provided at WSN, employees will be generally required to “demonstrate competency” before they will be considered “trained”. Details of such safety specific training (*i.e., course content, instructor details (i.e., resumes, experience) and other training details*) will be recorded on the “CWP and General Job Training Report” (*Refer to Figure 3*) and/or acceptable records as provided by the training provider.

NOTE: When training/education is conducted as part of the daily “toolbox” talk, the daily toolbox talk record may be used to document the training.

[illegible]

Toolbox Talks

Each supervisor is responsible for conducting a Pre-Job Safety Analysis "PSA" at the start of every shift. The toolbox talk will be used by the supervisor to: (1) review the planned activities/scope of work for the day, (2) review any expected unusual/non-routine conditions or practices, (3) remind personnel about key safety information/practices relevant to the shift and (4) review relevant emergency response procedures.

The "PSA" (Refer to Figure 4) will be used to assist the supervisor representative conducting the meeting, and to act as a permanent record of such.

NOTE: Subcontractors are generally expected to attend/participate in WSN delivered toolbox talks.

W.S. Nicholls
WESTERN CONSTRUCTION, LTD.

PRE-JOB SAFETY ANALYSIS (PSA)

Please complete a PSA form prior to the start of each task or change in conditions

Site/Project:		Name of Contractor/Subcontractor:		Date:	Weather:
Description of Work:					
Muster/Meeting Location:					

Review the following anticipated or potential hazards with the work crew at the work site and check only the items which apply to the task/activity. List these tasks and potential hazards and identify the safety controls to reduce or eliminate the hazards.

"HIGH RISK" tasks require a Safe Work Procedure or written Code of Practice:

Environmental Hazards: ☐ Spill potential ☐ Weather conditions ☐ MSDS / SDS reviewed ☐ Ventilation required ☐ Heat stress/cold exposure ☐ Other workers in area ☐ Lighting levels too low ☐ Stored pressure system (i.e. Propane) ☐ Housekeeping Activity Hazards: ☐ Welding/grinding ☐ Burning/heat sources ☐ Compressed gases ☐ Energized equipment in area ☐ Electrical cords/tools - condition ☐ Equipment/tools inspected ☐ Lock-out procedures in place ☐ Demolition ☐ Equipment handling & dismantling ☐ Work in hazardous area(s)	Ergonomic Hazards: ☐ Working in tight/confined area ☐ Parts of body in line of fire ☐ Working above your head ☐ Pinch points identified ☐ Repetitive motion Work at Height Hazards: ☐ Barricades, flagging and signage ☐ Hole coverings in place ☐ Protect from falling items ☐ Powered platforms ☐ Others working overhead/below ☐ Fall arrest systems ☐ Ladders Access / Egress Hazards: ☐ Scaffold (inspected and tagged) ☐ Slipping potential identified ☐ Required permits in place ☐ Excavations ☐ Confined space entry ☐ Traffic patterns (mobile equipment)	Personal Limitations/Hazards: ☐ Clear instructions provided ☐ Trained to use tools and perform task ☐ Distractions in work area ☐ Working alone (communication) ☐ Lift too heavy, awkward position ☐ External noise levels ☐ Physical limitations Piping Specific Hazards: ☐ Pressure testing ☐ Radiography (x-ray testing) ☐ Exposure to petroleum products ☐ Exposure to hazardous products ☐ Systems isolated and locked-out ☐ Piping or vessels purged/cleaned Heavy Equipment Lifting Hazards: ☐ Overhead power lines ☐ Critical lift meeting required ☐ Engineered lift plan required ☐ Other: ☐ Other:

It is important that all hazards/concerns have action plans to eliminate or control them, and that these plans are put in place prior to the start of each task. Identify the task/activity and potential hazards, and then identify the safety controls to reduce or eliminate the hazards.

TASK/ACTIVITY	POTENTIAL HAZARDS	SAFETY CONTROLS

Personal Protective Equipment: (Minimum requirement: safety boots, hard hat, safety glasses)

☐ Eye protection (type required)	☐ Gloves (task specific)	☐ Respirator
☐ Mono-goggles/face shield	☐ Coveralls (fire retardant)	☐ Other:
☐ Hearing Protection	☐ High visibility vest	☐ Other:

PERSON(S) CARRYING OUT WORK		
NAME	SIGNATURE	DATE

PSA Prepared By: _____ Position: _____ Date: _____

PSA Approved By (Supervisor): _____ Position: _____ Date: _____

Figure 4: PSA (Daily Toolbox Talk Report)

Crew Safety Meetings

Each supervisor is responsible for completing “Crew Safety Meetings” on at least a weekly basis.

Crew Safety Meetings are primarily an education tool, and will be used review specific rules, general, critical, and emergency response procedures, as well as other applicable safety expectations.

All Crew Safety Meetings will also include an opportunity for personnel to raise concerns, ask questions and make safety related suggestions. All workers, supervisors and managers on site must attend the Crew Talks, which will generally be 30 minutes or less in duration. To assist supervisors in the completion of such crew safety meetings, WSN will provide “information packages” for supervisors.

The “Weekly Crew Safety Meeting Report” (*Refer to Figure 5*) will be used to assist the supervisor representative conducting the crew safety meeting, and to act as a permanent record of such.

NOTE: *Subcontractors are generally expected to attend/participate in WSN delivered Crew Safety Meetings.*



Weekly Crew Safety Meeting Report

General Information

Supervisor: _____ Date: _____

Description of safety item(s) discussed

Record of Attendance

Employee Name	Signature	Employee Name	Signature

Figure 5: Weekly Crew Safety Meeting Report

Section - 4. Supervision and Supervisory Systems

Supervisor Training, Goals and Objectives

Personnel required to perform on-the-job supervision are critical to the success, or failure, of the WSN Health and Safety Program. They are accountable for the day-to-day performance of WSN employees. Supervisors must ensure that work is done efficiently and safely. They must also respond to the concerns of employees. To assist supervisory personnel in attaining supervision and due diligence expectations, WSN management will:

1. Ensure supervisory personnel receive instruction in:
 - Components and administration of the Health and Safety Program,
 - Legal obligations,
 - Conducting New Employee Orientations,
 - Preparing Correct Work Practices (CWPs),
 - Employee Training Process,
 - Workplace inspections,
 - Incident investigations,
 - Crew talks, and
 - Job Safety Observations

***NOTE:** Such training and education will be provided through a combination of internal (i.e., within WSN) and external (i.e., CLRA, COR, OSSA, etc....) initiatives and course providers.*

2. Ensure that supervisory personnel have demonstrated abilities in:
 - Effective communication,
 - Leadership and safe organization of work,
 - Problem solving, and
 - Compatibility with company health and safety philosophy
3. Provide supervisory personnel with achievable safety objectives and feedback on their safety performance on an annual basis.
4. Employ and promote only those supervisors who demonstrate a concern for the health and safety of the employees they supervise.
5. Provide materials to assist supervisors in developing and maintaining worker interest in health and safety.
6. Provide suitable/approved record keeping formats.

Promoting Safety & Health

Supervisors must take an active role in promoting workplace safety and health. To help ensure that WSN rules, policies & procedures, and the WCA & OHSR are (re)enforced, supervisors will use three important techniques:

- Modeling
- Rewarding
- Correcting

Modeling refers to any means used to demonstrate the proper way to perform a task. It also refers to behaving in a manner that people will imitate. Supervisors will model appropriate behaviour for the promotion of safety and health. In other words, **set a good example!** This includes:

- Using the correct work procedures,
- Wearing the required personal protective equipment (head protection, eyewear, footwear, hearing protection, hi-visibility clothing, etc....),
- Using the correct technique, tools, equipment, and/or machinery when performing or demonstrating a task,
- Operating machinery only if the guards, safety switches, etc.... are in place and working properly

Rewarding means recognizing employees that use safe and healthy work behaviours. Rewarding and encouraging safe and healthy behaviour will help make it occur more often. Supervisors will reinforce safe and healthy behaviour by:

- Recognizing when a job or task is performed properly (*i.e., using correct procedures, equipment, etc...*),
- Providing verbal (positive feedback) acknowledgement and reinforcement of the correct behaviour

Supervisors are encouraged to intentionally look for safe behaviours and let employees know they appreciate the effort that goes into doing a job the right way.

Correcting involves telling an employee when their behaviour, work practices, etc.... are not correct. The correction must be immediate. Supervisors should use the following technique for correcting incorrect/hazardous behaviours:

- Identify the hazardous action and/or condition,
- Restate your position if the employee disagrees with your observation,
- Inform the employee of the correct method that is to be used. Demonstrate if required,
- Check to ensure that the employee understands what changes are required,
- Emphasize the importance of the employee's well-being to yourself and WSN,
- Record your observations for reference at a later date should disciplinary actions become necessary. If a situation is serious enough to require corrective action, then be sure to record the events and follow WSN's policy on disciplinary procedures.

Planned Job Observations

While it is a requirement for supervisors to review the previously mentioned safe work procedures and practices (with employees) as part of the education and training process, WSN supervisory staff also play an important role in ensuring continued compliance with such procedures.

To help fulfill this obligation, supervisors are expected to complete regular (at least one per shift) Planned Job Observations (PJO). PJOs are a disciplined, documented observation process to provide a clinical review of task procedures. PJO involves a formal review of a task, either from start to finish or focused on

the “high-risk” portion of the task, for the purpose of improving the procedure and overall safety of the task.

PJOs differ from other types of job observation techniques. The primary difference is that during a PJO, your time is dedicated to the process, and thus likely much more focused and effective. PJOs differ from other job observations similar to how Planned Inspections differ from Information Inspections.

Following a PJO, the observer (usually a supervisor) engages the observed in a discussion for the purpose of reviewing the observations (both positive and corrective). This conversation is the key to PJO as it allows the observer the opportunity to: (1) evaluate the safety/risk of a given activity, (2) correct inadequate procedures and practices, (3) positively reinforce exceptional procedures and practices, and (4) demonstrate concern for a worker’s well-being.

To aid in the completion of PJO, WSN has developed a standard “Planned Job Observation” report (*Refer to Figure 6*). Completed PJOs are to be forwarded to the office for review of trends and findings. Findings that will improve safety will be communicated to workers through Crew Safety Meetings. Any findings that might render CWP’s safer will be incorporated into such.

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Planned Job Observation				
Task/Work Observed:		Date (mm/dd/yy)		
Person Observing:		Person(s) Observed:		
General Items	N/A	Safe	Concern	Details (as req'd)
Job set-up and sequence	☐	☐	☐	
PIPE choice, use and care	☐	☐	☐	
Conditions of tools/equipment	☐	☐	☐	
General Housekeeping	☐	☐	☐	
Person's housekeeping	☐	☐	☐	
Attention to work	☐	☐	☐	
Communication	☐	☐	☐	
Impacts of task/work on others	☐	☐	☐	
Impacts of others on task/work	☐	☐	☐	
Work above/below	☐	☐	☐	
Emergency equipment	☐	☐	☐	
Ambient conditions	☐	☐	☐	
Specific Items	N/A	Safe	Concern	Details (as req'd)
Confined Space Entry	☐	☐	☐	
Fall Protection	☐	☐	☐	
Overhead/Underground Utilities	☐	☐	☐	
Welding/Hazardous Products	☐	☐	☐	
Scaffolding/Ladders	☐	☐	☐	
New/Young Workers	☐	☐	☐	
Mobile/Heavy Equipment	☐	☐	☐	
Other	☐	☐	☐	
Other	☐	☐	☐	
Other	☐	☐	☐	
Other	☐	☐	☐	
Comments (use back of sheet for additional comments):				
Review and Approval (signature required)				
Observed:	Supervisor:	Superintendent:		

Figure 6: Planned Job Observation (PJO)

In general terms, all WSN supervisors are expected to complete (1) PJO per shift. However, supervisors are expected to complete PJOs more frequently on “higher risk” employees. Higher risk employees may include, but are not necessarily limited to:

- Those that have started a new job,
- Younger and newer workers,
- Workers that have recent/historical experienced difficulties,
- Workers that perform “higher risk” work, and
- Workers with a known/recognized elevated “risk tolerance” (*i.e., risk takers*)

Section - 5. Employee Health & Safety Representatives

Employee Safety Representative/Joint Occupational Health & Safety Policy

WSN recognizes the importance of having elected employee Health & Safety Representatives on every project.

To help support elected employee health & safety representatives, the following guidelines have been developed.

Elected Employee Health & Safety Representatives

Elected employee health & safety representatives have an important role to play on WSN projects. These persons are to act as the “voice” of the crew for health and safety related issues, and to be a “safe” person employees can talk to about health and safety issues should they, for whatever reason, choose not to report such concerns directly to their supervisor.

While the relationship/procedures for maximizing the benefit and role of elected employee health and safety representatives will undoubtedly vary for each project, the following guidelines have been established:

- An elected employee health and safety representative will be elected by the crew on the majority of WSN projects.
- The elected health and safety representative may be asked to participate in the investigation of incidents (such as employee injury).
- The elected employee health and safety representative will have the opportunity to participate on planned inspections of the worksite (as detailed in Section 8), as part of an overall inspection team.
- The elected employee health and safety representative will have the opportunity to meet and discuss health and safety issues with project management at **scheduled** intervals.
- The elected employee health and safety representative will have the opportunity to offer input into the development and delivery of education and training provided during the course of the project.
- The elected employee health and safety representative will promote compliance with applicable safe work requirements, including those dictated by WSN, the client and regulation by setting a good example and by encouraging co-workers to do the same.

Section - 6. Management/Supervisor Meetings

Management/Supervisor Meeting Policy/Overview

Management and supervisory staff at WSN believe it is necessary for all staff representatives to be well informed of the safety activities and initiatives at WSN. Management and supervisory staff will meet to review all aspects of production and safety. These meetings are essential to ensure that all levels of management are equally informed of safety activities and unified in their approach to dedicating sufficient resources to effectively support the Safety Program.

Quarterly Manager/Superintendent Meetings

Regular manager and supervisor meetings are held for the purpose of reviewing the operational activities at WSN from the previous period, planning the operational activities for the upcoming period, informing supervisors of important issues and discussing health and safety activities. Generally, monthly meetings will be held with all WSN managers, superintendents, and regular supervisors. While not the sole focus of the meetings, health and safety will be the first item discussed. Health and safety related discussions may include, but are not limited to:

- Results of accident investigations,
- Week, month, and year to date accident statistics,
- Accident trends,
- Workers' Compensation Board activities,
- Status of health and safety initiatives,
- Training required by personnel, and
- Client safety concerns/suggestions

Section - 7. Field Level Risk Assessments and Project Health & Safety Plans

Hazard Identification, Assessment and Control Policy

Identifying, assessing, and controlling hazards are a high priority and everyone's responsibility. It must be an on-going process of continual improvement. Three critical Hazard Identification/Risk Assessment processes at WSN project/site are: (1) specific Health & Safety Plans (HASPs), (2) Field Level Risk Assessments (FLRAs) and (3) Toolbox Talks (*discussed separately in Section 3*). A risk assessment must be performed in any workplace in which a risk of injury to workers from violence arising out of their employment may be present.

Site/Project Health and Safety Plans (HASPs)

Some hazards are inherent in the type of processes that take place during WSN projects. While common construction hazards are well known to the industry, each site poses unique hazards that must be identified and assessed. All hazards will be rated using the rating system detailed on page 143. As well, each client may have specific hazard control procedures that need to be considered and satisfied when working on that site. For these reasons, site-specific health, and safety plans (HASPs) must be developed.

Site Health & Safety Plan Development/Administrative Guidelines

The following guidelines have been developed to assist in the completion and administration of HASPs:

- HASPs will be developed for all WSN projects,
- The site/project superintendent is responsible for ensuring a HASP is developed prior to the beginning of work activities,
- The HASP will be prepared in conjunction with all site/project stakeholders including, but not necessarily limited to: WSN management and supervision, WSN project safety officers, WSN employees (usually the elected employee health and safety representative(s)), subcontractor representative and client representatives,
- To ensure that HASP remains current and "up-to-date", the site/project superintendent, as well as any WSN project safety officers will formally review HASPs on a weekly basis, whenever site conditions/project task change and following all emergency responses,
- HASPs will be forwarded to the client's project representative and designated safety representatives, as requested, and
- All HASPs will clearly identify the date of the HASP's creation/development, as well as the dates of any/all subsequent revisions.

HASPs will contain, as a minimum, the following:

General Site/Project Information

- Client name,
- Client address,
- Project description,
- Anticipated project dates/duration,
- Name of client project representative and contact information,
- Name of client safety representative and contact information,
- Name of WSN site/project superintendent and contact information,
- Name(s) of WSN project supervisors and contact information, and
- Name of WSN project safety officer and contact information.

Site Indoctrination Information

- Location/times for scheduled client delivered indoctrinations, and
- Orientation requirements for WSN and subcontractor employees

Site/Project Emergency Information – Emergency Response Plan

- Identification of potential emergencies (*employee injury, utility contact, confined space rescue, site evacuation, toxic process gases (i.e., H₂S, ClO₂, etc...), departmental/area evacuations, site wide evacuations, fires, earthquakes, bomb threats, severe weather, etc...*)
- Procedures for responding to each and every identified potential emergency. Such procedures may include, but are not limited to:
 - A map or plot plan of the work area that shows evacuation routes and head-count location, as well as the location of emergency equipment, emergency washing stations, first aid services, fire suppression equipment and the location of stations or signs for directing emergency service vehicles,
 - Basic fire-fighting procedures,
 - Basic wound/injury management,
 - Method(s) for sounding alarms and reporting the emergency, as well as details on the “all-clear” signal,
 - A list of personnel responsible in emergency situations and how to contact them,
 - Contact phone numbers for emergency support services (*including site and municipal (i.e., police, ambulance, fire department, hospitals, emergency care facilities, etc...)*)
 - Designated access route(s) for emergency service vehicles,
 - Designated person(s) to meet and direct emergency service vehicles,
 - Methods of emergency/non-emergency transportation to facility and off-site medical/emergency facilities,
 - Evacuation, headcount, and rescue,
 - A routine for notification of workers’ emergency contact, and
 - Procedure for the investigation and correction of hazards

Specific Identified Project Hazard Details

- All reasonably foreseeable health and safety hazards and necessary controls associated with all phases (*i.e., set-up/mobilization, scope execution and clean-up/demobilization*). Such hazard/control may include, but are not necessarily limited to:
 - Chemical, Biological and Harmful Substances to which workers may be exposed. Such includes but is not necessarily limited to: (1) toxic process gases, (2) process chemicals, (3) waste materials, (4) products used by WSN and (5) products used by other contractors. (*Worker training, SDS reviews, exposure control plans, decontamination procedures/facilities, PPE, emergency procedures, emergency equipment, etc...*),
 - Work activities of clients and/or other contractors (*coordination meetings, designated contact persons, work scheduling, etc...*),
 - Overhead/Crane work (*i.e., Safe lift plans, area barricading, qualified operators/riggers, etc...*)
 - Work in confined spaces (*hazard assessments, work procedures, entry permits, ventilation, atmospheric monitoring, etc...*),
 - Work at height (*fall protection work plans, fall protection training, rescue provisions, etc...*),
 - Work on/near energized or otherwise operating equipment (*lockout procedures, work on energized equipment procedures, hearing protection, etc...*),
 - Work with/near mobile equipment (*traffic management plans, designated pedestrian routes, operator training/certification, etc...*), and
 - The potential for workplace violence (*work procedures, situation diffusion practices, emergency call procedures, etc...*)

Field Level Risk Assessments

Field Level Risk Assessments (FLRAs) are a simple /quick process by which personnel can complete their own hazard identification and risk assessment process. FLRAs are generally reserved for tasks with low associated risks or tasks that are simple and are designed to help ensure employees do not “overlook” hazards.

WSN has developed two cue cards (*Figure 7*) to assist employees in the completion of effective FLRAs. While either cue card will generally suffice, only one of the cue cards can be used to document the FLRA. The decision as to which cue card will be used rest with the senior on-site WSN representative (*after/with consideration to: (1) client expectations, (2) jurisdictional requirements and (3) crew composition*).

 Field Level Risk Assessment - Do I clearly understand my task and am I prepared for this job? - Have applicable safe work procedures been reviewed and do I fully understand them? - Do I have all the safety equipment that I am required to have and am I using it properly? - Are tools and equipment in good condition? Have pre-use inspections been completed? - Do I need to lockout? Have I locked out correctly? - Do I have to work at heights? Is scaffolding adequate and did I check the scaffolding tags? Do I need fall protection? Is the fall protection system adequate? Do I know how I will be rescued if I am suspended from my fall protection equipment? - Do I need to enter a confined space? If so, do I understand the associated hazard assessments and work procedures. Do I know how to contact the standby person? Are atmospheric monitoring requirements being satisfied? - Is the job set-up properly? Do I need to take more time setting this job up or cleaning up? - Are my electrical cords, airlines/hoses strung overhead or otherwise secured/protected? - Is there any possible exposure to asbestos, i.e. gaskets or insulation? - Do I know where the nearest emergency shower/eye wash is, and is access to it clear? - Do I know how to contact emergency services? Do I know where phones/alarms are located? - Have all facility permitting (i.e. cold work, hot work, confined space, etc.) requirements been satisfied? - Could anything I am doing affect others (i.e. sparks, falling objects), and if so, have I done everything possible to protect others (i.e. warning tape, shields, fire blankets)? - Is there anything that could change that could create a new hazard? Am I prepared for this? - Do I need to manually lift or move something? If so, can I lift or move it safely by myself, or do I need to get assistance (i.e. mechanical or co-workers)? - Do I know the hazards of chemical products I am using? Am I taking all necessary precautions? Do I know where the MSDS are located? - Are apprentices working in accordance with safety expectations, and do they have a clear understanding of the task and the expected execution plan? - Is there anything else that I need to do to make this job safe for myself, my coworkers and my friends so that we all go home to our families at the end of the job?	 Field Level Risk Assessment Date: _____ Task: _____ Employee: _____ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">Safe</th> <th style="width: 5%;">Concern</th> <th style="width: 90%;">Risk</th> </tr> </thead> <tbody> <tr><td></td><td></td><td>Do I clearly understand my task and am I prepared for this job?</td></tr> <tr><td></td><td></td><td>Have applicable safe work procedures been reviewed and do I fully understand them?</td></tr> <tr><td></td><td></td><td>Do I have all the safety equipment that I am required to have and am I using it properly?</td></tr> <tr><td></td><td></td><td>Are tools and equipment in good condition? Have pre-use inspections been completed?</td></tr> <tr><td></td><td></td><td>Do I need to lockout? Have I locked out correctly?</td></tr> <tr><td></td><td></td><td>Do I have to work at heights? Is scaffolding adequate and did I check the scaffolding tags? Do I need fall protection? 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Field Level Risk Assessment Actions taken (by employees) to improve health and/or safety, or other safety improvement suggestions: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____ 13. _____ 14. _____ 15. _____ 16. _____ 17. _____ Date: _____ Signature: _____ Foreman: _____ Superintendent: _____ Safety Rep: _____ Client: _____
Safe	Concern	Risk																																																									
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		Do I need to manually lift or move something? If so, can I lift or move it safely by myself, or do I need to get assistance (i.e. mechanical or co-workers)?																																																									
		Do I know the hazards of chemical products I am using? Am I taking all necessary precautions? Do I know where the MSDS are located?																																																									
		Are apprentices working in accordance with safety expectations, and do they have a clear understanding of the task and the expected execution plan?																																																									
		Is there anything else that I need to do to make this job safe for myself, my coworkers and my friends so that we all go home to our families at the end of the job?																																																									

Figure 7: FLRA Cue Cards

All WSN personnel are required to perform such FLRA prior to conducting all tasks. To ensure such FLRA requirements are satisfied, WSN supervisors are expected to routinely “challenge” personnel under their direct supervision by engaging them in a conversation. Such challenges are intended to re-enforce WSN expectation for the completion of FLRA, and to encourage WSN personnel to actively and effectively get involved with a formalized process aimed at helping ensure their own health and safety. While each supervisor’s challenge “tactics” will undoubtedly vary slightly, the following conversational outline should be used:

“Can you now explain to me the hazards associated with this work, the controls that are in place, and what you have done to make this job safe?”

Following the completion of FLRA challenges, WSN supervisors are expected to either: (1) date and sign the employees FLRA cards (*for documented FLRAs*) or (2) make a notation in their personal log.

Section - 8. Emergency Preparedness

Emergency Preparedness Policy

Formalized site-specific emergency procedures will be prepared by WSN for each worksite where WSN is the prime contractor or sole contractor working on site. These procedures will include emergency response, care of injured workers, reporting requirements, and corrective follow-up for all injuries and serious accidents. The procedures will be developed bearing in mind that no job is immune to the possibility of a catastrophe at any time. The procedures will be thoroughly outlined, made known to all workers (*i.e., through training and education systems, such as orientation and toolbox talks*) and enforced.

Site emergency procedures may include, but are not necessarily limited to the following items:

- A map or plot plan of the work area that shows evacuation routes and head-count location, as well as the location of emergency equipment, emergency washing stations, first aid services, fire suppression equipment and the location of stations or signs for directing emergency service vehicles,
- Basic fire-fighting procedures,
- Basic wound/injury management,
- Method(s) for sounding alarms and reporting the emergency, as well as details on the “all-clear” signal,
- A list of personnel responsible in emergency situations and how to contact them,
- Contact phone numbers for emergency support services (*including site and municipal (i.e., police, ambulance, fire department, hospitals, emergency care facilities, etc...)*)
- Designated access route(s) for emergency service vehicles,
- Designated person(s) to meet and direct emergency service vehicles,
- Methods of emergency/non-emergency transportation to facility and off-site medical/emergency facilities.
- Evacuation, headcount, and rescue,
- A routine for notification of workers’ emergency contact, and
- Procedure for the investigation and correction of hazards.

For projects where WSN is working as a sub-contractor, the emergency procedures will be made available by the site prime. WSN site supervisory personnel will ensure that the prime’s site emergency procedures are known by the personnel they supervise, as well as any procedures specific to WSN’s portion of the project.

As part of the HASP review process noted in Section 7, all emergency procedures will be formally reviewed on at least a weekly basis to ensure that they remain current, applicable, and “up-to-date”.

As part of the “General Employee/Subcontractor Orientation”, “Safety Specific Instruction” “Daily Toolbox Talks” and “Weekly Crew Safety Meeting” processes noted in Section 3, personnel will receive the training and education necessary to respond to emergency situations appropriately.

The WSN "Job Site Emergency Preparedness Information" worksheet (*Refer to Figure 8*) can be used for developing/documenting emergency procedures; when/if suitable procedures are not provided directly from the client or developed through the completion of the HASP process.

W.S. Nicholls JOB SITE EMERGENCY PREPAREDNESS INFORMATION (complete, attach in the sketch or post plan, and post in conspicuous location) Page 1 of 3 - Project address or location description (to provide to emergency personnel: fire, police, and ambulance): _____ - To raise a "first-aid required" alarm: _____ - To raise a "general evacuation" alarm: _____ - Head-count location for general evacuation: _____ - Emergency transportation provisions: _____ - Names of emergency/first aid personnel for site: _____ - Emergency equipment location: _____ - Telephone(s): _____	W.S. Nicholls JOB SITE EMERGENCY PREPAREDNESS INFORMATION (complete, attach in the sketch or post plan, and post in conspicuous location) Page 2 of 3 - First Aid Facility: _____ - Alarms/Air Horn(s): _____ - MSDS File: _____ - Fire Prevention: Location of Designated Smoking Areas: _____ Location of Fire Extinguishers/Hoses/Hydrants: _____ Procedure for Use of Fire Extinguisher 	W.S. Nicholls JOB SITE EMERGENCY PREPAREDNESS INFORMATION (complete, attach in the sketch or post plan, and post in conspicuous location) Page 3 of 3 13. Phone Numbers: - Applicable Site/Facility/Client Emergency Numbers: - Head Office Telephone Number: - Project Manager Telephone Number: - Ambulance Telephone Number: - Police Telephone Number: - Fire Department Telephone Number: - Workers Compensation Board Telephone Number: - Health & Safety Regulator Name/Telephone Number: - Utility Provider Telephone Number (if powerlines in work area): NOTE: Supervisory personnel are responsible for ensuring the employees are familiar with site emergency preparedness provisions. Contact with the media should be avoided if possible. If it is not possible, they can be informed that "management representative will provide comment at the earliest opportunity after the incident has been investigated". Employees, after their management, are instructed to make no further comments in the media and to make no statements related to any persons at the event of a serious injury or fatality occurring within the workplace. W.S. Nicholls Western Construction Ltd. Western Canada Manager, in conjunction with the ICBC (or other Police Force) will contact the injured worker's family to inform them of the occurrence.

Figure 8: Job Site Emergency Preparedness Information

Section - 9. Workplace Inspections

Workplace Inspections Policy

Identifying and controlling hazards is a high priority and everyone's responsibility. It must be an on-going process of continual improvement. Workplace inspections provide an excellent opportunity to identify hazards. Only after hazards are successfully identified can they be controlled and monitored.

Types of Inspections

There will be four types of inspections conducted at WSN. These include:

- Informal on-going inspections,
- Planned formal inspections,
- Pre-Use inspections, and
- Special inspections

Informal On-Going Inspections

All employees should do informal inspections of their work areas on a continual basis. Employees must be aware of their surroundings as they go about their regular activities. Personnel need to report hazards to their supervisor, especially when they cannot be corrected immediately. Supervisors must then decide what corrective action is needed.

Daily Information Inspection Guidelines

The following guidelines are provided to assist personnel in conducting daily informal inspections:

- Know about items that require special attention. This can be done by reviewing the inspection assistance checklist, previous inspection records, and through knowledge of the job.
- Use your eyes, ears, and other senses to identify actual or potential problems as you go about your other daily activities. Correct hazards as you find them whenever you can. Report hazards to your supervisor, both the ones that have been corrected, and the ones still requiring correction.
- Supervisors will record hazard identification and corrections that occur through the informal inspection process. This is in support of good due diligence practices. A short entry in the supervisor's daily logbook will suffice.
- Ensure hazards that can be corrected immediately are corrected. Refer any hazards that need further follow-up to the site supervisor, site/project superintendent and/or safety officer as may be appropriate for ensuring the hazard is corrected. Personnel should only take corrective actions to control a hazard if such actions pose no additional risk to themselves or others.

NOTE: *Informal daily inspections have significant limitations - they commonly identify only the obvious problems and they do not take a systematic approach. As a result, informal daily inspections cannot replace planned inspections.*

Planned Inspections

These are formalized inspections and are done on a weekly basis by a qualified person or team. This may be a supervisor, an elected employee health and safety representative, manager, and/or person designated by management. Planned inspections are good for discovering hazards that informal on-going inspections might have missed. The inspection will result in an "Inspection Report" being developed. The report contains a list of the hazards found, how they will be corrected and who is responsible for correcting them. Risk ratings can be used to show which hazards need immediate attention and which ones can be dealt with later.

Planned Inspection Guidelines

The following guidelines are provided to assist personnel in conducting planned inspections:

1. Pre-Inspection

- Review previous inspection reports, if any, for the area to be inspected.
 - Refer to the "Workplace Inspection Checklist/Summary Report" (Refer to Figure 9).
- Identify specific equipment, machinery, jobs, etc... associated with accident trends or severe loss potential.

W.S. Nicholas WESTERN CONSTRUCTION Workplace Inspection Checklist/Summary Report	
Project Safety Requirements ☐ All Emergency Response Information Complete ☐ All workers on site have completed WCN General Orientation ☐ All workers on site have completed site specific orientation - client and WCN ☐ Toolbox talk requirements being satisfied on a daily (or more frequent) basis ☐ Weekly Safety Meetings being satisfied	Fall Protection: ☐ All situations where fall protection is required have been identified, i.e. work over 3.0 m (10 feet) or when special hazards exist ☐ A written fall protection plan is in place before work begins for all work above 7.5 m (25 feet) and includes as a minimum: (1) identification of fall hazards, (2) details on fall protection systems to be used in each area and (3) rescue procedures. ☐ Workers are instructed in fall protection before entering work areas where fall hazards exist ☐ Guardrails are used whenever possible, and are of the right type & construction ☐ Handrails, safety belts, lanyards, and safety nets used are of the right type, are used when required, are maintained and snap hooks or lanyards are self locking ☐ Catch arrestors are used on lanyards as required by regulation ☐ Calculators, ladders & rings (when used) meet the standards as required by regulation ☐ Anchor points are the right type and strength for the system in use (fall restraint & fall arrest) ☐ Certification in writing by a professional engineer is obtained for (1) anchor points & plates and (2) permanent horizontal lifeline systems ☐ Vertical lifelines are of the correct type and installation ☐ Horizontal lifeline systems used are of the correct type and installation ☐ All fall protection equipment is inspected and maintained, and defective equipment removed from service
Fire Prevention ☐ Fire extinguishers operations/appropriate ☐ Fire extinguishers are accessible ☐ Flammable materials are adequately stored ☐ Entry marked and clear of obstructions	Confined Spaces: ☐ Confined spaces are listed, clearly marked, posted, and access points are secured against entry ☐ Safe entry procedures are in place, and based on the latest assessment prepared by a qualified person ☐ A qualified supervisor is assigned responsibility for supervising entry and issuing entry permits ☐ Personnel with confined space entry duties are trained in hazards and safe procedures ☐ Personnel used when entering a confined space are consistent with written procedures ☐ A pre-entry meeting is conducted ☐ Permits are used as required ☐ Safety requirements are satisfied ☐ Ventilation and atmospheric monitoring requirements satisfied ☐ Personal protective equipment & clothing suited to the hazards are worn/used by personnel ☐ There is provision for rescue of persons inside a confined space; personnel are trained and equipped ☐ Welding torches, blowers, etc. are removed from the space when not in use & when space is vacated ☐ Compressed gas cylinders are kept outside of the confined space ☐ Electrical tools used inside the space are of the right type and design (double insulated, grounded) ☐ Only non-sparking tools are used in spaces containing flammable or explosive gases, vapours, or liquids
First Aid ☐ First aid room is clean ☐ First aid room is adequately stocked ☐ First aid attendant is scheduled ☐ First aid attendant's certificate is available ☐ First aid logbook is being used	Electrical (Low Voltage) ☐ GFCI or Arc Fault Grounding Program in place ☐ Electrical cords strung or otherwise protected to avoid tripping hazards ☐ Cords are intact ☐ Plugs and prongs are in good condition ☐ Energized panels and junction boxes are covered if outdoors ☐ Lighting systems are in place ☐ Tools are disconnected when serviced ☐ Locked procedures are used
Mobile Equipment ☐ Daily pre-shift top are being completed by the operator ☐ Horn, lights and backup alarm work properly ☐ Spikes and steering work properly ☐ Hydraulic systems functioning as required ☐ Equipment being controlled at a safe speed and under control ☐ Seat belts are worn ☐ Only the equipment operator is on moving equipment (i.e. no riders) ☐ Spill kits and fire extinguishers available ☐ Equipment parked in a safe location, with all attachments lowered and secured and the transmission in the manufacturer's specified park position	Electrical (High Voltage) ☐ Limits of Approach known and maintained: 750V to 25kV (2 metres - 10') 25kV to 35kV (4.5 metres - 15') 35kV to 50kV (if reties - 20') ☐ Awareness in Writing (Form 20633) if equipment could inadvertently move within limits of approach
Tools (Power, Gas, Hand, Pneumatic, Powder Actuated) ☐ Electrical Cords in good condition ☐ Guards in place and used correctly ☐ Compatible components used (i.e. disc RPM ratings) ☐ Suitable PPE worn by operator ☐ Equipment disconnected before repair and adjustment ☐ Trigger mechanisms functioning properly ☐ Compressed air connections secured (i.e. with pins)	Personal Protective Equipment (PPE) ☐ PPE requirements for each job are clearly communicated ☐ PPE requirements are being satisfied at each job ☐ PPE is being used and maintained properly
Compressed Gas Cylinders ☐ All cylinders are straight or otherwise secured (i.e. no free standing cylinders permitted) ☐ All cylinders are stored away from heat and sparks ☐ All bottles (oxy/acetylene) are equipped with flash arrestors/suppressors ☐ Cylinders are used on all hoses (i.e. no "sneak type") ☐ Cylinders are capped if not in use or affixed with a regulator ☐ Oxygen cylinders are not stored in bulk with flammable/combinable cylinders (i.e. acetylene)	Ladders ☐ Ladders are in good condition with suitable undamaged rungs, ribs and feet ☐ Ladders are secured in place when required ☐ No work is occurring on the last two steps of the ladder ☐ Ladders extend at least 3' above the upper landing ☐ Ladders are stepped as required (i.e. 1:4) ☐ Only "tight" work is occurring from a ladder, if moderate or heavy work is conducted, workers are using additional fall protection
Other ☐ Has the location of underground utilities been determined prior to beginning excavation? ☐ Has the utility location information been obtained through BC One Call, BC Hydro, etc. and are maps from utility services available on site? ☐ Have utility locations been clearly identified on the ground through the use of spray paint or another means? ☐ Have utilities been hand exposed prior to excavation? ☐ Have all exposed and undisturbed utilities been adequately supported? ☐ If the excavation is more than 4' deep, have workers been protected through the use of shoring, sloping, benching or by another method approved by a P. Eng?	Other ☐ If protected through the use of another method approved by a P. Eng, is the procedure: ☐ Written and available on site? ☐ Specifies the support and sloping requirements, and the subsurface conditions expected to be encountered? ☐ Does the P. Eng procedure include such specifics as: ☐ Date of issue ☐ Site address/location ☐ Drawings/section, plan and sections and/or clearly written instructions ☐ Geotechnical description of the expected soil conditions, or foundation upon the repair ☐ Limitations for machinery or equipment being adjacent to the excavation ☐ Time period for which certification applies ☐ Influence of changing weather conditions and ☐ Name of the certifying engineer, signature and seal

Figure 9: Workplace Inspection Checklist/Summary Report

Pre-Use/Equipment Inspections

Pre-use inspections will be conducted by all personnel prior to operating machinery, equipment, or power tools. Hand tools will also be inspected prior to use. Any defective equipment, tools, etc.... will be removed from service immediately until such time as they can be repaired. The person using the tools or equipment is responsible for its safe operating condition. No equipment that is broken or defective can be used, it must be tagged as such and placed out of service and not be used until it has been repaired and determined safe to use by a qualified person.

All inspections of power tools, equipment and machinery contribute to an on-going maintenance program. Pre-use inspections will help to ensure tools and equipment is maintained in accordance with applicable standards. These standards include the manufacturer's specifications, standards organizations (CSA, ANSI, etc....), and provincial health & safety authority requirements.

Some pre-use inspections must also be documented. When such pre-use inspections must be documented, WSN will provide approved/required documentation. Inspection of tools, equipment and machinery are regularly scheduled, and maintenance records are kept.

Additional Inspections

While pre-use (documented and undocumented) inspections are required, WSN will maintain an inspection system that ensure select tools and equipment are subjected to a more thorough inspection process on a quarterly basis. These select tools and equipment include:

- All portable ladders,
- All fall protection equipment,
- Slings, cables, chokers, and other lifting/rigging hardware, and
- Portable electrical equipment, (including distribution panels and extension cords)

While documentation of individual inspections will not necessarily be maintained, personnel will be able to quickly determine if the required quarterly inspection has occurred by confirming that the select tools/equipment are marked (with coloured tape) in accordance with the following:

Jan 1st – March 31st <i>(inspections must be completed in the month of January)</i>	April 1st – June 30th <i>(inspections must be completed in the month of April)</i>	July 1st – Sept 31st <i>(inspections must be completed in the month of July)</i>	Oct 1st – Dec 31st <i>(inspections must be completed in the month of October)</i>
RED	WHITE	BLUE	GREEN

Section - 10. Incidents & Accident Investigations

WSN strongly believes that only a thorough and completely investigated incident can provide the key information necessary for preventing a similar situation from occurring. In support of this belief, the following incident/accident investigation guidelines have been developed. WSN requires all of its subcontractors to take part in any incident and/or accident investigation if they are involved in any such event.

Incident Reporting

Internal Incident Reporting

Employees and subcontractors are required to report all incidents to their immediate supervisor, including incidents that result in injury, illness or property damage, incidents that had the potential for injury or property damage (near misses) and incidents of (potential) violence.

Subsequent to receiving such a report, supervisory staff is responsible for: (1) initiating a preliminary investigation, and (2) reporting the incident (and perhaps preliminary findings) to senior project management (i.e., the site superintendent).

- Complete a "Near Miss Report" (*Refer to Figure 11*).

Dependent on the circumstances, the site superintendent may need to notify senior WSN management. ***NOTE:*** All serious incidents (i.e., those requiring immediate notification of a Provincial regulator and/or compensation authority, the client, or WSN insurer/underwriter), must be immediately reported to senior WSN management.

	
Near Miss Report	
A near miss is a potential hazard or incident that has not resulted in any personal injury. Unsafe working condition, unsafe employee work habits, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report these potential accidents/incidents immediately. Please complete this form as means to reporting these near-miss situations.	
Site/Project: _____	Location: _____
Date: _____	Time: _____
Please check all appropriate conditions: ☐ Unsafe Act ☐ Unsafe Condition ☐ Unsafe equipment ☐ Unsafe use of equipment	
Description of incident or potential hazard: _____ _____ _____ _____	
Employee: _____	Signature: _____
Near Miss Investigation	
Description of near miss condition: _____ _____	
Cause (primary & contributing): _____ _____	
Corrective action taken (Remove the hazard, replace, repair, or retrain in the proper procedures for the task) _____ _____ _____ _____ _____	
Signature: _____	Date Completed: _____
Date: _____	Time: _____

Figure 11: Near Miss Report

External Incident Reporting

Serious incidents must also be reported to the appropriate Provincial regulator and/or compensation authority in accordance with prescribed regulation/legislation.

Investigation Team

When an incident occurs, the site/project superintendent will determine if an investigation is required. If an investigation is deemed necessary, the superintendent may choose to complete the investigation himself. Alternatively, the superintendent may appoint other qualified and competent personnel to conduct the investigation. ***NOTE:*** *In most cases this will be a site supervisor, as well as the elected health and safety representative.*

Incident Investigation Process

The following guidelines have been prepared to assist personnel with responsibilities for conducting incident investigations:

1. Prepare: Before an incident/accident occurs, incident investigation materials must be ready. This should include as a minimum:
 - Writing pad, pencil, eraser, ruler,
 - Clipboard,
 - Measuring tape,
 - Warning tape,
 - Incident Investigation Report Forms,
 - Camera, and
 - Flashlight
2. Ensure No Further Danger: Ensure that there is no further danger to yourself or others at the scene.
3. Ensure Injured Are Cared For: Ensure that the injured workers are cared for before proceeding with the investigation. Assist if directed to do so, otherwise observe and note appropriate information about scene.
4. Preserve the Scene: Investigators will want as close a picture as possible of what happened. For serious incidents, the scene will also need to be preserved for investigation by the WCB. Nothing will be moved unless it is necessary for treating or rescuing injured personnel or ensuring no further danger.
5. Get Information at the Scene: The information required includes:
 - Date, time, location, conditions at time of incident,
 - Name of persons involved, injured, bystanders, persons rendering aid,
 - Measurements, drawings, photos, or video tape of the scene,
 - Descriptions and conditions of equipment, machinery, tools, etc.... involved, and
 - Other information that the investigator feels is relevant

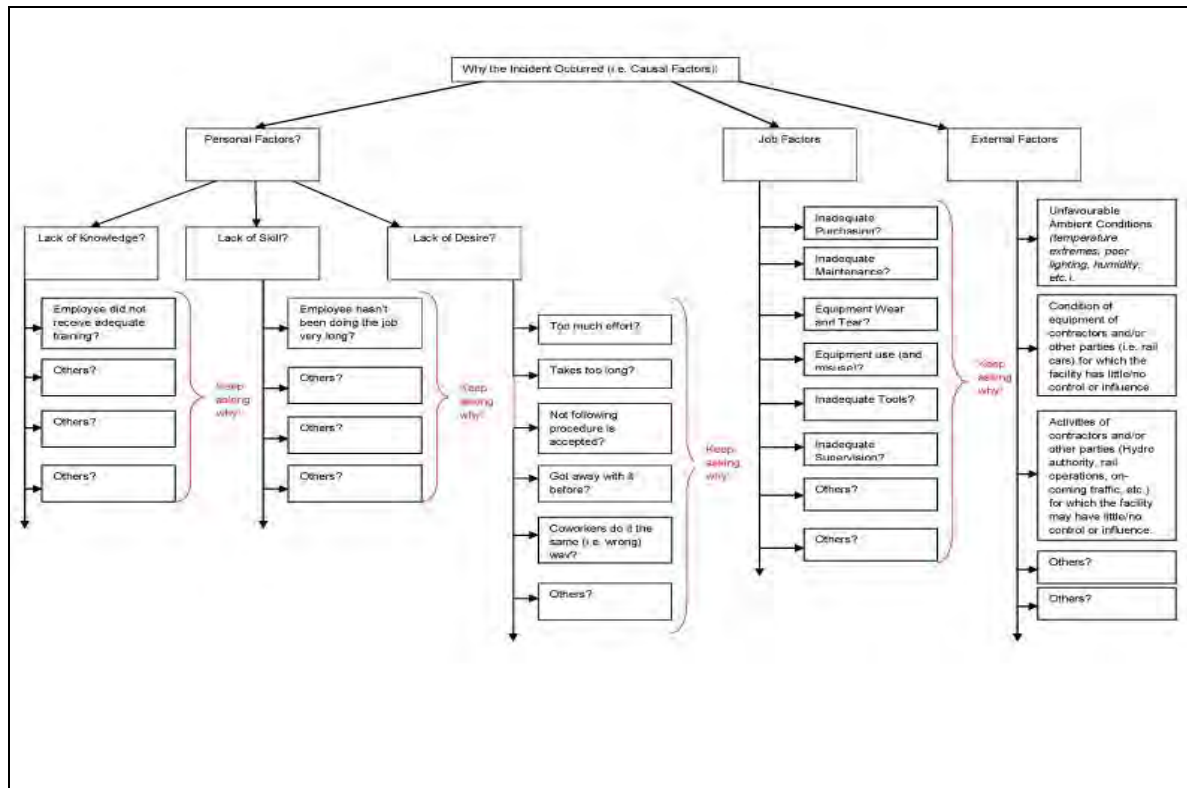
6. Interview the Observers and the Injured: Perform interviews as soon after the incident as possible. Interview persons individually who observed the incident. Gather all the facts before making conclusions.

Good Interview Techniques Include:

- **Interview Separately** - Do not interview groups, each interview must be private, separate interviews will help discourage influencing other memories.
- **Interview in an Appropriate Place** - Interview at the scene if there are no dangers, if not possible, conduct the interview in a relaxed environment. DO NOT conduct the interview in the supervisor's office; this may lead to a feeling of interrogation.
- **Put the Person at Ease** - Explain that this is a fact-finding exercise, not a fault finding one. Be conscious of posturing; DO NOT stand over the witness.
- **Get the Persons Version of Events** - Let the person tell the whole story, start to finish, do not interrupt unless the story is off subject.
- **Ask Appropriate Questions** - Avoid asking questions that will make the person defensive or questions that can be answered with yes or no. Also, consider asking questions to which you already know the answers, this can help establish whether the person really saw what happened and on their power of accurate observation.
- **Give Feedback** - Repeat key points back to the witness in your own words, this will ensure you understood what was said, allows the witness to correct details and it requires active listening on the part of the interviewer and witness.
- **Record Critical Information** - Record notes, not every word, DO NOT use a tape recorder.
- **Use Visual Aids** - If not interviewing at the scene use photographs or sketches to get a clear and accurate description of events.
- **End on a Positive Note** - Thank the person for their assistance, give credit and feedback when ideas are used.
- **Keep Future Communication Open** - Tell the witness to call or contact you if they remember or think of anything that may be of assistance, follow up with a further interview when/if there are conflicts among evidence and witnesses.

7. Review Pertinent Documentation: Documents are another form of information that may be useful during investigations.
8. Observe and analyze the equipment, chemicals, etc.... involved in the incident. Ensure that their position is reflected on the sketch of the incident site, and the contribution of the equipment to the incident is included in the sequence of events.
9. Note the Contributing Factors: Contributing factors are events, conditions, equipment, practices, etc.... that increased the likelihood of the incident occurring. Other factors might be what increased (or could have decreased) the severity of injuries.
10. Prepare an events and causal factors chart that lists:
 - The events immediately prior to the incident in as near as possible, the order of the occurrence,
 - The events following the incident, including the management of the incident, and
 - All contributing "substandard practices (unsafe acts) and "substandard conditions (unsafe conditions)
11. Determine the "Root Cause" for each identified substandard practice and condition. Review all of the facts. Avoid any assumptions about unsafe acts or "stupid mistakes". Invariably there are reasons

why people do what they do. A review of physical data, observers' accounts and documentation should enable investigators to answer the following questions.



12. Write the Report and Make Recommendations: Be complete and include as much information as possible. Make recommendations that will prevent the incident from occurring again.

13. Forward Copies of Incident Investigation Reports:

In general, the distribution list will include the following at a minimum:

- Main Office. Copies will be made and placed in the injured employee's individual files and in the main office safety file, and
- Clients (as part of the post job file)

If required, a copy of the incident investigation may be forwarded to the Provincial regulator and/or compensation authority as well. *(NOTE: Accident investigations must be reviewed by the General Manager prior to being forwarded to the Provincial regulator and/or compensation authority)*

14. Follow-up: Be sure that your recommendations are acted upon.

Developing Recommendations

The next step must be to develop recommendations to prevent reoccurrence. Recommendations must have two important properties. They must be:

- Measurable, and
- Achievable

Effective recommendations must be measurable. There must be a way of determining if a recommendation makes any difference. The resulting action must fix the problem and not add to it. The critical element of follow-up must either confirm or refute the effectiveness of actions taken as a result of the investigation.

Effective recommendations must also be achievable. If the recommendations are too general, or vague, they will not be implemented. Recommendations must also be reasonable. If recommendations are unduly expensive, or not feasible, they will not be implemented.

Recommendations should not be aimed at disciplining a person or assigning blame. This will detract from the reason for doing an investigation. It would also seriously jeopardize the reporting of future incidents.

Prioritizing Recommendations

Recommendations must be prioritized for action/implementation. The first priority is to provide recommendations that will prevent a similar incident from occurring. In other words, remove the events, or change the sequence of events, so that the cause(s) of the incident cannot occur again.

The second priority is to provide recommendations that will prevent injuries if a similar incident does occur. It is not always possible to be 100% certain that a similar incident will not occur. If it does, what steps can be taken to ensure there are no injuries.

The third set of recommendations should address how the injury severity can be reduced.

Investigation Report

WSN has developed a standard "Incident Investigation Report" form to assist in the completion of incident investigations (Refer to Figure 12).

	
Incident Investigation Report	
Date/Time of Incident:	Date/Time of Investigation:
Person(s) Involved in Incident:	
Witnesses:	
Type of Incident (Circle): Personal Injury - Near Miss - Property/Equipment Damage - Complaint - Other	
Please Explain:	
If incident resulted in a Personal Injury, what is the current status of injured person: (1) First Aid Only, (2) Medical Aid, (3) Medical Treatment, (4) Lost Time, (5) Restricted Work?	
Events Preceding Incident:	
Incident Description:	
Events Following Incident:	
Accident Investigation Team Investigating Supervisor: _____ Employee Safety Rep: _____	
Accident Investigation Report October 2017	

	
Investigation Discoveries	
Contributing Factors (causes) in the Incident:	
Recommendations to Prevent Reoccurrence	
Recommendations: recommendations that will (1) prevent a similar incident from occurring (2) prevent injuries/damage if a similar incident occurs (3) reduce the severity of injuries/damage if a similar incident occurs.	
Employer Incident Investigation Report (EIIR) Does the incident fall under any of the following categories? Yes ☐ No ☐ For the first 6 types of incidents, you must also notify WorkSafe BC immediately. Call toll-free 1-888-621-7233 After hours call 1-866-922-4357	
(1) Serious injury or death of a worker (3) A major release of a hazardous substance (5) A blasting accident causing personal injury (7) A diving incident, as defined by the OHS Reg.	(2) A major structural failure or collapse (4) Fire or explosion with potential for serious injury (6) Dangerous incident involving explosives, whether or not there is personal injury (8) Minor injury, or no injury but had the potential for causing serious injury
(9) Injury requiring treatment beyond first aid If the incident falls under any of the 9 categories listed above, it needs to be reported to WorkSafe BC.	
Does the incident need to be reported to WorkSafe BC? Yes ☐ No ☐ Why not (please explain)?	
Employer Incident Investigation in conjunction with the requirements of Part 3, Division 10, of the Workers Compensation Act and prevention policies D10-175-1 and D10-176-1 Submit the completed EIIR template available on the WorkSafe BC website • online at the EIIR upload portal • By fax at 604-276-3247 in the Lower Mainland or toll-free 1-866-240-1434 • By mail to WorkSafe BC, PO Box 5350, Stn Terminal Vancouver, BC V6B 5L5	
Recommendation Review & Acceptance The investigation findings and recommendations must be reviewed and approved by the General Manager.	
Date of Review: _____ Manager Signature: _____	
Accident Investigation Report October 2017	

Figure 12: Incident Investigation Report

Investigation Follow-up

After a recommendation has been made by the Incident Investigators, the recommendations must be reviewed with the Senior Manager of the unit/project involved. The Senior Manager will then be responsible for accepting or rejecting the recommendations. If the recommendations are accepted, the Senior Manager must assign responsibility for implementation along with an expected completion date.

Once responsibility has been assigned, and an expected timeline established, the responsibility for implementation rests with those individuals. Following implementation, the Senior Manager will personally verify the effectiveness of all recommendations.

Section - 11. Employees Injury/First Aid/Claims Management

First Aid Policy

WSN is committed to ensuring that appropriate first aid is provided as quickly as possible for injured employees. WSN will provide and maintain a first aid program for the purpose of minimizing the suffering related to job-related injuries and illnesses, reducing absenteeism, maintaining productivity, and meeting provincial health & safety authority requirements.

Where required, WSN will provide and maintain first aid services, supplies and equipment as required by the provincial health & safety authority.

In British Columbia, such requirements are detailed in Part 3 of the Occupational Health & Safety Regulation. As WSN projects will normally be considered “*High Risk*” (as determined by OHSR 3.16(2) (b)), the following tables detail the “minimum” levels of first aid that must be available at WSN projects in BC:

Minimum First Aid Required:

Table 1: Less than 20 minutes surface travel time to a hospital

# of Employees on Site	Supplies and Equipment	Level of first aid (certification) attendant
1	Personal First Aid Kit	Not Required
2-15	Level 1 First Aid Kit	Level 1 Certificate
16-30	Level 2 First Aid Kit & a Dressing Station	Level 2 Certificate
31-300	Level 2 First Aid Kit & a First Aid Room	Level 2 Certificate

Table 2: More than 20 minutes surface travel time to a hospital

# of Employees on Site	Supplies and Equipment	Level of first aid (certification) attendant
1	Personal First Aid Kit	Not Required
2-5	Level 1 First Aid Kit	Level 1 Certificate
6-10	Level 1 First Aid Kit & ETV Equipment & ETV	Level 1 Certificate with Transportation Endorsement
11-30	Level 3 First Aid Kit & Dressing Station & ETV Equipment & ETV	Level 3 Certificate
31-50	Level 3 First Aid Kit & First Aid Room & ETV Equipment & ETV	Level 3 Certificate
51-200	Level 3 First Aid Kit & First Aid Room & Industrial Ambulance Equipment & Industrial Ambulance	Level 3 Certificate

All first aid attendants will have means of communication readily available to them to call for more advanced first aid treatment if required.

In Alberta, such requirements are detailed in Part 11 of the Occupational Health & Safety Code. As WSN projects will normally be considered “*High Hazard Work*” (as determined by Schedule 2, Table 2 of the Occupational Health & Safety Code), the following tables detail the “minimum” levels of first aid that must be available at WSN projects in Alberta:

Minimum First Aid Required:

Number of workers at work site per shift	Close work site (up to 20 minutes)	Distant work site (20 – 40 minutes)	Isolated work site (more than 40 minutes)
1	Type P First Aid Kit	Type P First Aid Kit	Type P First Aid Kit
2-5	1 Emergency First Aider No. 1 First Aid Kit	1 Standard First Aider No. 2 First Aid Kit 3 Blankets	Standard First Aider No. 2 First Aid Kit 3 Blankets
5-9	1 Emergency First Aider 1 Standard First Aider No. 2 First Aid Kit	2 Standard First Aider No. 2 First Aid Kit 3 Blankets	2 Standard First Aider No. 2 First Aid Kit 3 Blankets
10-19	1 Emergency First Aider 1 Standard First Aider No. 2 First Aid Kit 3 Blankets	2 Standard First Aider No. 3 First Aid Kit 3 Blankets, Stretcher, Splints	2 Standard First Aider No. 3 First Aid Kit 3 Blankets, Stretcher, Splints
20-49	2 Emergency First Aider 1 Standard First Aider No. 2 First Aid Kit 3 Blankets	3 Standard First Aider No. 3 First Aid Kit 3 Blankets, Stretcher, Splints	3 Standard First Aider No. 3 First Aid Kit 3 Blankets, Stretcher, Splints
50-99	2 Emergency First Aider 2 Standard First Aider No. 3 First Aid Kit 3 Blankets	2 Emergency First Aider 3 Standard First Aider No. 3 First Aid Kit 3 Blankets	4 Standard First Aider 1 Advanced First Aider No. 3 First Aid Kit 3 Blankets
100-199	2 Emergency First Aider 2 Standard First Aider 1 Advanced First Aider First Aid Room	4 Standard First Aider 1 Advanced First Aider First Aid Room	4 Standard First Aider 1 Advanced First Aider First Aid Room
200 or more	2 Emergency First Aider 2 Standard First Aider 1 Nurse or 1 EMT-P, plus 1 Standard First Aider for each additional increment of 1 to 100 workers First Aid Room	4 Standard First Aider 1 Nurse or 1 EMT-P, plus 1 Standard First Aider for each additional increment of 1 to 100 workers First Aid Room	4 Standard First Aider 1 Advanced First Aider 1 Nurse or 1 EMT-P, plus 1 Standard First Aider for each additional increment of 1 to 100 workers First Aid Room

First aid services, supplies, equipment, and appropriately trained personnel will be made available to all employees during working hours. In situations where the provision of first aid services, supplies and equipment is not the responsibility of WSN, WSN will make every effort to ensure that the responsible party (usually the client) makes the aforementioned provisions. The provisions will include ensuring that first aid supplies and equipment are maintained in a clean, dry, and serviceable condition, contained in a material that protects the contents from the environment, and clearly identified as first aid equipment and supplies.

(NOTE: When WSN personnel require first aid related training, such will be provided through an approved training agency that meets the standards for a certificate in emergency first aid, standard first aid or advanced first aid)

Workers who sustain a job-related injury or illness, regardless of seriousness, are required to immediately report it to the first aid attendant for treatment and/or recording and must also report it to their immediate supervisor. If medical treatment is required, employees are entitled to choose their own medical practitioner. **NOTE:** WSN must obtain a copy of all first aid treatment reports from the client (when the

client is providing first aid services). Copies of first aid records must be kept at the main office for a period of "Length of Employment" plus 5 years.

The first aid attendant will be in complete charge of all first aid treatment of injured workers until medical aid is available. Supervisory personnel will not attempt to overrule the attendant's decisions relating to first aid or emergency transportation.

Injury Claims Management Policy

WSN understands that a disabling injury may happen to any employee and accepts that, as an employer, we have both a moral and financial interest in fair administration of the injury claims management process. Our injury claims management efforts are intended to ensure that:

- All employees are treated equally and fairly in administering the compensation system,
- Injured employees recover and return to work as soon as possible for their benefit and the benefit of the organization,
- Employees receive any help required to help them return to work, including modified work and work conditioning programs, and
- False claims are identified and contested

The overall goal of our injury claims management efforts are to ensure that each claim for compensation is administered as quickly and fairly as possible, and helps restore the worker to full pre-injury earning capabilities as soon as possible. To achieve this goal WSN will:

- Investigate every injury that results in the need for medical attention (see also *Section 9 – Incident Investigations* in this manual),
- Process injury compensation claims application forms in a timely manner,
- Maintain contact with every worker who is away from work due to injury,
- Consult with the provincial workers' compensation authority and medical service providers as to the recovery progress and expected return to work date for every injured employee,
- Consider the possibility of offering modified duties, additional job training and other early return to work opportunities to injured workers in consultation with the provincial workers' compensation authority, worker, worker's physician, and union representative, and
- Confer with the injured worker when they return to work to ensure that they are fit for work and have clearance from their physician to return to work

Review with the worker the cause of the injury and:

- Provide any remedial training as may be necessary to ensure they have the job skills to prevent a reoccurrence, and
- Assign the worker duties that are consistent with any physical limitations and the process of recovery

Opportunities for Early Return to Work

WSN will endeavour to accommodate injured employee's return to work at the earliest possible opportunity. Injured workers that return to work as soon they can safely do so will have the best recovery from their injury. Long delays in return to work can create complications in a safe return such as reduced levels of work conditioning and proneness towards easy re-injury.

It is important to establish contact with worker as soon as they return to work. When the worker returns to work, let them know you are glad they are back. The recovered worker, the workers' supervisor and first aid attendant need to discuss the worker's current condition and any work restrictions.

There needs to be a match between the injured worker's physical abilities with either a shorter workday, less strenuous work, or both until the injured employee has recuperated sufficiently to resume normal duties. This allows for the gradual improvement of the worker's physical condition and return to a full workload. Returning to work for a shorter workday or lighter duties means that the worker is back sooner. This preserves the behavioural pattern of getting up in the morning and going to work. Self-esteem also improves with the return to productivity.

Effective early return to work requires:

- The worker's physician to be involved and provide consent to the proposed return to work,
- The worker is not to be placed at risk of further injury,
- The modified duties proposed do not delay the worker's recovery, and
- The work is meaningful and productive

Early return to work initiatives, successfully implemented, will return injured workers to productive employment faster and with less chance of recurring injury and will substantially reduce wage loss payments.

Some of the options for early return to work to be considered are as follows:

- Modified duties: The employee will be assigned suitable and productive work that is less physically demanding, and will not aggravate the existing injury, or impede the recovery process.
- Graduated return to work: The employee will gradually return to pre-injury status through shortened workdays that are progressively lengthened.
- On-the-job training: The employee will attend training opportunities that enhance their skills and facilitate a full recovery.

Section - 12. Hazardous Materials

Hazardous Materials Policy

WSN management will ensure that all hazardous materials stored, used, transported, or disposed of by company personnel are identified and labelled in accordance with applicable legislation. This includes the **Workplace Hazardous Materials Information System (WHMIS)**. All information regarding hazardous materials will be made readily available to workers exposed to such materials by providing a Safety Data Sheet (SDS) file for all work locations where hazardous materials are used, handled, or stored. Management will ensure all employees using or handling hazardous materials have been trained in hazard recognition, and safe handling, use, storage, transportation and/or disposal procedures as may be required. The information and training regarding hazardous materials will be reviewed on an annual basis.

Supervisors are responsible for ensuring that workers who use, handle, transport or dispose hazardous materials have been adequately trained to recognize standard hazard symbols and safe handling/transportation information such as risk phrases, first aid measures and appropriate protective measures. Supervisors are also responsible for ensuring that sufficient labelling, SDS and protective equipment are available.

Workers are responsible for following procedures and instructions provided for safe use, handling, storage, transport, and disposal of hazardous products. Lastly, workers are responsible for reporting containers that are unlabelled, illegibly labelled or incorrectly labelled.

Inventory

WSN Management accepts responsibility for establishing an inventory of WHMIS hazardous products. This will be accomplished by reviewing purchase records, contacting suppliers, and inspecting materials storage areas. The inventory will be reviewed as often as necessary to ensure that it is maintained up to date.

Purchasing

At the time of ordering any new materials, the supplier must be requested to identify which products, if any, are covered by hazardous materials legislation.

Where multiple products that are used for the same purpose are available, the least hazardous material will be obtained if practicable. All WHMIS-controlled hazardous materials ordered will only be accepted if accompanied with applicable labelling and SDS.



Workplace Hazardous Materials Information System

Labelling

Any person that orders new materials is responsible for checking that supplier labels have been provided and applied to (WHMIS) hazardous products received at the workplace. Improperly labelled products must not be handled or used except to be held in temporary storage, (any such products must be properly and safely disposed of at a suitable approved facility).

Supplier labels must be affixed to the original containers of hazardous products, if labels are missing or illegible, they should be replaced with workplace labels.

With bulk shipments, if the supplier sends a supplier label, the receiver must apply or post it to individual containers. Where the supplier only sends labelling instructions, the receiver must apply, at minimum, a workplace label to containers.

Workplace labels are also necessary on containers of hazardous products which have been transferred or decanted from a supplier's bulk container. Workplace labels will provide three types of information: product name, safe handling information and a reference to the SDS.

NOTE: Simple identification of a hazardous product is all that is required on a container of a decanted product that will remain under the control of the employee that transferred the product to the new container for use during a single work shift.

Safety Data Sheets (SDS)

The person responsible for receiving new materials must ensure that SDS are received for all hazardous products supplied to the workplace. In addition, the receiver must contact the supplier for an updated sheet if the preparation date on an SDS indicates it is more than three years old. Copies of SDS must be made accessible to employees, close to their work areas and available during the work shift. **NOTE:** A SDS Binder will be available on all WSN projects.

Work Procedures and Controls

Supervisory personnel are responsible for monitoring storage, handling and use of hazardous products on their work sites as part of their daily and bi-weekly inspections. Monitoring will take into account the physical and health hazards of the product, quantities, work processes, location of use, etc....

On the basis of WHMIS and other workplace information, management, in cooperation with suppliers and supervisory personnel, will develop safe work procedures that ensure worker health and safety. Such work procedures will be detailed in job/task specific safe work procedures.

Hazard control measures may include:

- Engineering controls such as ventilation, process modification or isolation of the hazard source,
- Administrative controls such as work procedures, storage arrangements, maintenance, and shift scheduling,
- Personal protective equipment such as respirators, gloves, and protective clothing, and
- Procedures that will be followed in case of an uncontrolled, unplanned, or accidental release/spill

Education

WSN employees will receive training and new certification in WHMIS every 3 years. After a hazard assessment of the work site is conducted WSN employees will receive training pertaining to the specific Chemical & Biological hazards they might be exposed to. Workers that use hazardous materials or work in proximity to them are required to have received previous instruction in:

- Hazards of the materials they will be exposed to,
- Procedures for safe use, handling, and storage as contained on labels and SDS,
- Recognition of symptoms of overexposure,
- Overexposure emergency response, and
- Responsibilities for reporting injuries, and reporting containers that are unlabelled, illegibly labelled or incorrectly labelled.

WHMIS 2015 Symbols & Hazards

	Exploding bomb (for explosion or reactivity hazards)		Flame (for fire hazards)		Flame over circle (for oxidizing hazards)
	Gas cylinder (for gases under pressure)		Corrosion (for corrosive damage to metals, as well as skin, eyes)		Skull and Crossbones (can cause death or toxicity with short exposure to small amounts)
	Health hazard (may cause or suspected of causing serious health effects)		Exclamation mark (may cause less serious health effects or damage the ozone layer*)		Environment* (may cause damage to the aquatic environment)
	Biohazardous Infectious Materials (for organisms or toxins that can cause diseases in people or animals)				

* The GHS system also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

Uncontrolled, Unplanned or Accidental Releases (Spills)

In the event of an accidental leak, spill or uncontrolled release of a hazardous substance, the actions outlined in the project specific Emergency Response Plan will be taken by all WSN employees.

All persons on a WSN site will be informed about the emergency procedures as part of the site-specific indoctrination that includes the location of all emergency equipment, such as: spill kits, fire extinguishers, first aid kits, safety showers, telephones, and emergency contact numbers.

Safety Data Sheets (SDS's) specify the emergency and first aid actions to be taken with the management of hazardous substances. Before using any hazardous substances WSN employees must first read the SDS for that particular substance.

In the event of a spill, WSN will immediately take all measures necessary to contain and prevent any release into the environment. The first priority is to minimize the amount of the spill and to cover all drains in the surrounding area. The spill should also be minimized by isolating or interrupting the flow by immediately closing a valve, rotating a drum, or transferring the contents, etc.... WSN will keep an appropriate spill kit available and accessible near all high-risk areas.

Depending on its severity, WSN employees must first attempt to stabilize the spill, then immediately notify the designated emergency contact(s) of the appropriate release of, or exposure to, suspected or known hazardous material(s).

In addition, WSN will notify the appropriate federal, provincial/territorial, or municipal authorities in accordance with applicable legislation. With respect to federal requirements, in the event of a spill or environmental emergency, the [Environmental Emergencies website](#) provides information on when to report and who to notify.

For spill cleanup, absorbent or other cleaning methods may be used. All spills and liquid wastes will be collected and placed in a sealed container prior to disposal. It is recommended to keep a record of all the spills that have occurred at the facility. These records should include, but not be limited to, the following information:

- The name, civic address and telephone number of the person who owns or has the charge, management or control of the substance released,
- The date, time, and location of the release,
- The date of notification of the spill,
- The name and Chemical Abstracts Service (CAS) registry number of the substance released,
- The quantity of the substance released or, if the quantity cannot be determined, an estimate of the quantity,
- The identification of the container from which the substance was released and a description of its condition,
- The location of the release and description of potential negative effects on the environment or on human life or health,

- A description of the circumstances and of the cause of the release (if known) and of the measures taken to mitigate any negative effects on the environment or on human life or health,
- The identification of all persons and agencies notified as a result of the release, and
- All measures taken, or planned, to prevent similar releases.

Section - 13. Occupational Hygiene

Occupational Hygiene and Employee Health Policy

WSN will take all reasonable steps to ensure that our employees are protected from health hazards through adequate control measures. These control measures will ensure that worker exposure does not exceed the allowable permissible limits (*i.e., exposure limits, ceiling limits, etc...*) as dictated by the provincial health & safety authority (*i.e., British Columbia – Part 5 and Part 6 of the Occupational Health & Safety Regulation/Alberta - Part 4, Section 16 of the Occupational Health & Safety Code*). This will be accomplished by implementing and maintaining an occupational hygiene program as part of the overall health & safety program. The occupational hygiene program will focus primarily on-site hazards that can affect employee health. This includes exposures common to the construction industry such as:

- Noise (*i.e., use of “jack hammering” equipment during tear out phase of projects, or when working adjacent to/near operating equipment*)
- Welding Fumes (*i.e., from other contractors working within the same confined space*)
- Chemical Exposures:
 - ⇒ Acids/Caustics (*i.e., residual process chemicals, cement/mortar mixes*)
 - ⇒ Paints and Solvents (*i.e., paints used to mark/identify work areas*)
 - ⇒ Crystalline Silica (*i.e., mortar mixes and debris during tear out*)
 - ⇒ Asbestos (*i.e., gaskets and insulation on facility equipment*)
 - ⇒ Lead (*i.e., lead based paints on facility equipment and/or process exposures at facility*)
 - ⇒ Reduced Sulphur Gases – specifically Hydrogen Sulphide (*i.e., dimethyl sulphide, dimethyl disulphide, hydrogen sulphide, and methyl mercaptan.*)

NOTE 1: In the Kraft pulping process, wood chips or sawdust are cooked under pressure in a solution containing sodium hydroxide, sodium sulphide, and sodium carbonate. An unavoidable consequence of this cooking is the production of reduced sulphur gases. These gases, collectively known as TRS (total reduced sulphur gas) can evolve from washing the digested wood pulp, evaporating the spent pulping liquid, and burning the spent liquid for chemical and energy recovery.

NOTE 2: The potential for Hydrogen Sulphide is not unique to WSN's Pulp and Paper clients. Hydrogen Sulphide may also be encountered at refineries/petrochemical facilities (as it can be found naturally in crude oil or produced as a by-product of oil refining), waste treatment facilities, or other industrial settings. Other locations may be in sewers, cesspools, or stagnant water, as Hydrogen Sulphide is also formed by the decay of organic materials.

NOTE 3: WSN does not handle/encounter H₂S in quantities that require a specific Code of Practice by Alberta OHS Code.

- Whole body and segmental vibration
- High heat environments
- Low (cold) temperatures
- Ionizing and non-ionizing radiation

- Entry into hazardous atmospheres, (*i.e., confined spaces*)
- WHMIS, TDG and waste hazardous materials

Identifying Health Hazards

WSN will conduct an occupational hygiene assessment as necessary (*normally as part of the HASP process*). Such hygiene assessments will focus on issues where there is a potential for over-exposure to harmful substances or there may be adverse environmental conditions that can affect employee health. The will, as a minimum, consider the following:

- Potential for overexposure,
- Routes of exposure including inhalation, ingestion, and skin contact, and
- Who is at risk?

The results of the hygiene assessment will be documented in an appropriate format (*i.e., commonly as part of the HASP or a distinct/separate Exposure Control Plan*). A reassessment will be performed if work conditions change.

If the hygiene assessment reveals that there is a potential for over-exposure, WSN will ensure a qualified person:

- Conducts sampling/testing to determine exposure levels,
- Implements acceptable methods for monitoring of worker exposures if the sampling reveals that exposure levels may approach 50% of permissible exposure limits, and
- Develops an exposure control plan if exposures will exceed 50% of permissible exposure

NOTE: WSN has conducted (with the assistance of an occupational hygienist) exposure monitoring. All work procedures (*i.e., Crystalline Silica Exposure Control Plans*) and controls (*i.e., respiratory protection requirements*) detailed in this document have been deemed necessary (and appropriate) based on the exposure monitoring that has been conducted.

Occupational Hygienists

It may be advantageous for WSN to seek assistance from a certified occupational hygienist (*ROH or CIH*) if the identified hygiene issues are significant. Hygienists can:

- Assist in the identification of health hazards,
- Evaluate hygiene health risks including conducting tests, hazard assessments and monitoring exposures,
- Recommend means to control hazards or reduce hazard exposures, and
- Develop exposure control plans and assist in the implementation process

An occupational hygienist can also provide assistance to ensure that instrumentation used to measure critical levels of atmospheric contaminants are adequate, meet legal requirements, are properly calibrated and regularly tested.

Controlling Exposures

Some of the common approaches to be used to control hygiene hazards on WSN sites include may include: WSN employees will have a hearing inspection once every year and will receive training in a Hearing Conservation Program.

- Implementing a hearing conservation program/hearing conservation measure.
- Ensuring signage is in place in high noise level areas. *NOTE: While the majority of WSN's clients have completed extensive noise surveys and placed signage in areas where elevated (i.e., greater than 85 dBA) noise levels exist, some have not. When the client has not completed such surveys or placed such signage, WSN will identify the area as being a "Noise Hazard Area" and require the use of hearing protection if there is any chance of elevated noise levels existing/occurring.*
- Issuing personal protective equipment to workers:
 - Respirators for airborne contaminants (respirator fit testing required)
 - Chemical goggles and/or face shields for liquid chemical splash
 - Impervious gloves, aprons and/or boots for liquid chemical contact
 - Barrier creams for skin contact with irritant chemicals
 - Disposable coveralls to ensure clothing does not become contaminated
- Using extraction methods to remove particulate matter:
 - Portable "smoke eaters" (welding fume extraction filters) to controlling welding fume exposure
 - HEPA vacuum extraction systems to control silica dust
- Using wet methods when concrete grinding to control silica dust.
- Enclosing equipment and work processes (i.e., lead and asbestos removal, and sand blasting and noise reduction).
- Testing for exposure levels.
- Using safe procedures as outlined on the SDS and training workers in safe use procedures.
- Ensuring hazardous products are labelled and stored properly.
- Providing readily available wash facilities to remove contaminant materials.
- Ensuring emergency washing facilities (i.e., showers and/or eyewashes) are immediately available and in good working order. *NOTE: While WSN clients will generally have such emergency washing facilities available when necessary, WSN will always ensure that portable emergency eye washing equipment is immediately available when work activities expose employees to the risk of an acidic/caustic eye injury.*
- Monitoring worker health to determine exposure effects (noise, lead, asbestos, silica).

Silica Exposure Control Plan Risk Rating 4-C (High)

Health Hazards from Silica Exposure

- Long-term exposure to airborne crystalline silica (i.e., quartz) can cause a disabling, sometimes fatal lung disease called silicosis.
- When the dust is inhaled deep into the lungs, microscopic particles of silica can cause scar tissue to form in the lung tissue, which restricts the lungs' ability to extract oxygen from the air. This damage is permanent, but symptoms of the disease may not appear for many years.
- The disease initially causes fatigue and shortness of breath. If exposure continues, it can lead to chest pain, heart problems (difficulty breathing can strain the heart) and respiratory failure.
- Exposure to crystalline silica has also been linked to other diseases, including bronchitis, tuberculosis, and lung cancer.

Purpose and Responsibilities

- WSN recognises the duty to protect our workers from silica exposure. Studies show that work tasks involving the drilling, cutting, grinding, chipping, or jackhammering of silica-containing stone products generate airborne silica levels well in excess of safe levels. WSN ensures that effective controls are available to protect workers from harmful exposure.
- WSN will use a combination of control measures to achieve this objective. We commit to being diligent in our efforts to select the most effective control technologies available, and to ensure that the best practices, as described in this Exposure Control Plan (ECP), are followed at our worksites.
- The work procedures we establish for cutting and grinding silica-containing stone will protect not only our workers, but also any other workers on-site who are not involved in these operations.

WSN is Responsible for the Following:

- Ensure that the materials (i.e., tools, equipment, and personal protective equipment (PPE) and other resources (i.e., worker training) required to fully implement and maintain this ECP are readily available where and when they are required.
- Ensure that all required tools, equipment, and PPE are readily available and used as required by the ECP.
- Ensure that supervisors and workers are educated and trained to an acceptable level of competency.
- Maintain records of training, fit-test results, crew talks and inspections (for equipment, PPE, work methods and practices).
- Conduct a periodic review of the effectiveness of the ECP. This includes a review of available dust control technologies to ensure these are selected and used when practical.
- Coordinate the work with other parties' present on site to ensure a safe work environment.

Supervisors are Responsible for the Following:

- Provide adequate instruction to workers on the hazards associated with drilling, cutting, grinding, chipping, or jackhammering of silica-containing stone products.
- Select and implement the appropriate control measures.
- Ensure that workers using respirators have been properly fit-tested and that the results are recorded.
- Direct the work in a manner that ensures the risk to workers and others is minimized and adequately controlled. This includes ensuring that workers use appropriate engineering controls and wear the necessary PPE.

Workers are Responsible for the Following:

- Use the assigned protective equipment in an effective and safe manner.
- Follow established work procedures as directed by the supervisor.
- Report any unsafe conditions or acts to the supervisor.
- Report any exposure incidents, or any signs, or symptoms of silica illness.

Some common materials that contain silica include:

- Rock and sand
- Topsoil and fill
- Concrete, cement, and mortar
- Masonry, brick, and tile
- Granite, sandstone, and slate
- Asphalt (containing rock and stone)
- Fibrous-cement board containing silica

Silica is the second most common mineral on earth and makes up nearly all of what we call “sand” and “rock.” Silica exists in many forms—one of these, “crystalline” silica (including quartz), is the most abundant and poses the greatest concern for human health.

Silica is so common that many workplace activities that create dust can expose workers to airborne silica. In British Columbia, the Occupational Health and Safety Regulation has established occupational exposure limits (OELs) for five different forms of silica; three of these are amorphous, and two are crystalline (quartz and cristobalite). The form most likely to cause serious problems for worker health is quartz.

Activities that have the potential of exposing workers to silica

Silica is a primary component of many common construction materials, and silica-containing dust can be generated during many construction activities, including

- Abrasive blasting (e.g., of concrete structures)
- Jackhammering, chipping, or drilling rock or concrete
- Cutting brick or tiles
- Sawing or grinding concrete
- Tuck point grinding
- Road construction
- Loading, hauling, and dumping gravel
- Demolition of structures containing concrete
- Sweeping concrete dust

Unprotected workers performing these activities, or working in the vicinity, can be exposed to harmful levels of airborne silica. Workers in other industries can also be exposed to silica.

Risk Identification and Assessment

A key step in developing a silica exposure control plan is to identify the work activities that would put workers at risk of exposure.

- Work activities that may generate airborne silica dust—For silica, the route of exposure is through the inhalation of airborne dust. W.S. Nicholls will have a qualified person review the planned work activities to identify those that may generate airborne silica.
- Identify workers at risk of exposure—For example, workers who finish concrete would be at greater risk of exposure than plumbers or electrical workers.
- Amount of exposure—Some work activities generate more dust than others, and the amount of exposure should be estimated. Published resources are available that provide air sampling data and compare silica dust levels from various construction activities.
- Duration of exposure—Workers who grind concrete for a full shift would be at greater risk than workers jackhammering for an hour.

Worker exposure measurements

The Occupational Health and Safety Regulation lists an occupational exposure limit (OEL) for respirable crystalline silica (including quartz) of 0.025 milligrams per cubic metre (mg/m³). This is a concentration to which nearly all workers could be exposed for eight hours a day, five days a week, without adverse health effects. However, as a suspected carcinogen, crystalline silica is also an ALARA (as low as reasonably achievable) substance. W.S. Nicholls will implement control measures to reduce the exposure to levels that are as low as reasonably achievable below the OEL.

Studies show that when construction work tasks involving the drilling, chipping, grinding, cutting, and sawing of concrete and concrete products are conducted without using effective dust controls, workers are exposed to airborne silica concentrations at levels far above the OEL.

Exposure Limit

- The occupational exposure limit (OEL) for respirable crystalline silica (including quartz) is 0.025 milligrams per cubic metre (mg/m³).
- Because crystalline silica is linked to lung cancer, workplace exposures must be reduced to levels that are as low as reasonably achievable (ALARA) below the OEL.

Silica Dust Control

- The Regulation requires employers to select silica dust controls based on the following hierarchy:
 1. Engineering (i.e., local exhaust ventilation or water attachments)
 2. Administrative controls (for example, chipping when other workers are not in the area)
 3. Personal protective equipment (for example, respirators and disposable coveralls)
- Use of respirators as a primary control is not acceptable when other methods are available and practical.
- Respirators will be used in conjunction with other controls such as wet cutting and grinding, local exhaust ventilation (LEV), HEPA filter attachments or water attachments to reduce worker exposure to silica, unless air monitoring information suggests otherwise.
- Wet drilling, cutting, and grinding or the use of local exhaust ventilation (LEV) are the preferred engineering methods and will be used when practicable.
- Dry drilling, cutting, and grinding will be avoided unless additional respiratory protection and other controls are used.
- Dry drilling, cutting, or grinding methods might be required for certain applications or work locations. Dry work will be isolated from other work areas. Effective LEV will be used in order to control the dust. A HEPA vacuum will be used for clean-up and decontamination.
- Air discharged from an LEV system will not be recirculated into the work area.

Acceptable Control Methods for Concrete Drilling

- The work methods in the following table are acceptable, provided that the respirator selection, dust suppression and other controls are adhered to.
- The following control options will be used to eliminate or reduce the risk to workers from the hazards of silica dust exposure, unless air monitoring information suggests otherwise:

Work Activity	Dust Suppression	Other Controls	Respirator Type
Drilling a few (12 or fewer) holes in a wall or ceiling	Dust cap, HEPA attachment on drill, or HEPA vacuum extraction	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P or R) filters
Drilling a few (12 or fewer) holes in a floor	HEPA attachment on drill or HEPA vacuum extraction	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P or R) filters
	Continuous water spray	Barriers (for example, a tape barrier) to restrict access to the work area	N95 respirator
Drilling more than 12 holes in a wall or ceiling	Drill connected to HEPA vacuum extraction	Barriers to restrict access to the work area or a full enclosure system with negative air (depending on the size of the work area and amount of work)	Full-face respirator with 100 series (P or R) filters
Drilling more than 12 holes in a floor	Drill connected to HEPA vacuum extraction	Barriers to restrict access to the work area or full enclosure system with negative air (depending on the size of the work area and amount of work)	Full-face respirator with 100 series (P or R) filters
	Continuous water spray	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P, or R) filters
Drilling holes in a small unventilated work area where standard engineering controls are not practicable	None	Full enclosure systems (with negative air) are required to restrict access to and contain the work area	Full-face powered air-purifying respirator (PAPR) with 100 series (P or R) filters

Acceptable Control Methods for Cutting and Grinding Stone

- The work methods in the following table are acceptable, provided that the respirator selection is adhered to.
- The following control options will be used to eliminate or reduce the risk to workers from the hazards of silica dust exposure, unless air monitoring information suggests otherwise:

Cutting and Grinding Method/Tools	Dust Suppression	Respirator Type
Circular saw on table	Water	N95 respirator
Hand-held circular saw	Water	Half-face respirator with N100 filters
Circular saw (less than one hour per shift)	HEPA vacuum extraction	Half-face respirator with N100 filters
Circular saw (more than one hour per shift)	HEPA vacuum extraction	Full-face respirator with N100 filters
Circular saw	None*	Full-face (PAPR) respirator with N100 filters

* This work should be conducted in isolation from the general shop and other workers, with some form of general exhaust ventilation.

Acceptable Control Methods for Chipping or Jackhammering Concrete

- The work methods in the following table are acceptable, provided that the respirator selection, dust suppression and other controls are adhered to.
- The following control options will be used to eliminate or reduce the risk to workers from the hazards of silica dust exposure, unless air monitoring information suggests otherwise:

Work Activity	Dust Suppression	Other Controls	Respirator Type
Chipping small areas of walls or ceilings	LEV (could include a negative air unit or HEPA vacuum positioned near the working surface)	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P, or R) filters
	Continuous water spray (could include a portable airless sprayer, air mister, or hose sprayer)	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P, or R) filters
Chipping large areas of walls or ceilings	LEV (could include a negative air unit or HEPA vacuum positioned near the working surface)	Barriers (for example, a tape barrier) to restrict access to the work area	Full-face respirator with 100 series (P or R) filters
	Continuous water spray (could include a portable airless sprayer, air mister, or hose sprayer)	Barriers (for example, a tape barrier) to restrict access to the work area	Full-face respirator with 100 series (P or R) filters
Using a chipper in a small unventilated area	None	Full enclosure systems (with negative air) are required to restrict access to and contain the work area	Full-face powered air-purifying respirator (PAPR) with 100 series (P or R) filters
Jackhammering a small area of floor	LEV (could include a sleeve on the tool, connected to a HEPA vacuum or negative air unit)	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P, or R) filters
	Continuous water spray (could include a portable airless sprayer, air mister, or hose sprayer)	Barriers (for example, a tape barrier) to restrict access to the work area	Half-face respirator with 100 series (N, P, or R) filters
Jackhammering a large area of floor (or using more than one tool in an area)	LEV (could include a sleeve on the tool, connected to a HEPA vacuum or negative air unit)	Barriers (for example, a tape barrier) to restrict access to the work area	Full-face respirator with 100 series (P or R) filters
	Continuous water spray (could include a portable airless sprayer, air mister, or hose sprayer)	Barriers (for example, a tape barrier) to restrict access to the work area	Full-face respirator with 100 series (P or R) filters

Using a jackhammer in a small unventilated area	None	Full enclosure systems (with negative air) are required to restrict access to and contain the work area	Full-face powered air-purifying respirator (PAPR) with 100 series (P or R) filters

Safe Work Planning

- The online BCCSA Silica Control Tool will be used to conduct appropriate risk assessments and implementing effective controls and safe work practices. <http://www.silicacontroltool.com/>
- Select one or more of the methods described in the tables above.
- Establish a barrier around the work zone to restrict access by unprotected workers.
- Inspect all dust control equipment and tools to make sure they are in good working order.
- Use and maintain all tools as specified by the manufacturer. For example, test the effectiveness of HEPA filters using dioctyl phthalate (DOP) testing or similar means at least annually, and any time a HEPA filter is replaced in a vacuum cleaner or ventilation system.
- When working on a multi-employer site, provide the General Contractor with a copy of the Silica Exposure Control Plan and Safe Work Procedures.
- Ensure that workers inspect their respirators before start-up.
- Monitor dust release from equipment during use. When tools and equipment are working properly, very little dust should be visible in the air. Stop work if excessive dust is observed.

Respiratory Protective Equipment

- Each worker will be fit-tested if a respirator is required.
- If a worker is required to wear a respirator that requires an effective seal with the face for proper functioning, the worker must be clean shaven where the respirator seals with the face.
- When the worker notices a notable resistance to breathing, the respirator filters must be replaced.
- Respirators will be used, cleaned, and stored in accordance with the respiratory protection program.

Other Personal Protective Equipment and Hygiene

- Workers will wear approved safety glasses and hearing protection when cutting silica-containing stone. This equipment will not interfere with the fit of the worker's respirator.
- Workers will wear washable work coveralls that do not retain dust. These coveralls will be laundered and changed regularly, and workers will not wear them outside the work area (alternately, disposal coveralls may be worn and immediately disposed of upon completion of the work task).

Housekeeping Procedures

- Dry sweeping and the use of compressed air are prohibited for removing dust and debris containing silica. Work areas and equipment covered by dust will be cleaned at the end of every shift using a HEPA filter vacuum.
- Wet clean-up may also be used to remove dust.
- Waste material will be placed in a dumpster and will be removed at least weekly. The location and method used to store waste will not allow silica-containing dust to re-enter the workplace.
- Supervisors are responsible for ensuring that work areas are free from dust at the end of each shift.

Worker Training for Silica Dust Exposure

- Training will be performed by the employer, or the employer's designate.
- Records of attendance, dates of training and training material will be documented and retained at WSN's office.
- Additional training or reference material on silica dust exposure will be made available to employees upon request.

Training Topics

- Health hazards of silica dust exposure (including signs and symptoms of silicosis).
- Operations and materials that can produce silica dust exposures.
- Engineering controls and safe work practices used to protect workers.
- The importance of proper equipment control and maintenance.
- Housekeeping procedures.
- Proper use of respirators and the respirator program.
- Personal hygiene procedures to reduce exposures.
- How smoking increases the risk of developing silicosis and other lung damage.
- The details of the Exposure Control Plan for silica dust.

Health Surveillance

- Workers who are regularly exposed to silica dust will receive regular medical examinations from their family physicians. These examinations may include chest x-rays.
- Workers will report any symptoms of silica exposure to the employer and WorkSafe BC for tracking and investigation.

Annual Review

- This ECP will be reviewed at least annually and updated, as necessary.

Heat and Cold Exposure

WSN employees and/or subcontractors will generally only be dispatched to the project job site when the “Equivalent Chill Temperature” is in the range of “Little Danger”, as indicated in the chart below.

Cooling Power of Wind (°C)													
Estimated Wind Speed (km/h)	Actual Temperature Reading (°C)												
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
	Equivalent Chill Temperature (°C)												
Calm	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
8	9	3	-2	-7	-12	-18	-23	-28	-33	-38	-44	-49	-54
16	4	-2	-7	-14	-20	-27	-33	-38	-45	-50	-57	-63	-69
24	2	-5	-11	-18	-25	-32	-38	-45	-52	-58	-65	-72	-78
32	0	-7	-14	-21	-28	-35	-42	-50	-56	-64	-71	-78	-84
40	-1	-8	-16	-24	-31	-38	-46	-53	-60	-67	-76	-82	-90
48	-2	-10	-17	-25	-33	-40	-48	-55	-63	-70	-78	-86	-94
56	-3	-11	-18	-26	-34	-42	-50	-58	-65	-73	-81	-89	-96
64	-3	-11	-19	-27	-35	-43	-59	-59	-66	-74	-82	-90	-98
Wind speeds greater than 64 km/h have little additional effect	LITTLE DANGER In < 1hr with dry skin, Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER Flesh might freeze within 30 seconds				
Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress Threshold Limit Values													

When, and if, personnel must be dispatched to the job site when the “Equivalent Chill Temperature” is less than -7°C, WSN will ensure that a heated shelter is available. **NOTE:** *Project lunchroom crew trailers will be located on site and available, although employees may opt to use the cab of a site vehicle that has a working heater at times (i.e., vehicle can be parked closer to the work activities and accessed more frequently for shorter breaks).*

When, and if, personnel are dispatched to the job site when the “Equivalent Chill Temperature” is in the range of “Increasing Danger”, as indicated in the chart below, a site-specific exposure control plan will be developed. The exposure control plan will include provisions for a suitable work/warm-up schedule. The following 4.0-hour work/warm-up cycle will generally be adhered to.

WSN employees and/or subcontractors will not be permitted to work when the “Equivalent Chill Temperature” is in the range of “Great Danger”, as indicated in the chart above.

Threshold Limit Values (TLVs)

Work /Warm-up Schedule for Outside Workers Based on a Four-Hour Shift

Air temperature – Sunny sky		No noticeable wind		8 km/h wind		16 km/h wind		25 km/h wind		30 km/h wind	
°C (approx.)	°F (approx.)	Max. work period	No. of breaks	Max. work period	No. of breaks	Max. work period	No. of breaks	Max. work period	No. of breaks	Max. work period	No. of breaks
-26° to -28°	-15° to -19°	Normal breaks 1		Normal breaks 1		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	Normal breaks 1		75 min	2	55 min	3	40 min	4	30 min	5
-31° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38 to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

NOTES:

- Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of 10 minutes in a warm location and with an extended break (i.e., lunch) at the end of the 4-hour work period in a warm location. For light-to-moderate work (limited physical movement), apply the schedule one step lower in the table. For example, at -35° C (-30° F) with no noticeable wind (Step 4), a worker in a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available: 8 km/h – light flag moves; 16 km/h – light flag fully extended; 25 km/h – raises newspaper sheet; 30 km/h – blowing and drifting snow.
- If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factor given above would be: (1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; (2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart over-compensates for the actual temperatures in the colder ranges because windy conditions rarely prevail at extremely low temperatures.
- TLVs apply only to workers wearing dry clothing. Refer to the “Cold Stress” section of the current Threshold Limit Values and Biological Exposure Indices publication for further information.

During cold weather extremes, personnel must dress appropriately. Clothing should be layered and cover as much skin as possible. Hard hat liners are available, as are mittens (*mittens tend to be warmer than gloves*). Boots must be in good condition and have suitable treads. **NOTE:** *If ladders must be climbed, personnel must wear gloves (i.e., ladder rungs may be difficult to grasp with mittens).*

When personnel must work in conditions where and when heat related disorders could occur, the following precautions will be taken by personnel:

- **Hydration:** The easiest way to avoid Heat Stroke and other heat related disorders is to keep your body well hydrated. This means drinking plenty of water before, during and after exposure to the elements. Sports drinks are a good choice if you are exercising or working in hot conditions, but water works fine as well. Potable drinking water will be available on the project site at all times.
- **Ventilation:** Staying in a place where there is plenty of airspace, which will help allow your body to naturally cool itself. Sitting in a shaded, wide-open area will help your body rid itself of heat through sweating. If you are located indoors, always open windows, use a fan, central air, or air conditioning during excessively hot days.
- **Clothing:** What you wear can play a big factor in how your body will handle the heat. Light coloured, loose fitting clothing will aid your body in breathing and cooling itself down naturally. Tight clothing restricts such a process and dark colours absorb the sun's light and heat.
- **Limit Yourself:** Watching how much activity you are participating in during hot days is also important. Do not overdo it. Heat Stroke can set in less than 1.0 hour. If you feel yourself getting warm or lightheaded, it is best to take a time out, rest in the shade and rehydrate your body. If any worker on a WSN project site shows symptoms of heat stress or cold stress the first aid attendant will be summoned and attend to the worker, the worker will immediately be removed from the heat or cold as applicable.

Fatigue Management Policy

Policy Statement

The WSN fatigue management policy is in place to increase awareness and understanding of fatigue and its effects on a safe workplace. WSN recognises that fatigue is a hazard and that managing the risk of fatigue impacting safety can prevent related injuries and illnesses.

Fatigue Management Program Objective

The prevention of the onset of fatigue is the main goal of the fatigue management program, it should serve as a guideline for setting work schedules and providing adequate staffing levels.

Work Practices and Procedures

Work Schedules

WSN management ensures that each employee has at least 8 consecutive hours free from work between each shift worked. Hours should generally not exceed a 16-hour work shift if they extend beyond 16-hours they shall never exceed 18-hours. Any shift exceeding 12-hours should be an exception and needs to be approved by the site Superintendent, or WSN management.

Breaks

All employees will be given breaks at intervals appropriate to their work shift. As a minimum, all employees must not work more than 5-hours in a row without a 30-minute meal break. Coffee breaks are also provided at appropriate intervals. In a regular 8-hour shift two 10-minute coffee breaks will be provided. Where work is required for a period of 10-hours, a third rest break will be taken at the end of 8-hours. Where work is required beyond 10-hours, a second 30-minute meal break will be provided at the end of 10-hours. If a second meal break is provided, the third rest break shall not be taken. Break areas should have chairs or other acceptable means for employees to sit down and rest.

Work Task and Workplace Conditions

Some work tasks can aggravate the onset of fatigue. WSN Supervisors and Managers will analyze and evaluate the potential for fatigue in all assigned tasks.

Workplace conditions and work tasks such as those listed below can aggravate fatigue:

- Low lighting levels, bad visibility
- High noise areas, both inside and outside
- Extreme weather conditions, or room temperature, hot or cold
- Poor ventilation
- Work tasks that are long, repetitive, paced, difficult, boring, or monotonous
- Standing for extended periods
- Being away from home for lengthy periods
- Wearing PPE such as respirators, heavy clothing, etc.

To mitigate potential workplace fatigue, the following controls shall be used:

- Well lit work areas
- Anti fatigue mats, where applicable
- Personal Protective Equipment (hearing protection, respirators, etc.)
- Switch up work tasks throughout the shift, if possible
- Lift assist devices
- Cooling headbands
- Ventilation
- Electrolyte replenishing drinks

Training

All WSN employees receive fatigue management training as part of the New Employee Orientation Process.

The best way to cope with fatigue is to prevent its onset.

The training includes identifying the hazards of fatigue and risk controls outlined by this policy:

- How to recognize and control fatigue through appropriate work and personal habits
- How to report fatigue to your supervisor

Fatigue Management Training

Hazards of Fatigue

Fatigue increases the risk of injuries or other accidents. Special attention needs to be applied to scheduling, especially when overtime and night shift work is planned.

How to Recognize Fatigue

Fatigue is a state of feeling very tired, exhausted, weary, or sleepy. Fatigue results from a lack of sleep and can be heightened from prolonged mental activity, or extended periods of stress or anxiety.

Signs and symptoms of fatigue:

- Tiredness or sleepiness
- Memory lapses
- Difficulty concentrating
- Irritability
- Lack of motivation
- Slower reaction times
- Poor decision making
- Increased mistakes
- Decreased performance
- Dangerous lapses from micro sleeps
- Automatic behaviour

How to Report Fatigue

Supervisors shall evaluate that workers are not experiencing signs or effects of fatigue at the beginning of each shift. All employees are encouraged to speak up and let their Supervisor know if they are experiencing fatigue. The Supervisor shall then decide if the worker is fit for a non-safety sensitive task or send the worker home. A worker must never operate motor vehicles and/or heavy equipment while excessively fatigued. The worker will be offered the opportunity to rest in the first-aid room before driving home.

How to Prevent Fatigue

Tasks that are safety sensitive, or require heavy physical labour, or intense concentration should be performed at the beginning of the shift if possible.

When work tasks need to be completed that aggravate the onset of fatigue, be sure to take preventive measures to minimize the effects.

Task	Preventive Measure
Low lighting levels, bad visibility	Well lit work areas, set up extra lights
High noise areas, both inside and outside	Personal Protective Equipment (hearing protection)
Extreme weather conditions, or room temperatures (hot)	Cool vests, cooling headbands, Electrolyte replenishing drinks
Poor ventilation	Set up ventilators or air movers
Standing for extended periods	Anti fatigue mats
Work tasks that are long, repetitive, paced, difficult, boring, or monotonous	Switch up work tasks throughout the shift if possible
Wearing PPE such as respirators, heavy clothing, etc.	Regular breaks
Strenuous tasks	Lift assist devices
Being away from home for lengthy periods	Scheduling
Working extended hours	Regular and adequate breaks

If these measures are taken, the effects of fatigue in the workplace can be reduced significantly. This is one more step WSN is taking to provide the safest and healthiest workplaces achievable.

Section - 14. Records and Statistics

Records and Statistics Policy

WSN will maintain records and statistics for health and safety as required by good practice and regulation.

WSN will use the health & safety records to:

- Monitor and evaluate health and safety performance,
- Identify common factors or trends in accidents and incidents, and
- Monitor and evaluate the effectiveness of corrective actions

Records

Health and safety related records maintained by WSN include, but are not necessarily limited to:

- Incident investigation reports,
- Workplace Inspection records (WSN and WCB),
- Disciplinary action records,
- First Aid Treatment Reports, (retained for a minimum of 3 years)
- Copies of WCB Forms,
- WCB monthly Claims Cost Statements,
- Right to refuse unsafe work occurrence records,
- New Employee Orientations,
- Correct Work Practice (CWP) and General Job Training Reports,
- New and Young Worker Assessment Reports,
- Planned Job Observations (PJO) Reports,
- Supervisor Evaluations,
- Records of management meetings (H&S component), and
- Health and safety program review records

Statistics

Health and safety related statistics maintained by WSN include, but are not necessarily limited to:

- Number of First Aid Incidents (*maintained monthly and YTD*),
- Number of Medical Aid Incidents (*maintained monthly and YTD*),
- Number of Medical Treatment Incidents (*maintained monthly and YTD*),
- Number of Lost Time Incidents (*maintained monthly and YTD*), and
- "Recordable Incident" frequency rate (*maintained monthly and YTD*)

Statistics Preparation/Maintenance Guidelines

The following guidelines have been prepared to ensure statistics are maintained consistently and accurately.

Relevant Definitions

- **First Aid:** Any reporting of an injury to a qualified first aid attendant.
- **Medical Aid:** A visit to a doctor where the treatment was limited to:
 - ⇒ *Using non-prescription medications at non-prescription strengths.*
 - ⇒ *Administering tetanus immunizations*
 - ⇒ *Cleaning, flushing or soaking wounds on the skin surface,*
 - ⇒ *Using wound coverings, such as bandages, Band Aids, gauze pads, etc...., or using SteriStrips or butterfly bandages*
 - ⇒ *Using hot or cold therapy*
 - ⇒ *Using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc....*
 - ⇒ *Using temporary immobilization devices while transporting an accident victim,*
 - ⇒ *Drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters*
 - ⇒ *Using eye patches*
 - ⇒ *Using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye*
 - ⇒ *Using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign materials from areas other than the eye*
 - ⇒ *Using finger guards*
 - ⇒ *Using massages*
 - ⇒ *Drinking fluids to relieve heat stress*
- **Medical Treatment:** A visit to a doctor where the treatment was not limited to those items described as a "Medical Aid".
- **Lost Time:** Lost time injuries occur when an employee is unable to return to work following a work-related injury, provided a qualified medical professional has prescribed "time away from work" as a treatment and such was accepted by the WCB.

Statistic Calculations:

Frequency Rate:

$$\frac{\text{Number of lost time injuries and illnesses} \times 200,000}{\text{Total hours worked during the month, year, etc....}}$$

NOTE: The 200,000 figure represents 100 workers at 40 hours per week for 50 weeks per year.

Section - 15. Annual Safety Program Review

Annual Safety Program Review Policy:

WSN is committed to formally reviewing the “Health and Safety Program” on an annual basis. The Safety Program Review will be conducted in accordance with a WSN developed/derived protocol. Following every Safety Program Review, senior management will be responsible for preparing a “Safety Improvement Action Plan” to address all identified deficiencies.

Safety Program Review Protocol:

The audit will review and evaluate elements common to and indicative of an effective and encompassing safety program. The physical scope of the audit will be inclusive of sites/projects (*i.e., temporary places of employment*) and the shops/warehouse (*i.e., permanent places of employment*). The safety program elements covered by the audit may include, but are not necessarily limited to:

- Policy, Leadership and Commitment,
- Hazard Identification, Risk Assessment and Controls,
- Workplace Inspections,
- Accident/Incident Analysis,
- Worker Health & Safety Representative/Joint Health and Safety Committee,
- Work and General Emergency Planning and Preparedness,
- First Aid Supplies, Services and Equipment,
- Claims and Disability Management,
- Health & Medical Monitoring,
- Records and Statistics,
- Written Work Procedures,
- Worker Training,
- New/Young Workers Training,
- Supervisor Training,
- Supervisory System,
- Mobile Equipment Operation,
- Working Alone or in Isolation,
- Hazardous Materials and WHMIS,
- Fall Protection,
- Confined Space Entry, and
- Personal Protective Equipment

The audit process at WSN will involve: (1) the review of safety program materials, various documentation, guiding procedures and records, (2) discussions or interviews with persons at all levels of the organization and (3) field inspections to confirm the level of system/element implementation.

NOTE: As the WSN Safety Program is regularly subject to a variety of other internal/external evaluations processes, the previously described Safety Program Review may be postponed for up to a one-year period at the discretion of senior WSN management, when other internal/external evaluation processes have not identified substantial deficiencies.

Appendix - 1: Specific Rules, Instructions & Programs

PART I - General Safety Rules

1. Hard hats must be worn at all times on projects unless the employee is:
 - inside a vehicle that provides protection from falling objects,
 - operating equipment that is equipped with overhead protection, or
 - in a work location that has been designated by the project supervisor as having no danger of head injury from falling, flying, or thrown objects, or other harmful contacts.
2. All employees are required to wear appropriate safety footwear to protect them from injury. Footwear must be: (1) CSA approved, (2) provide ankle support and (3) be worn properly (*i.e., fully laced*).
3. CSA approved eye protection must be worn when grinding, chipping, mixing grout, blowing, burning, drilling, welding, using with/near chemical products that pose a risk of eye injury, or performing other work activities where exposure to an eye injury hazard is present.
4. CSA approved (Z94.2-02) Hearing protection devices (muffs and/or plugs) must be worn when there is excessive noise (85 dB or greater daily average) and when directed by your supervisor.
5. Suitable respiratory (respiratory protection requirements will be determined by WSN on a site-by-site and task-by-task basis) must be worn/used as identified by your supervisor.
6. Fall protection must be used in fall hazard areas where it is possible to fall 3 meters (10 feet) or more, or where there is an injury hazard greater than the hazard of hitting the ground (*i.e., above operating equipment or protruding rebar*).
7. Every employee must wear clothing appropriate for work. Sleeved shirts and long pants are the minimum requirement.
8. All hazardous conditions (*work procedures, atmospheres, defective or malfunctioning tools, equipment, structures, protective clothing or equipment*) must be immediately corrected (*if it safe for you to do so*) and reported to your immediate supervisor.
9. If you have any concerns or questions regarding the safety of a work procedure, consult with your immediate supervisor before proceeding with the task. If after discussing the situation with your supervisor, you still feel there is an unacceptable risk involved, do **not** carry on with the job. Your supervisor will follow the procedures detailed under "Right to Refuse Unsafe Work" located in this appendix. You will not be reprimanded in any way for questioning the safety of a work procedure.
10. Equipment and machinery must be shut down AND locked-out before oiling, adjusting, repairing, or maintaining. Shut down equipment and machinery before fuelling.
11. Use the tools and equipment necessary to do your job safely and use them in the way they were meant to be used. Take good care of tools and equipment - keeping equipment in good working order helps prevent accidents.
12. Inform others if you are going to work above or below them and ensure that safeguards or precautions have been arranged. Never leave tools or equipment in an elevated position where they can be knocked off onto another person.

13. All rigging, hoisting and work platform procedures must be performed safely in compliance with applicable regulations. Appropriate slings, chokers, etc.... must be used for all lifts.
14. All injuries must be reported to your immediate supervisor and first aid at the earliest practicable opportunity. **If a serious accident occurs do not change anything at the accident location unless it is necessary to prevent further injury.**
15. If you are under the influence of, or impaired by, illicit drugs or alcohol, stay off the project site. You will not be allowed to work if it becomes evident that your ability to work safely is impaired by these substances.
16. Improper conduct, and all instances (including potential) of harassment, intimidation or bullying must be reported to your immediate supervisor.
17. Only authorized, competent persons may operate machinery, company vehicles and powered mobile equipment.
18. Maintain good housekeeping in your work area.
19. Heed all safety guards, barriers, signs, and tags and never render inoperable any safety device. Report any safety devices or guards that are not performing their intended function to your immediate supervisor for correction. These devices are in place for **your** protection.
20. Use of hazardous materials must conform to manufacturer recommendations. A collection of Safety Data Sheets (SDS) WHMIS-hazardous products is available for reference. Contact your supervisor.
21. Use proper lifting techniques to avoid sprains, strains, and back injuries. Get help or use lifting equipment for heavy or cumbersome loads. Guard against getting into an unbalanced position when pulling, prying, or pushing - particularly at heights.
22. Sub-trades are largely responsible for their own safety, but they must abide by the instructions of our supervisory personnel. If you see them doing something that may cause a health or safety hazard to themselves or others, please report it at the earliest opportunity to your immediate supervisor.
23. For your own safety and that of your fellow employees, **please take particular care when working in confined spaces, at heights, near power lines, and in excavations.** These are the areas of our industry where the most serious accidents occur. When you are involved in these jobs take an extra moment to anticipate and minimize potential hazards to yourself and others.
24. Copies of the Provincial health & safety regulations are kept on the site for your reference. Feel free to discuss/obtain clarification on a specific regulation with your supervisor.
25. Be safety smart - consult the safety program on site. Your participation in our program is encouraged, expected and for your benefit. Some methods of getting involved include:
 - Never walk past an unsafe practice or condition and do nothing...get involved,
 - Participating in safety meetings...do not just attend, bring a topic to discuss,
 - Making suggestions to your supervisor on how we can improve safety on the job, and
 - Working safely and encouraging fellow workers to do the same

PART II - Specific Safety Rules

***NOTE:** The following “specific” safety rules are intended to provide direction/instruction on WSN projects/sites. The vast majority of the rules may be adjusted by the senior on-site WSN representative to satisfy additional/conflicting client requirements.*

Asbestos - Risk Rating 4-A (High)

(Also see: Project Specific Asbestos Program)

Asbestos is the generic name for a group of naturally occurring fibrous minerals. Asbestos colour may range from white to a pale yellow, green or blue. Asbestos fibres are very harmful to the lungs. They may cause lung scarring (asbestosis), lung lining scarring (pleural scarring), cancer of the lung lining (mesothelioma) and lung cancer. Time lapse before the disease becomes evident may be 20-40 years. Workers who smoke have a 10-15 times greater risk of lung cancer from asbestos exposure than workers who do not smoke. The WCB has set a maximum exposure limit of 0.1 fibres/m³ and lists asbestos as a known human carcinogen and an ALARA substance (exposure to be kept **As Low As Reasonably Achievable**).

The high strength, flexibility, heat and chemical resistance, and frictional properties of asbestos led to its widespread use in electrical insulation, high strength asbestos cement products, pipe covering, floor tiling and asphalt. A good measure of the hazard posed by asbestos is its **friability - the ease with which it can be crumbled or pulverized**. Products with "bound" asbestos do not pose a hazard unless they are cut, sawn, ground or sanded.

New construction materials in presently use do not normally contain asbestos. However, due to the age of many of the facilities/pieces of equipment WSN works on, WSN employees may encounter asbestos containing materials. Several common/likely activities/areas where an asbestos encounter is likely including: (1) gaskets/refractory around pressure vessel (and other) access doors and ports, (2) expansion joints and (3) building cladding/insulation materials.

The following guidelines are to be followed if it becomes apparent, or you suspect, that asbestos containing materials may be present:

1. If you believe there may be asbestos where you are working (*i.e., inside a pipe chase*), alert your supervisor immediately. The supervisor will take immediate actions including:
 - Alerting workers in the vicinity to the presence of the material,
 - Removing the workers from the environment where exposure may occur,
 - Restricting access to the area and posting warning notices, and
 - Contacting a qualified client representative to: (1) take a sample of the suspect materials, and (2) perform an analysis of the material – ***NOTE:** Many of WSN clients have the ability to collect such samples and perform analysis. If no such collection and analysis can be performed by the client, WSN will make such arrangements for a qualified contractor to collect a sample of the suspect material for analysis at an independent laboratory.*

Clothing, Jewellery and Hair

1. WSN will provide coveralls for all employees. It is your responsibility to wear the coveralls properly, to replace them when they are damaged or excessively soiled, and to place them in the designated area at the end of each shift.
2. Where clothing may come in contact with moving parts of equipment, tools or machinery, the clothing must not be torn, ragged or loose.
NOTE: As part of the HASP process, work areas will be assessed for possible entanglement/contact hazards associated with moving parts of equipment, tools, or machinery.
3. Employees are not permitted to wear bracelets, necklaces, rings, jewellery, or other items that could become snagged or entangled or pose other risks. Facial and cranial hair must also be maintained (or contained) such that it cannot become snagged or entangled or pose other risks.

Compressed Air - Risk Rating 2-C (Medium)

1. Hose couplings (twist fittings) are to be secured against dislodgement. Tieback restraints, or other effective restraints, are to be used where dislodgement of a connection could harm a worker.
2. Hoses are to be checked regularly for cuts or bulges.
3. Compressed air is never to be used to clean debris from a person's body. Air under pressure can enter the blood stream through the skin and cause death.
4. Workers using compressed air to clean surfaces are to wear eye and hearing protection, and ensure the other workers are away from the operation and fallout area.
5. Compressor air is not be used for in-line breathing apparatus unless the equipment provides for filtering/purifying.

Compressed Gas Cylinders - Risk Rating 3-C (Medium)

1. Cylinders and any other container of substances under pressure must be protected from excessive heat, sparks, molten metal, electric current, flames, and physical damage and should be stored in dry locations to prevent corrosion.
2. Cylinders and other containers of pressurized substances may only be modified or repaired in accordance with the manufacturer's instructions.
3. Cylinders and other containers of pressurized substances, other than hand-held aerosol spray cans, must be equipped with appropriate pressure relief mechanisms.
4. Compressed gas containers that require pressure testing must bear a valid, current indication of testing.
5. Compressed gas cylinders must not be hoisted by slings or magnets, dropped, subjected to impact, handled by the regulator, or used as a roller or work support.

6. Compressed gas cylinders must be secured (strapped or chained) to prevent falling or rolling during storage, transportation or use and kept in an upright position.
7. Cylinders must be prevented from bumping together during transport and must be transported with protective caps in place.
8. Empty cylinders and cylinders not in use must have the valve closed. When opening a cylinder valve avoid standing in front of the regulator.
9. Acetylene cylinders that have been placed in a horizontal position must stand in a vertical position for at least one hour prior to use.
10. Compressed gas cylinders must be marked to indicate their pressure rating and contents.
11. Oxygen cylinders and their fittings must not come in contact with grease or oil, including that from hands, gloves or clothing.
12. Oxygen must never be used as a substitute for compressed air.
13. Empty cylinders must have the pressure regulator removed, the protecting cap put on (unless integral guards are provided) and be marked "empty" or "MT".
14. Prior to filling, thoroughly inspect the cylinder for dents, damaged foot rings or protective collars, corroded areas, leaks, or any other conditions that indicate possible weakness. Remove damaged cylinders from service.
15. Cylinders must not be filled beyond their marked capacity.
16. Compressed gas cylinders must never be brought into a confined space. The only exception is small, portable fire extinguishers.

Confined Space Entry - Risk Rating varies

(Also see: Confined Space Entry Program)

1. Hazard Assessments. A detailed hazard assessment must be developed for each confined space. The hazard assessment will be developed based on information supplied by the space owner (client), with consideration to the activities that WSN will be performing inside the vessel.
2. Safe Work Procedures. Specific safe work procedure will be developed and available for each confined space entry.
3. Responsibilities. Each person involved in a confined space entry has specific responsibilities. These persons include: the project superintendent, job/task supervisors, entry attendant, atmospheric monitors, and entrants. Responsibilities for each will be detailed in writing before an entry into a confined space commences.
4. Isolation of Hazards. Before personnel are allowed to enter a confined space, it must be isolated so that no hazardous materials will enter the space. This will be accomplished through a combination of the following as may be appropriate:
 - closing valves and locking in the closed position using a double block & bleed

- blinding and blanking lines
 - disconnecting lines
 - locking-out all switches and controls for motors and pumps
 - blocking or restraining moving parts
 - de-energizing equipment
5. Pre-Entry Testing and Continual Monitoring. Thorough atmospheric testing information will be done prior to entry into any confined space and will be checked/monitored during entry.
 6. Access Control. Access to the confined spaces will be controlled through posting of warning signs, physically securing access points, and through the entry permit system.
 7. Ventilation. All confined spaces will be continually ventilated during entry.

Contact Lenses

1. WSN will discourage personnel from wearing contact lenses on projects. When personnel are insistent on being able to wear such, the worker will be informed on the hazards such devices pose and encouraged to seek/use alternatives.

Correction of Unsafe Conditions

1. If you identify an unsafe condition or practice that is easily correctable, you are expected to correct the hazard. The hazard must also be reported to your supervisor so he may complete required documentation. If the unsafe condition is not easily correctable, immediately report it to your supervisor who will determine and implement any necessary corrective action and record it.

Electrical Safety - Risk Rating 4-C (High)

1. All temporary wiring must be installed and maintained in accordance with applicable codes.
2. Only competent, qualified electrical workers are permitted to construct, install, alter, repair, or maintain electrical equipment.
3. Temporary electrical cords are to be kept clear of locations where they may be subjected to damage or present tripping hazards.
4. Assured grounding program or GFCIs must be used when wet conditions exist on the worksite.
5. Splices in electrical cords must retain the mechanical, water penetration and electrical strength of the original.
6. Energized wiring in junction boxes, circuit breaker panels, etc.... must be protected from accidental contact whenever left unattended.
7. Temporary lighting lamps that are broken or burned out are to be replaced as soon as possible. Bulbs must not be removed from other areas to provide lighting.
8. Avoid working on any circuits when standing on metal or in water.
9. Avoid having electrical cable or connections in water.

10. Prior to operating equipment or otherwise working within 7 meters of an overhead power line, the senior on-site WSN representative must contact the power line owner (usually the client) for the purpose of determining the power lines voltage. Once the power line's voltage has been determined, WSN must ensure that the "Safe Limits of Approach" as detailed below are maintained.

British Columbia:

VOLTAGE	MINIMUM DISTANCE
751 V to 75 kV	3.0m
Over 75 kV to 250 kV	4.5m
Over 250 kV to 550 kV	6.0m

Alberta:

VOLTAGE	MINIMUM DISTANCE
0-750 V (Insulated/polyethylene covered conductors) (1)	300mm
0-750 V (Bare, uninsulated)	1.0m
Above 750 volts (insulated conductors) (1) (2)	1.0m
750 V to 40 kV	3.0m
69 kV, 72 kV	3.5m
138 kV, 144 kV	4.0m
230 kV, 260 kV	5.0m
500 kV	7.0m

Notes:

- (1) *Conductors must be insulated or covered throughout their entire length to comply with this group.*
 (2) *Conductors must be manufactured to rated and tested insulation levels.*

11. When job circumstances require that work be done closer than the limits of approach stated above, the following procedure must be followed prior to commencing work:
- An assurance in writing must be obtained from and signed by the person(s) controlling the electrical system. The assurance must state that during the work period, the electrical conductors will be de-energized or effectively guarded against contact or displaced/re-routed away from the work area. The assurance must be available for inspection at the project site.
12. Employees (other than qualified electricians) and equipment must not touch or handle electrical guarding. Whenever guarding is used, a qualified safety watcher (trained and experienced journeyman electrician) must be posted to control the approach of equipment, tools and workers and prevent contact with the guarding.
13. ***NOTE:*** *WSN does not transport loads greater than 4.15 meters in height below energized overhead power lines.*

Excavating Around Underground Utilities (Applicable to BC) - Risk Rating 3-C (Medium)

(Also See: “Locating Underground Utilities”, “Utility Daylighting” and “Trenching, Shoring and Excavations” in this section)

Sequence

1. Determine support procedures if utility is being exposed for any length of time, or over 1 meter of utility will be fully exposed at any given time. This may require a separate geotechnical excavation plan and specific approval by the utility owner. Installation of utility support is separate to these instructions.
2. Notify utility owner of excavation activities and request if it is possible for the utility being located to be turned off or re-routed during excavation.
3. Determine contingency plan and notification procedures in the event of unintentional contact with and damage to underground services. A separate written contingency plan may be required. Ensure that utility owner is aware and on standby, especially if the service being exposed is live.
4. Concrete saws, jackhammers, machine excavation equipment, hand tools or other similar equipment may be used to break and remove asphalt and concrete on the road surface and/or sidewalk over the excavation area. *(NOTE: All loose asphalt and concrete pieces along the side of the excavation must be removed, or it could fall in at a later date and damage exposed utility.)*
5. Confirm approximate depth of utility to be located. Care should be taken when removing surface asphalt and concrete with machine excavation equipment not to remove underlying gravel if potential for shallow underground utilities exist. Concrete below road surface layers should not be removed without consultation with the utility, as they may contain services.
6. Daylight utility at specific locations to confirm the exact location of the utility corridor. Excavation along a utility should only be completed once the utility location has been confirmed through day lighting, and visual confirmation of the utility location has been determined.
7. Machine excavation can be used up to 1 meter from the identified utility without a dedicated spotter provided the machine operator has a clear line of sight to the utility. Machine excavation must take place under the direction of a dedicated spotter within 1 meter of the underground utility, or of the machine operator does not have a clear line of sight to the utility. Excavation within 1 meter of the utility or without a clear line of sight to the utility without a dedicated spotter is considered a near miss.
8. With the exception of a Telus utility, machine excavation equipment should not be used closer than 50 cm (1.6 feet) to the utility without the specific authorization of the utility owner. Machine excavation equipment should not be used closer than 1 meter to any Telus utility without specific authorization from Telus.
9. Wherever possible, the machine excavation equipment should be operated parallel to the direction of the utility when the excavation is within 1 meter of the utility.
10. Excavation within 50 cm (1.6 feet) of the utility is completed through hand excavation.

11. The above procedures may be modified with specific approval from the utility owner under specific conditions with additional precautions. The conditions under which the utility owner has provided a specific exemption to the above procedures should be documented. The site superintendent must detail the exceptions in writing, along with the required additional precautions as stipulated by the utility owner. These exceptions and precautions will form part of this procedure and should be reviewed on a daily basis during the site health and safety meeting.

Additional Precautions/Requirements

12. Use an experienced operator and spotter when working around utilities.
13. A spotter must be utilized any time equipment is working within 1 meter of an underground utility. No equipment shall work in the vicinity of any utility without the authorization of the project superintendent and the presence of a designated spotter.
14. Prevent access of personnel by barricading the area; barriers are set up around excavations and trenches to protect employees, subcontractors, and the general public.
15. Ensure that the utility owner has been informed of day lighting activities. WCB regulations stipulate minimum distance for machine excavation adjacent to a utility corridor. This distance can be reduced in specific circumstances by the utility owner under certain conditions. Use the attached form (Utility Owner Communication Log) to record specific communication and verbal instructions from utility owner, which become part of this SWP. Review utility owner communication with all workers on site on a regular basis.
16. Complete a thorough pre-job utility locates as outlined in *SWP: Utility Location*.
17. Ensure you are confident about the locations of all utilities on and around your work site, including hydro, telephone, cable, sanitary, storm, water, and gas.

18. Review the location of all utilities with all workers on site on a daily basis.

Falling Objects - Risk Rating 2-D (Medium)

1. Prevent access of personnel by barricading the area designated for waste disposal from upper floors of structures.
2. Always use toe boards on floor openings, elevated work platforms and scaffolds if materials, tools or equipment may otherwise be able to fall off and create a danger to other workers or there is a danger of slipping off the work surface due to environmental conditions or work practices being used.

Fall Protection - Risk Rating 4-C (High)

1. Whenever work is performed at a height greater than 3 meters (10 feet), or when a fall from a lesser height involves an unusual risk of injury, WSN will incorporate the use of a fall protection system.

2. The use of guardrails must be considered before the use of personal fall restraint, fall arrest or alternate work procedures. The hierarchy of fall protection methods will always be:
 - Guardrails,
 - Fall Restraint Systems,
 - Fall Arrest Systems, and
 - Control Zone/Safety Monitor – Alternate Work Procedures
3. Whenever personnel must work under the protection of a fall protection system, a specific “Fall Protection Work Plan” (FPWP) must be developed. The FPWP must detailed, as a minimum:
 - The specifics of the chosen fall protection system, including the procedures necessary to install, maintain, inspect, and remove the system,
 - Personnel training requirements, and
 - Provisions for rescue (*i.e., whenever an employee could be in a situation where they are suspended from a fall protection system and unable to affect “self rescue”*).
4. All fall protection system must be designed, installed, used and maintained in accordance with the manufacturer’s requirements, applicable regulations and generally accepted “best practices”. While not a comprehensive list, the following are some such practices.
 - Fall Protection Anchor Points must be effective. Common fall protection/anchor related deficiencies include but are not limited to: (1) incorrect use of wire cable clips, (2) incorrect load configurations and (3) obviously “underrated” or otherwise inadequate components.
 - Fall Protection anchors/lanyards must be attached/positioned as to limit the employee’s “free fall” and connecting hardware must be used correctly. All anchors/lanyards must be attached/positioned as to limit an employee’s free fall, comply with regulatory requirements, meet accepted industry practices, and generally be functional. Common anchor/lanyard attachment/position related deficiencies include, but are not limited to: (1) fall protection systems configured in such a manner that the system would not engage before the employee contacted the ground, (2) fall protection systems configured such that the employee would be subject to an unacceptable amount of “free fall”, (3) fall protection systems configured such that an employee is presented with a significant “swing” hazard and (4) the incorrect use of connecting hardware.
5. WSN will only purchase fall protection equipment that meets legislated/CSA standards.
6. Prior to using fall protection equipment/systems, the users of such systems are responsible for completing thorough pre-use inspections. ***NOTE:*** *All fall protection equipment will also be subject to documented inspections on a quarterly basis as detailed in Sections 8 of the “Reference Guide to Occupational Health & Safety Activities”.*
7. When inspections (*i.e., pre-use or quarterly*) or observations otherwise identify damaged, worn or otherwise unacceptable fall protection equipment, the equipment must be destroyed and disposed of. Under no circumstances may WSN staff attempt to fix or otherwise use fall protection equipment that is damaged or worn.

Fire Protection and Prevention - Risk Rating 2-C (Medium)

1. Client “hot work” permitting/approval requirements must be satisfied.
2. In addition to adhering to the client’s “Hot Work” permitting/approval requirements, site specific fire protection and prevention procedures will be developed as part of the HASP and/or Job Site Emergency Preparedness Information Worksheet preparation process.

3. The best means of fighting fires is to prevent them. All employees are responsible for doing everything they can to prevent fires. If you observe a potential fire hazard, report it to your supervisor so that the hazard can be eliminated, or fire suppression equipment can be issued and maintained at the hazard location.
4. Smoking is permitted only in designated smoking areas.
5. Workers must know the locations and types of fire extinguishers in their work area. There are four general classes of fires, and each requires a particular type of extinguishing agent. Portable fire extinguishers are labelled as to the type/class of fires they should be used on:
 - **CLASS “A” FIRES** occur in materials such as rags, paper, wood, and trash.
 - **CLASS “B” FIRES** arise from the vapour-air mixtures found with flammable liquids such as gasoline, oil, grease, paints, and thinners.
 - **CLASS “C” FIRES** are electrical fires, or fires occurring in or near electrical equipment, thereby presenting the additional hazard of electrical shock.
 - **CLASS “D” FIRES** involve combustible metals such as sodium and magnesium.
 - **NOTE:** ABC extinguishers will handle the majority of construction related fires.
6. Personnel are not to endanger themselves by attempting to fight fires beyond their training and experience. Personnel attempting to extinguish a fire must immediately summon the assistance of fellow workers. If there is any indication that the fire will not be able to be extinguished an alarm must be raised, and evacuation procedures implemented.
7. Fire equipment must always be kept accessible and in good working condition. It must be inspected annually, or as required by fire regulations. Tampering with fire protection equipment is a serious offence and will result in immediate dismissal.

Flammable and Combustible Liquids - Risk Rating 3-B (Medium)

1. Flammable and combustible liquids must be stored in designated storage areas, away from sources of ignition, electrical equipment, and the direct sun.
2. Containers with flammable and combustible liquids must be kept tightly closed to prevent hazardous vapour loss when not in use.
3. Only approved safety containers (CSA, ULC, FM, etc....) are to be used to store flammable and combustible liquids.
4. Equipment fuel tanks must not be filled:
 - While the engine is running,
 - While anyone is smoking in or around the vehicle, and
 - While there is any known source of ignition in the immediate area, **including cell phones**
5. Volatile or flammable materials must not be carried in or on a vehicle transporting workers unless such materials are carried in an:
 - Isolated compartment accessible only from the outside,
 - Inside compartment separated from all persons by a firewall, and
 - In approved containers
6. Gasoline and other flammable liquids may only be transferred from one container to another if steps to prevent static electricity accumulation have been implemented. Static electricity may be controlled through the use of container contact or grounding. Glass, plastic, or other non-conductive containers with a capacity of 23 litres or more that are used to transfer a flammable liquid must have static electricity controlled by:
 - Limiting flow to less than one metre per second (200 fpm),
 - Using a nozzle extending to the bottom of the container, and
 - Using anti-static additives, or other effective means.
7. Gasoline dispensing from storage containers by means of an approved pump or gravity feed, must be done by utilizing hoses and fittings approved for that purpose.
8. Gasoline must not be used to start fires.
9. If flammable liquids are dispensed or transferred inside a flammable liquid storage room, the room must be adequately ventilated (1cfm/sq. ft.) to the outdoors, makeup air ducts must be equipped with fire dampers and the door to the room must be self-closing.
10. Except for packaging used to contain flammable/combustible liquids, combustible shelves, racks, and other materials are not permitted inside a flammable/combustible liquids storage room/cabinet unless required as part of the fire separation.
11. Keep fuel off clothing and promptly remove clothing that has been soaked with a flammable liquid.
12. Vehicles are never to be refuelled under high-voltage powerlines.

Floor/Deck Openings - Risk Rating 2-C (Medium)

1. Floor/deck openings must be guarded against inadvertent entry or covered with adequate covers securely fastened in place.
2. Covers placed over openings must be marked to indicate they are covering a hole. They must be marked as follows:



3. Covers placed over openings must be able to withstand the equivalent of a 2.4 kilo newton per square metre evenly applied force.
4. The edges of open pits and excavations must be protected to prevent falling into the pit or excavations. Fall protection requirements apply if the edge has a straight vertical drop of 10 feet or more, or if there is an additional hazard such as rebar, rocks, etc.... at the bottom.
5. Where guarding or covers are not used, personal fall protection equipment must be utilized.

Forklifts - Risk Rating 3-C (Medium)

(Also see "*Obstructed Vision*" in this Section)

1. Forklift operators are to follow all applicable Vehicle and Mobile Equipment safety rules.
2. The operator is the only person permitted to ride on a forklift.
3. Forklift operators must be trained in accordance with recognized standards, and forklifts must not be operated unless the operator is authorized to do so by their supervisor.
4. Materials and equipment are to be loaded on the forklift in a manner that prevents any movement of the load that could create a hazard to workers.
5. All loads that could be subject to shifting during transportation are to be restrained if such shifting would result in the forklift becoming unstable.
6. Carry loads as low as possible.
7. Do not drive with arms, head, or legs outside the confines of the forklift.
8. Any operator who cannot clearly see the load or off-load points and the full path of travel must use a signal person.
9. Sound horn and slow down when approaching pedestrians, ramps and other forklifts or vehicles.
10. If equipped, lights must be on at all times. Forklifts used at night or indoors **must** be equipped with lights.

11. Forklifts used in enclosed spaces must be shut down when not in use to minimize emissions into the work area and must be equipped to ensure emissions meet air quality standards.
12. Do not exceed the load capacity of the forklift.
13. When shutting a forklift down, level and lower the forks, apply the parking brake and put the controls in neutral.
14. Forklift trucks may only be used to lift personnel if a properly designed and approved lifting device is used and is firmly attached to the forks. The forklift must not be used transport personnel in these situations.

Bench Grinders - Risk Rating 2-C (Medium)

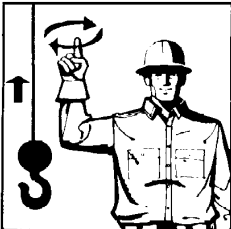
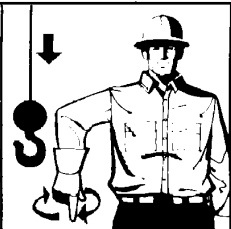
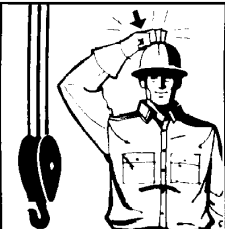
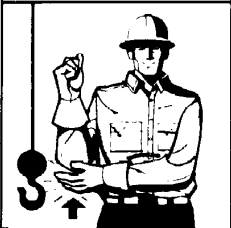
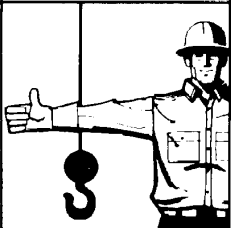
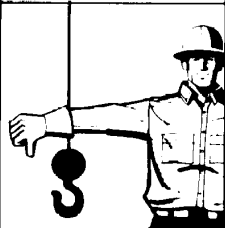
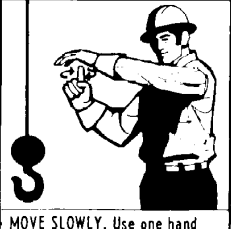
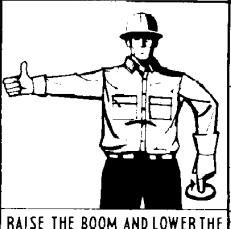
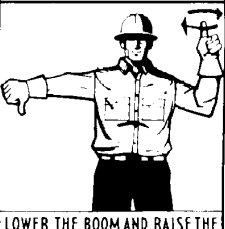
1. Only authorized persons will operate grinders.
2. Face shields and hearing protection are required when operating a grinder.
3. Long hair, loose clothing and jewellery must be restrained to prevent entanglement.
4. Operators must ensure that all guards are in place and operational. Spark guards, if installed, must be adjusted to the correct place.
5. Check to ensure that blotters and wheel flanges have been used to mount the wheels onto the shaft.
6. The tool rest must be adjusted and tightened to within 3mm (1/8") from the wheel.
7. Wheels must be inspected to ensure they have a speed rating greater than or equal to the grinder's speed rating and that they are in good condition. Cracked or chipped wheels must be replaced.
8. Do not stand in line with the wheel when starting the grinder.
9. Do not use the side of the wheel when grinding, use the face only.
10. Use pliers or a vice grip to hold small items.
11. If the wheel vibrates, dress it (on the face only), replace it or replace the shaft bearings if they are worn.
12. Allow the object you were grinding to cool before handling it.
13. Unplug or lockout the grinder before doing repairs.
14. Never leave a grinder unattended while the wheels are turning.

Guardrails - Risk Rating 2-C (Medium)

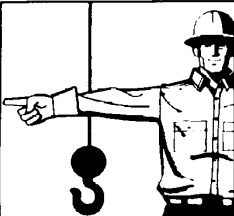
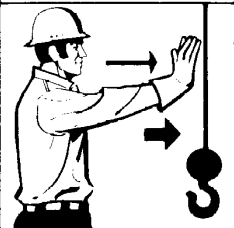
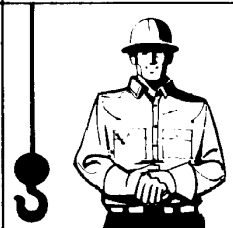
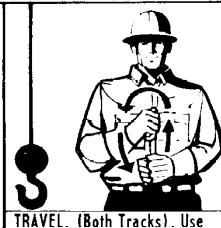
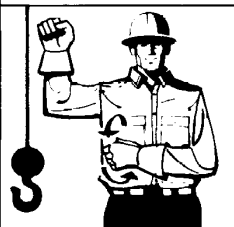
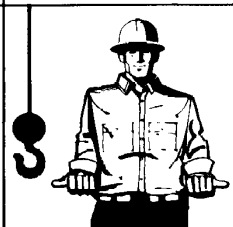
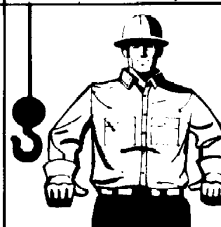
1. Guardrails are the first choice for fall protection wherever there is a hazard of falling 3 meters (10 feet) or more. Other fall protection must be used if guardrails not practicable.
2. Workers installing guardrails must be protected from falling.
3. Guardrails or other fall protection systems must be installed for work over water if a drowning hazard exists.
4. Where guardrails have to be removed for work to proceed, permission to remove them must be obtained from the worksite supervisor. When fall prevention devices are temporarily removed, workers must be protected by other fall restraint or fall arrest devices.
5. Guardrails and barricades that have been temporarily removed must be replaced at the earliest opportunity. Areas unguarded as a result of such removal are not to be left unattended.

Hand Signals - Risk Rating 3-C (Medium)

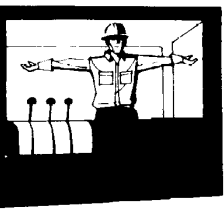
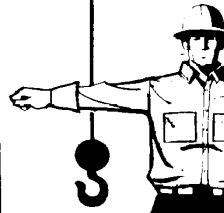
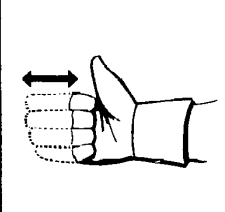
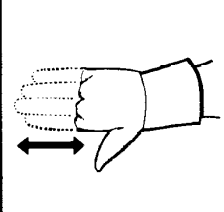
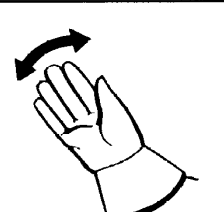
Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes

		
HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.	LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.	USE MAIN HOIST. Tap fist on head; then use regular signals.
		
USE WHIPLINE. (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.	RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.	LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.
		
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example).	RAISE THE BOOM AND LOWER THE LOAD. Arm extended, fingers closed, thumb pointing upward, other arm bent slightly with forefinger pointing down and rotate hand in horizontal circles.	LOWER THE BOOM AND RAISE THE LOAD. Arm extended, fingers closed, thumb pointing downward, other arm with forearm vertical, forefinger pointing upward and rotate hand in horizontal circles.

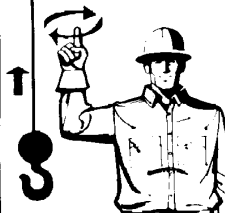
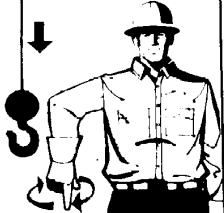
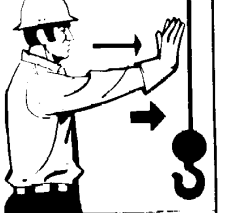
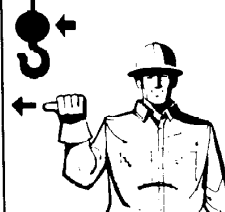
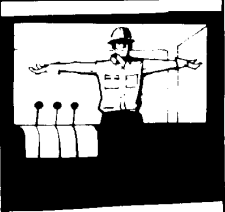
Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes

		
SWING. Arm extended, point with finger in direction of swing of boom.	STOP. Both arms outstretched at the sides horizontally, fingers outstretched.	
		
TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.	DOG EVERYTHING. Clasp hands in front of body.	TRAVEL. (Both Tracks). Use both fists in front of body, making a circular motion about each other, indicating direction of travel; forward or backward. (For crawler cranes only.)
		
TRAVEL. (One Track). Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only.)	EXTEND BOOM. (Telescoping Booms). Both fists in front of body with thumbs pointing outward. One hand signal may be used.	RETRACT BOOM. (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other. One hand signal may be used.

Standard Hand Signals for Controlling Crane Operations, Crawler, Locomotive and Truck Cranes

		
MAGNET IS DISCONNECTED. Crane operator spreads both hands apart — palms up.	OPEN CLAM SHELL BUCKET. Arm extended, palm down, open hand.	CLOSE CLAM SHELL BUCKET. Arm extended, palm down, close hand.
		
HOIST SLOWLY TO CLEAR FOULED LINE. Hands crossed in front, above shoulders, fingers relaxed.	BOOM UP AND LOWER THE LOAD. One hand.	BOOM DOWN AND RAISE THE LOAD. One hand.
		
STOP. One hand.	WHIP LINE. One hand.	

Standard Hand Signals for Controlling Crane Operations, Overhead and Gantry Cranes

		
HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.	LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.	BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.
		
TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.	STOP. Both arms outstretched at the sides horizontally, fingers outstretched.	
		
MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2". Regular signals follow.	MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist Slowly shown as example.)	MAGNET IS DISCONNECTED. Crane operator spreads both hands apart — palms up.

Hand Tools - Risk Rating 2-D (Medium)

1. Do not use tools for jobs they are not intended for.
2. WSN will ensure the correct tool (type, rating) is available for the task at hand.
3. Do not apply excessive pressure on tools.
4. Carry sharp or pointed tools in a heavy belt or apron rather than pockets, and hang tools at your sides, not behind your back.
5. Carry tools in a manner that does not interfere with using both hands when climbing a ladder or a structure.
6. Wear appropriate personal protective equipment (safety glasses, gloves, etc....).
7. Maintain tools carefully, keep them clean and dry, and store them properly after use.
8. Inspect tools for defects prior to use.
9. Replace cracked and broken handles on files, hammers, sledges, and screwdrivers.
10. Re-dress burred or mushroomed heads of tools such as chisels.
11. Exercise extreme caution when using tools near live electrical circuits. Do not use cushion grip handles as a replacement for insulated handles.
12. Pull on wrenches and pliers. Never push unless you are using an open hand.
13. Face adjustable wrenches forward and turn the wrench so that pressure is against the permanent jaw.
14. Do not cut or chip towards yourself when using cutting tools or chisels.
15. Do not re-dress, grind, weld or heat-treat hammer heads.
16. Do not use one hammer to strike another.
17. Do not use a dull chisel. Re-dress heat-treated tools with a whetstone rather than a grinder.

Harassment, Intimidation, Bullying and Workplace Violence

WSN is committed to the promotion of an environment for work which upholds the dignity and respect of the individual and which supports every individual's right to work in an environment which is free of any form of harassment, intimidation, or bullying.

WSN recognizes the right of every individual to such an environment and requires all persons employed by WSN to recognize their responsibilities in this regard.

Harassment of employees (WSN or others) or the public will not be tolerated.

DEFINITIONS:

BULLYING is defined as behaviour of a physical, verbal or a psychological nature which is unwanted and unwelcome, and which could reasonably be regarded as offensive. The bully, intentionally or unintentionally, misuses the power of position, knowledge, or personality to domineer, intimidate or humiliate others. The following are common but not exclusive examples of bullying behaviour:

- Open aggression, threats, shouting abuse or the use of obscenities,
- Constant humiliation, sneering or ridicule,
- Unreasonable scrutiny or unreasonable demands,
- Taking credit for another person's work,
- Undermining a person's authority,
- Spreading malicious rumours, and
- Physical harassment: physical assault, threats of physical assault

HARASSMENT is defined as any act or conduct which is unwanted and unwelcome and which could reasonably be regarded as offensive, humiliating, or intimidating on any of the following discriminatory grounds: gender, marital status, family status, sexual orientation, religion, age, disability, or race. The following are common but not exclusive examples of harassment:

- Treating people less favourably or subjecting them to ridicule on any of the nine discrimination grounds,
- Demeaning and derogatory remarks, name-calling,
- Isolation, non-cooperation, or exclusion within the workplace,
- Unwelcome comments on appearance,
- Unwarranted criticism of work performance,
- Undermining the authority of a colleague in the workplace,
- Production, display or circulation of offensive material, and
- Physical harassment: physical assault, threats of physical assault

SEXUAL HARASSMENT is defined as unwanted and unwelcome conduct that could reasonably be regarded as sexually, or otherwise on the gender ground, offensive, humiliating or intimidating. Sexual harassment undermines the dignity of the recipient, and adversely affects work or study performance. The following examples are some of the most common forms of sexual harassment:

- Sexually suggestive jokes or comments
- Innuendo or jokes about a person's sexual orientation
- Questions or insults about one's private life
- Unwelcome sexual attention
- Display of offensive material
- Leering, offensive gestures or whistling
- Threats of, or actual, physical assault
- Groping, patting or unnecessary touching
- Suggestions that sexual favours may further someone's career, or that refusal may damage it.

RACIAL HARASSMENT is harassment on the grounds of race/ethnic origin is defined as unwanted or unwelcome conduct based on a person's race that is offensive to the recipient and which might threaten a person's security or create a stressful, hostile, or intimidating work environment. Harassment on the grounds of race may include:

- Verbal harassment: offensive jokes or remarks about a person's race or ethnic origin, ridicule or assumptions based on racial stereotypes.
- Visual harassment: Production, display or circulation of materials offensive to particular racial or ethnic groups, such as cartoons or racial propaganda.
- Physical harassment: physical assault, threats of physical assault

WHAT DO YOU DO IF YOU FEEL YOU ARE BEING HARASSED OR BULLIED?

INFORMAL APPROACH

As part of its commitment to an environment that is free of any form of harassment, WSN has a number of resources available to those who feel that they are the subject of harassment and has established procedures to deal with formal complaints.

If you feel you are being harassed or bullied you should, if at all possible, endeavour to make it clear to the person, or persons, causing offence that such behaviour towards you is offensive and unacceptable.

If such behaviour is having an adverse effect on your work, point this out to them and ask them to stop. Keep a record of incidents so that you can be specific about the behaviour or actions that are causing offence. If speaking to the person fails, or if it proves too difficult to do, there are other sources of help available to you.

MAKING A FORMAL COMPLAINT

If you wish to make a formal complaint, you are encouraged to do so in writing, although such is not necessary. Written complaints should contain details of the person or persons against whom the complaint is being made and where possible, details of the alleged act or acts of harassment. Assistance in making a formal written complaint can be sought from either your supervisor, the Shop Stewart, or Employee Health & Safety Representative.

All formal complaints will be referred directly to an Investigator appointed by a Senior Manager. All complaints will be investigated in a confidential manner and without undue delay. The complainant will be advised of the identity of the individual who will be performing the investigation.

The alleged harasser will be given a copy of the written formal complaint and afforded the opportunity to respond in writing. Each party will have the right to present his or her side of the case and/or be represented by one person of their choice. Both parties will be advised of the outcome of the investigation once the Investigator has made a report to WSN Management.

Because there can be sensitive and confidential aspects to such cases, the procedures have been designed to safeguard the rights, both of the complainant and the alleged harasser. All complaints will be dealt with promptly and treated with the utmost discretion. The outcome will be advised to both parties. All reasonable steps will be taken to protect the individual who files a complaint, or assists in an investigation from intimidation, victimization, or discrimination. Retaliating against someone who complains about harassment is a serious disciplinary offence.

Malicious complaints will also be regarded seriously by WSN and may result in disciplinary action.

NOTE #1: *If the alleged harassment or bullying involves non-WSN personnel, WSN management will initiate an investigation with the assistance of other persons/parties as necessary (i.e., RCMP, Clients Reps, etc...), and subsequently take any and all necessary precautions.*

NOTE #2: *Employees who have been subject to harassment, bullying (or violence), or have been otherwise been affected by such, will be encouraged to seek assistance through the Employee Family Assistance Program (EFAP). Contact information for the EFAP is available through the site supervisor. If employees chose not to seek assistance through the EFAP, WSN management will assist (as able) and encourage an employee to consult a health professional that specializes in such.*

NOTE #3: *If a specific (potential) threat of violence (i.e., escalating labour conflict, historical interactions with the public, public protests, etc...) against WSN is identified during the development of the HASP (described in Section 7), or identified in another manner (i.e., as a result of an incident), specific hazard elimination or risk mitigation procedures will be developed. Such procedures may be developed by WSN, and for the exclusive use of WSN personnel, or by (or in conjunction with) the site/client. When specific procedures are developed, personnel will receive specific instruction related to such.*

NOTE #4: *The preceding information will be reviewed with employees during their general orientation, site specific orientations, as well as during daily toolbox talks and weekly crew safety meetings.*

Any reports of Harassment and or Bullying will be investigated and may lead to disciplinary action.

Housekeeping - Risk Rating 2-D (Medium)

1. Work areas must be kept clean and free from obstructions at all times. Tools, waste, and other materials cluttering the site can be hazardous.
2. Tidy your work area at the end of your shift, immediately after finishing a job, and as necessary.
3. Hazardous waste, as well as spilled toxic, flammable or corrosive materials must be cleaned up immediately and disposed of using the method described in the appropriate Safety Data Sheet (SDS). Large spills of such materials must be reported to your supervisor.
4. Workers must help to keep project sites, roads, walkways, and yard areas clean and free of tripping/slipping hazards by depositing refuse in designated containers or locations.
5. Materials, tools, and equipment must not be stored in stairways, corridors, catwalks, ramps, passageways, and exits. Materials stored overhead must be protected against falling into work areas.
6. Broken glass and other "sharps" must be disposed of in designated trash containers.
7. All materials must be stacked and secured to prevent sliding, falling or collapse. Pipe, conduit, and bar stock should be stored in racks or stacked and blocked to prevent movement.
8. All materials must be stacked or stored in a manner that permits safe access to and egress from a work area.

Impairment (Excerpts from Drug & Alcohol Program)

WSN is concerned about the effects of illegal or unauthorized use of drugs, and the abuse of alcohol, upon the health and safety of its employees. Such drug or alcohol use may pose serious safety and health risks not only to the user, but to those who work with the user and to the general public as well. In addition, the decreased productivity and dependability of these individuals because of drug and alcohol abuse places an increased burden on other employees and can adversely affect our ability to continue to provide appropriate service to our customers.

In light of these concerns and in order to properly place drug-free individuals into our workplace, WSN has adopted the following policy regarding the use, possession or sale of drugs or alcohol.

ALCOHOL/DRUG USE GENERALLY

Alcohol

The possession of, or consumption of, or being under the influence of, alcohol by an employee during work hours, while performing WSN business, or otherwise while on WSN premises, or in a WSN vehicle is prohibited. Employees are not permitted to have a blood alcohol concentration of .04% or higher, except for those persons in safety-sensitive positions who shall have no alcohol present in the body.

Legal Drugs

Except as provided below, the possession, sale, purchase, transfer, or use of, or being under the influence of (to the extent such use or influence may affect the safety of the employee, co-workers, or the safe or efficient operation of WSN equipment) any legally obtained drug by any employee during work hours, while performing WSN business, or otherwise while on WSN premises, or in a WSN vehicle is prohibited.

An employee may continue to work while using a legal drug if the employee does not pose a threat to their own safety, or the safety of co-workers, the employee's job performance is not significantly affected by the legal drug and the employee is not working in a "safety sensitive" position.

Employees Reporting Requirement – Legal Drugs

Any employee in a safety-sensitive position who is taking a prescribed medication, or an over-the-counter medication which could induce drowsiness, disorientation, impairment to coordination or attention, or any other impairment affecting the employee's ability to safely perform his job, must advise the supervisor of the type of medication being used, the amount of daily medication, the expected length of time they will be using such medication and the expected side effects of such medication. If in the opinion of WSN the medication renders an employee unfit to perform their duties safely and efficiently, they will either be reassigned to other work or sent home until they are able to resume working safely. Failure to notify an immediate supervisor of consuming this type of medication will be a violation of this policy and result in disciplinary action.

Illegal Drugs

The possession, sale, purchase, transfer, or being under the influence of any illegal drug by any employee during work hours, while performing WSN business, or otherwise while on WSN premises, or in a WSN vehicle is prohibited.

TESTING

Reasonable Suspicion Testing

When WSN has reasonable suspicion to believe that an employee has been drinking alcohol or taking drugs, the employee will be temporarily removed from active work and provided with an opportunity for verification testing for such drug or alcohol presence. "Reasonable suspicion" shall include, but shall not in any way be limited to: (1) employee appearance, (2) behaviour, (3) conduct, (4) judgment, (5) coordination or (6) physical or mental ability which in the judgment of the management of WSN indicates the employee may be under the influence of alcohol or drugs; as well as information, reports, or other evidence indicating that an employee (or employees) is in possession of, or using, or under the influence of alcohol or drugs, which is brought to the attention of WSN and upon which WSN may reasonably rely.

Accident/Injury Testing

If an employee is involved in a "significant incident", the fact of such an incident will result in drug/alcohol verification testing for the presence of drugs or alcohol.

Testing Procedure

Testing shall be made through a local independent drug and alcohol testing facility of WSN's choice, and may include breathalyser, urinalysis or blood test, or any other reasonable and appropriate testing device or a combination of these procedures. All employees subject to testing will be asked to "volunteer" for such testing, thus consenting to the testing and to the release of test results to a designated management official of WSN. The refusal of an employee to volunteer will be deemed to be a refusal by the employee to submit to required testing, subjecting the employee to immediate discharge as set forth below.

Refusal to Submit to Testing

When an individual is asked by WSN to submit to drug/alcohol testing and such individual fails to submit to such required testing, the employee's refusal will be construed as an admission of guilt and the employee will be subject to immediate discharge. If an employee switches, adulterates, dilutes, or in any other manner modifies or attempts to modify a urine sample submitted for testing, such action shall be deemed to be a refusal to submit to required testing by the employee, the employee's refusal will be construed as an admission of guilt, and the employee will be subject to immediate discharge.

Communication of Test Results

All actions taken under the authority of this policy will respect the confidentiality of employees. Information relative to investigations, possible violations of the policy, drug/alcohol screen results, and other such information will be communicated only on a "need to know" basis.

CONSEQUENCES OF POLICY VIOLATION

An employee who is found to be in violation of this policy is subject to discipline, up to and including discharge, for a first offence or any subsequent offence.

Improper Conduct

1. Engaging in horseplay, fighting, practical joking and other similar potentially hazardous conduct is forbidden, and will result in disciplinary action.
2. Knowingly or intentionally engaging in hazardous behaviour is forbidden and will result in disciplinary action.

Ladders - Risk Rating 2-D (Medium)

1. Ladders may only be used for “light” and “short duration” at height activities. Whenever possible, the use of ladders should be restricted and alternative methods for access/work at heights (*i.e., scaffolding*) employed.
2. Manufactured ladders must meet CSA, ANSI, or other standards acceptable to the WCB.
3. Ladders must be inspected for defects prior to use. Ladders with broken rungs, split rails, worn or broken safety feet, frayed or damaged ropes must be taken out of service and reported to your immediate supervisor.
4. Ladders must always be placed at least 1/4 of their length away from the base of the structure they are leaned against and secured against movement. Ladder feet must be placed on a firm surface.
5. Working from the top two rungs or steps of a ladder is prohibited unless permitted by the ladder manufacturer’s specifications.
6. Ladders used for ascending or descending from one level to another must extend at least 1 metre (3 feet) above the upper landing except where there is restricted clearance, and the ladder is adequately secured.
7. Metal ladders or wire reinforced wooden ladders must not be used near energized electrical equipment unless permitted by manufacturers’ specifications. All ladders used around/near energized electrical equipment must be non-conductive and designed for use in such applications.
8. Ladders used in locations where they may be struck by workers or equipment in the area must have a watcher stationed at the bottom. Ladders must not be left standing in such a location when not in use.
9. Ladders used in corridors, stairwells or aisles must be barricaded.
10. Doorways must be blocked, locked, or guarded while ladders are used in front of them. Emergency exits must remain operational.
11. Protective coatings on ladders, other than a small amount for identification purposes, must be of a transparent type to enable proper inspection for defects.
12. Workers on ladders must use suitable hoisting equipment to lift or lower heavy or bulky items.
13. When working from a ladder you must maintain three points of contact (*i.e., two feet and one hand*) with the ladder.
14. Avoid over-reaching while working from a ladder - move the ladder or work from scaffolding.
15. Never use ladders in a horizontal position as runways or scaffolds.
16. For obvious reasons, do not place ladders against windowpanes.
17. Ladders may only be used by one person at a time.

18. Manufactured ladders must be marked for grade and use and used in accordance with manufacturer's specifications.

Loading/Unloading Dump Trucks - Risk Rating 2-C

1. All truck drivers must be alert to workers, moving equipment and materials being transported by cranes when entering and travelling on the project site.
2. Truck drivers must wear a hard hat, steel toed boots and high visibility apparel (vests) whenever they leave the cab of their truck on a project site.
3. Truck drivers are to remain in the truck while awaiting their turn to be loaded and during the loading procedure.
4. The excavator operator will position trucks by means of communicating to the driver with hand signals and the excavator horn. Trucks should be spotted in a position so that the loading machine does not swing over the truck cab.
5. Persons, other than the truck operator, must stand well clear of loading operations. The restricted area extends from 3 meters (10 feet) in front of the front bumper of the truck back to and including the complete length of the hitch if the truck is towing a pony. The restricted area also includes the complete swing radius of the excavator counterweight and the bucket and also extends 3 meters (10 feet) out past the far side of the dump truck.
6. Truck drivers and other operators of equipment must not drive into the swing radius of cranes, excavators, or shovels when such equipment is in operation.
7. Truck drivers may leave the loading position only upon receiving the signal to do so from the excavator operator.
8. Rocking the truck to loosen a load is dangerous and should be avoided. Trucks must not be driven with the box raised.
9. Never position yourself under the raised box of a truck unless it is safely blocked up from the frame of the truck by a heavy timber or other safety device.
10. Anyone trying to contact the excavator operator or the truck driver during the loading operation must make eye contact with both the truck driver and the excavator operator. The excavator operator must stop operations before anyone enters the restricted area. When leaving the restricted area, the person must leave in full view of the truck driver and the excavator operator. Loading may only restart once the person has left the restricted area.

Locating Underground Utilities (Applicable to BC) - Risk Rating 3-C (Medium)

(Also See: “Excavating Around Underground Utilities”, *Utility Day lighting*” and “*Trenching, Shoring and Excavations*” in this section)

Sequence

1. Obtain all available utility drawings from consultant and/or owner.
2. Determine whether any other work has already been done on the site (*i.e., drilling, excavations, etc...*).
3. Call BC One Call at number listed below. (this should cover BC Hydro, Telus, Terasen Gas and other BC One members). Note the GVRD, some municipalities, and Shaw cable are not part of the BC One group. These utilities need to be contacted independently. The contact numbers are provided below.
 - BC One Call: Land Line 1-800-474-6886, Cellular Phone *6886
 - GVRD: 604-436-6952
 - Shaw Cable: 1-866-344-7429
4. Review all utility drawings as they come in or request a meeting with the utility on site – note that all utility locates require a minimum 72 hours to complete.
5. Once on site, look for surface indications of utilities such as catch basins, water shut offs, gas pins and meters, overhead power lines, overhead telephone lines, street lighting and trench lines in asphalt.
6. All project utility drawings must be kept together in a separate file maintained by the project foreman. – note that if practicable, a master site utility drawing, marked and color coded should be clearly posted.
7. For city utilities (including storm, sanitary, water and adjacent building services), get drawings from the local city hall (see blue pages of telephone book under Engineering Department of municipality).
8. When utilizing the services of an independent utility locator, ensure that they are provided with **all** of the available utility drawings.
9. Accompany the utility locator while he/she performs the location service and confirm the location of all utilities shown on drawings.
10. Identify and record any other utilities found or suspected.
11. The site superintendent and utility locator must communicate and be satisfied that all the utilities shown on the available drawings have been clearly identified and marked on the ground surface.
12. Compare on site observations with drawings and ensure everything matches up.
13. Obtain a written field report from the utility locator clearly showing his/her findings.

14. Using coloured highlighter pens, color code each utility to readily identify them on a site plan. – note that a color-coded legend should be produced to avoid any possible confusion. The following standard colors should be used.

- Red = Electric
- Yellow = Gas–Oil–Steam
- Orange = Communication CATV
- Blue = Water
- Green = Sewer
- Pink = Temporary Survey Markings
- White = Proposed Excavation

15. Special procedures are required near railway right-of-ways and airports – contact specific authorities.

16. All underground utilities within the excavation footprint or within 1 meter of the excavation boundaries should be visually exposed to confirm their location prior to bulk excavation.

Additional Precautions:

17. Begin utility locate a week before anticipated job start up to ensure enough time to do a thorough check.

18. Ensure you are confident about the locations of all utilities on and around your work site, including hydro, telephone, cable, sanitary, storm, water, and gas.

19. Review the location of all utilities with all workers on site on a daily basis.

Lockouts – Risk Rating 4-C (High)

1. Lockout Program requirements detailed by the client will be followed.
2. Lockout must be applied when performing maintenance or repair work on air, electric, hydraulic, or steam-driven equipment. All equipment must be locked and tagged in accordance with client/provincial requirements.
3. Installation, maintenance and repair work on machinery, equipment or hazardous energy sources must not be performed unless there is no hazard to workers while doing the work.
4. Where it is essential that machinery or equipment remain in operation, only those parts of the machine or equipment that must remain in operation may be operating. All other parts, which can present a hazard, must be locked-out.
5. Work other than that described in 4) above must not begin until all isolating devices have been secured in the "off" or "stop" position by the use of locks.
6. The first worker applying a lock in the lockout procedure must ensure that the locked-out equipment cannot be operated and has been tagged. If more than one worker is assigned to a task, each worker must place his own lock and tag on the isolating devices.

7. Installation, maintenance, and repair work on machinery and equipment must not begin until all parts, extensions and attachments have been secured against inadvertent movement and all sources of stored energy have been released.
8. Any lock used in lockout procedures must be marked to identify the worker whose lock it is and be operable only by that worker's key and the master key (usually kept by the client).
9. Lockout locks must be removed only by the person identified on the lock. Master keys may only be used to remove lockout locks in emergencies, and only by a supervisor following the lock removal requirements of the client.
10. In the event that the work is not completed before the shift ends, workers coming on shift must place their own locks on all isolating devices **before** the workers coming off shift remove their locks. Alternatively, a supervisor may lock out the equipment during shift changes to allow workers going off shift to remove their locks.

Manual Handling of Materials and Musculoskeletal Injury Prevention - Risk Rating 2-C (Medium)

1. Practice good housekeeping.
2. Pre-plan procedures to ensure the proper tools, equipment and number of personnel are available.
3. Minimize the distance materials have to be moved - plan storage and movements properly.
4. Store materials at or above hip height to minimize unnecessary bending.
5. Break or divide heavy or large loads into smaller loads for easier transport.
6. Use personal protective equipment such as knee pads, and gloves.
7. Do not swing and throw heavy loads.
8. Talk with your supervisor about alternating activities if you have been assigned repetitive work.
9. Where practicable, use dollies, hoists, forklifts, or other equipment to do a job more efficiently.
NOTE: Such equipment is available/or can be acquired through WSN supervision/management.
10. Where practicable, use extended handles on tools to reduce the need for crawling when doing floor level tasks.
11. Take a minute to stretch/warm up before any repetitive or heavy lifting jobs.
12. Do not attempt to lift objects that are obviously too heavy or bulky for one or which require getting into an awkward position. Get help.
13. Be ready to lend a hand to fellow employees with lifting tasks.
14. Ensure you have a firm grip on the object before lifting it, and ensure your hands and body are in the clear.
15. Watch out for slivers, nails, and sharp ends when handling objects. If possible, these must be removed from the object.

16. Ensure that you have a clear view of your route when carrying materials.
17. At the first signs of a musculoskeletal injury (*i.e., tenderness, soreness, swelling, etc...*) are noticed, report it to your supervisor. Your supervisor will investigate and take appropriate actions (*i.e., ensure first aid is provided, assign alternate duties, change method of work, job rotation, etc...*).
18. When lifting:
 - Keep your back as nearly upright as possible,
 - Use leg muscles instead of back or stomach muscles, and
 - Avoid twisting motions - turn with your feet
19. As part of the HASP process, WSN will attempt to identify all known and reasonably foreseeable ergonomic issues. When ergonomic concerns are identified, WSN management will assess the risks, and implement appropriate controls. Such ergonomic hazards and controls will be explained during the orientation process and will be a regular topic of discussion/training at daily toolbox talks and weekly crew safety meetings. If/when additional ergonomic concerns are identified during a project, inform your supervisor. Your supervisor will ensure an assessment is completed, suitable control measure devised, and personnel educated/trained.

Obstructed Vision

1. When a vehicle or equipment operator's vision is obstructed, the unit should not be moved until suitable precautions have been taken to protect the operator and any other workers from possible injury. Precautions must include:
 - Inspection, on foot, of the area into which the equipment will be moved, or
 - Direction by a signal person wearing a high visibility vest and stationed in a safe position in continuous view of the operator and having an unobstructed view of the area into which the equipment will move, or
 - Direction by a traffic control or warning system, and
 - When reversing, the repeated sounding of an audible warning device while the equipment is in motion.

Personal Protective Equipment

1. As part of the HASP process, WSN will determine the PPE requirements for all projects. Once PPE requirements have been determined, WSN will ensure appropriate (suitable for the situation/hazards/client/regulations) PPE is obtained, and that all persons who are required to use such receive the training necessary to use, maintain and store the PPE properly. As part of this process, WSN will take efforts to ensure that the PPE itself does not pose any additional hazards/risks.
2. All personnel will be trained in the selection, inspection, use and maintenance of all required/provided personal protective equipment.
3. CSA approved (Z94.2-02) Hearing protection (muffs and/or plugs) is required in any work location where there is noise of 85 dBA or greater and where your supervisor determines hearing protection is necessary. Under most circumstances hearing protection will be required when working in the vicinity of operating power equipment or tools.

4. Hard hats must be worn at all times on the project, unless the employee is:
 - Inside a vehicle,
 - Operating equipment that is equipped with overhead protection,
 - In a work location that has been designated by the project supervisor as having no danger of head injury from falling, flying, or thrown objects or other harmful contacts
5. Hard hats must meet all requirements and CSA (Z94.1-05 or Z94.1-15) or ANSI (Z89.1-2009 and Z89.1-2014) standards. Hard Hats must have non-conductive rating for any worker exposed to any electric hazards, Chin straps, or other means to retain the hard hat on the worker, must be used when the worker is climbing heights greater than 10ft, exposed to high winds or other conditions that may cause the loss of the head gear and must have a properly adjusted suspension. Any damage to the hard hat, missing, mismatched or modified components must be removed from service.
6. All employees are required to wear appropriate footwear to protect them from injury. Workers on job sites must wear CSA (Z195-02) approved above-the-ankle-footwear that provides toe protection and sole puncture protection (CSA has a green triangle patch on the right boot).
7. Eye protection must be worn when grinding, chipping, mixing grout, blowing, burning, drilling, welding, or a worker must wear eye protection if the worker is in an area of the workplace where one or more hazards involving the eyes exist, or are created, due to conditions or activities conducted in the area. Eye protection must meet all regulations and requirements. Must fit properly and provide the worker with appropriate protection from eye hazards. Eyeglasses or eye protection with glass lenses must not be worn by a worker in a workplace. Eye protection must cover glasses or lenses and must be impact resistant and have gone through impact rated requirements set out in Section 6 of the regulations. Eye protection must have side protection if there is any eye hazard that could reach a worker's eye through an unprotected area beside the eye. Removable side shields may be used for eye protection if applicable. Eye protection must comply with applicable CSA standards (Z94.3) and be suited to the tasks being performed.
8. Face protection must be worn covering the worker's eye protection if the worker is in an area of the workplace where one or more hazards involving the face exist, or are created, due to conditions in the area or activities conducted in it. Face protection must meet all regulations and requirements. Must fit the worker properly and provide the worker with appropriate protection from the face hazards.
9. Fit tested and suitable respiratory protection (respiratory protection requirements will be determined by WSN on a site-by-site and task-by-task basis and will be subsequently provided by WSN) must be worn/used as identified by your supervisor.
10. Personal flotation devices must meet all requirements and CGSB Standard CAN/CGSB-65.11-M88, Personal flotation devices with a minimum buoyancy of 69 N (15.5 lbs). Must have with white or silver retro-reflective material fitted on surfaces normally above the water surface, must be worn properly zippered, buckled or tied on where a drowning hazard exists.
11. Fall protection must be used in fall hazard areas, such as those where it is possible to fall 3 meters (10 feet) or more, or where there is an injury hazard greater than the hazard of hitting the ground (*i.e., above operating equipment or protruding rebar*).
12. Workers must wear hand/arm protection when handling materials likely to puncture, abrade, or irritate hands and arms, unless the use of this equipment introduces equal or greater hazards.
13. Workers exposed to the hazards of mobile equipment on the site must wear high visibility apparel.
14. Use additional protective equipment such as barrier creams, aprons, etc.... as the work requires them.

Pneumatic Tools - Risk Rating 3-C (Medium)

1. Only authorized, experienced, and trained workers may use pneumatic tools.
2. Inspect the tool before connecting to the air supply. Ensure screws and caps are securely tightened. Check hoses for cuts or bulges and replace if defective.
3. Pneumatic tools must be held against the work surface before pulling the trigger.
4. Safety features must not be disengaged or overridden.
5. Operating triggers must never be held in the "on" position while moving between work positions.
6. Operating triggers must never be secured in the "on" position under any circumstances.
7. The air supply must be disconnected before adjustments or repairs are made to the tool.
8. The manufacturer-specified air pressure for tools, hoses and fittings must never be exceeded.
9. Safety "whip-checks" must be attached at all air hose connections.
10. Do not use compressed air to blow debris or clean dust from clothes.
11. Where practicable, avoid laying hoses across pedestrian and vehicular access routes.

Power Tools - Risk Rating 2-C (Medium)

1. Power hand tools must meet standards (CSA, ULC, etc....) acceptable to the WCB.
2. Inspect tools, power cords and electrical fittings for damage prior to each use. Repair or remove from service and replace damaged equipment.
3. Ensure all belt and pinch point guards are in place and functioning.
4. Do not wear gloves, loose clothing or jewellery while using revolving/rotating power tools.
5. Switch tools off before connecting them to a power supply.
6. Do not use electric tools in wet or damp locations without a Ground Fault Circuit Interrupter (GFCI) or under the protection of an assured grounding program.
7. Ensure tools are properly grounded (3-prong plug) or are double insulated.
8. Keep power cords clear of tools during use.
9. Suspend power cords over aisles or work areas, when possible, to minimize stumbling or tripping hazards and prevent damage to the cords
10. Do not carry electrical tools by the power cord.
11. Avoid octopus (overloaded) connections.

12. Wear approved safety glasses or goggles when using power tools for grinding, cutting and sanding operations.
13. All equipment guards must be in place and functioning. If missing guards (or other defects) are noticed, do not use the equipment, and inform your supervisor immediately.
14. If a guard in woodworking machinery is impracticable for a specific operation it may be removed, but an appropriate push stick, feather board, jig or similar device must be used to prevent hands entering the cutting area. Guards must be replaced upon completion of the operation.
15. Radial arm saws must be adjusted to prevent any part of the saw blade traveling past the forward edge of the cutting table
16. A hand-held circular saw must have a guard that automatically adjusts to the thickness of the material being cut and covers the cutting area of the blade when the saw is removed from the material.
17. Prior to drilling into walls or the ground, accurately determine and mark the location of utilities.

Rigging, Slings and Hoisting - Risk Rating 3-C (Medium)

(Also see "Standard Hand Signals" in this Section)

1. All wire rope, alloy steel chain, synthetic fibre rope, metal mesh slings purchased by WSN must meet the requirements of ASME Standard B30.9-1996, Slings.
2. All lifting devices must have a plate or weatherproof label permanently secured to it that legibly shows: (1) the manufacturer's load rated capacity, (2) the manufacturer's name, and (3) the model, serial number and (3) Year of Manufacturer or shipping date. Lifting devices that have not been commercially manufactured must also be equipped with a plate or weatherproof label that legibly shows the rated capacity (as determined by a professional engineer – certification from P. Eng. must also be readily available)
3. Rigging and slinging work may only be done by and under the supervision of qualified and authorized workers.
4. Prior to using cranes/hoists and rigging equipment, the user must complete a thorough inspection of the equipment. For equipment with a rated capacity greater than 2000 kgs, the inspection must be documented on the crane/hoist inspection log. ***NOTE: As WSN does not own such equipment, the responsibility to provide a suitable crane/hoist inspection log rests with client. When pre-use inspection logs are not provided (and thus previous pre-use inspections cannot be reviewed), WSN personnel are not authorized to use the equipment until such a log is provided.***
5. When signalling is required, visual signals are preferred. Signals must only be given by one person at a time and the signal person must have a clear, unobstructed view of both the load and the operator of the lifting equipment. Signal persons must wear a high visibility vest.
6. Store and use hoisting equipment with care to prevent damage. Cable clips, shackle pins, heel pins, wedge sockets, anchors, sheaves, and slings must be visually inspected prior to use, installed, and used in accordance with regulatory requirements and the manufacturer's recommendations.

Inspection of Ropes and Slings

POLYPROPYLENE AND NYLON ROPE	
Chalky exterior	Overexposed to sunlight (UV) rays possibly from being left unprotected outside. Remove from service and replace.
Dusty residue when twisted open	Wearing from inside out. Usually due to overloading. If extensive, replace rope.
Frayed exterior	Damaged by abrasive or sharp edges. Strength may be reduced.
Broken strands	Remove from service and replace.
Cold or frozen	Thaw and dry at room temperature.
Reduced width	Usually indicates previous overloading. Use caution and reduce lifting capacity or remove from service and replace.

MANILA ROPE

Manila rope is not recommended for use in construction and is **prohibited** for use in fall restraint and fall arrest systems.

Dusty Residue when twisted open	Wearing from inside out. Usually due to overloading. If extensive, replace rope.
Broken strands, fraying, spongy feel	Remove from service and replace.
Wet	Reduce maximum load limit.
Frozen	Thaw and dry at room temperature.
Mildew or dry rot	Remove from service and replace.
Dry and brittle	Do not oil. Wash with cold water and hang in coils to dry at room temperature.

WIRE ROPE AND WIRE ROPE SLINGS

Rusty, dry	Apply clean light oil. Do not use engine oil
Excessive outside wear	Indicates rope has been used over rough surfaces or with misaligned or incorrect sheaves. Reduce load capacity according to wear. If any of the outside individual wires are more than 1/3 worn away, replace and remove from service.
Broken wires	In running ropes, up to 5 allowed in one rope lay or 2 in one strand in one rope lay or, in standing ropes, up to 2 in one lay and a maximum of 1 at an end connection. If any of these limits are exceeded, replace rope and remove from service.
Crushed, jammed, or flattened strands	Replace and remove from service.
Bulges in rope	Replace and remove from service.
Gaps between strands	Replace and remove from service.
Core protrusion	Replace and remove from service.
Heat damage, torch burns or electric arc damage	Replace and remove from service.
Frozen	Allow to warm at room temperature. Avoid sudden loading of cold rope.
Kinks, bird-caging	Replace and remove from service.
Size reduction	Replace and remove from service if reductions are in excess of 0.4 mm (1/64 in) for ropes up to and including 8 mm (5/16 in), 1 mm (3/64 in) for ropes greater than 8 mm (5/16 in) up to and including 19 mm (3/4 in), 2 mm (1/16 in) for ropes greater than 19 mm (3/4 in) up to and including 29 mm (1 1/4 in) or, 3 mm (3/32 in) for ropes greater than 29 mm (10 in).
Sharp bends	Sharp corners should be avoided. Use pads such as soft wood, rubber hose, old carpet, etc... to avoid damaging slings and ropes.

CHAIN SLINGS

Capacity safety tag	Use only alloy steel identified by an "A" or "8" for overhead lifting.
Stretched or deformed links	Return to manufacturer for repair or remove from service.
Cracks, nicks, or gouges	Return to manufacturer for repair or remove from service.
Failure to hang straight	Return to manufacturer for repair or remove from service.
Corrosion pitting	Return to manufacturer for repair or remove from service.
Burns	Return to manufacturer for repair or remove from service.
Reduction in chain diameter of any link	Reference the requirements of the WCB Regulation regarding chain sling wear rejection criteria. If allowable limits exceeded, remove from service.

POLYPROPYLENE AND NYLON WEB SLINGS

Chalky exterior appearance	Overexposed to sunlight (UV) rays. Should be checked by manufacturer or replaced and removed from service.
Frayed exterior	May have been shock-loaded or abraded. Inspect very carefully for signs of damage.
Breaks, tears or patching	Replace and remove from service.
Frozen	Thaw and dry at room temperature before use.
Oil contaminated	Replace and remove from service.

7. Do not allow sharp bends, pinching, and kinking in rigging components. Thimbles should be used in sling eyes. In a choker hitch, slings must be long enough, so the choker fitting chokes on the webbing and not on the other fitting.
8. Do not wrap the hoist line around the load. Attach the load to the hook by a sling.
9. A professional engineer must determine safe working loads of rigging components if a manufacturer's specification is not available, or there are signs of stress or damage, or when regulation (or regulatory officials) otherwise require such.
10. Sharp edges and corners of the material being rigged must be protected to prevent damage to the choker. Use softeners to prevent slippage and damage.
11. All components must be of an adequate strength for the application. Only forged alloy steel load-rated hardware (stamped or tagged with its SWL) may be used for overhead lifting. Ensure that the safe working load of all hardware is compatible with the rope or chain used with it.
12. All monorails, trolleys, hoists and rigging equipment must have the manufacturer's determined load rating clearly displayed/identified, and equipment components must be compatible (*i.e.*, *Monorails*,

trolleys, hoist, and cranes must be configured such that the hoist does not exceed the rated capacity of the superstructure, including the monorail and trolley).

13. Do not use open hooks. Safety hooks, moused hooks, or shackles (*shackle pins must be secured*) must be used for all hoisting operations.
14. Make sure loads are balanced in the hook. Eccentric loading can result in a hazardous reduction in capacity. Open hooks are not to be used in any circumstances where accidental dislodgement of the load from the hook could cause injury to workers.
15. Tag lines must be used when hoisting and rigging loads and rigging must not be rigged from unsound structural points.
16. Loads must be kept as low to the ground as possible.
17. At no time may elevated/suspended loads be lifting over personnel, nor may workers stand or pass under an elevated load. To help ensure that personnel do not pass under elevated/suspended loads, the areas around lifting activities may need to be barricaded, or have personnel positioned to prevent access from others.
18. If the operator of a lifting device has any doubts as to the safety of workers in the vicinity of the lift, the operator must not move any equipment or load until the operator is assured that the working conditions are safe.
19. All loads must be safely landed and supported before rigging is detached.
20. No equipment that is broken or defective can be used, it must be tagged as such and placed out of service and not be used until it has been repaired and determined safe to use by a qualified person.

Right to Refuse Unsafe Work

1. Never carry out or cause to be carried out any work process, or operate or cause to be operated any tool, appliance or equipment that would create an undue hazard to your health or safety or to the health or safety of any other worker. ("Undue hazard" means: A danger that is not normal for that occupation or a danger under which a person engaged in that occupation would not normally carry out his work.)
2. You will not be disciplined for exercising this right.
3. If you exercise your right to refuse unsafe work, you must immediately report the problem to your supervisor.
4. Your supervisor will investigate and either correct the problem or inform you that the report was not valid.
5. If there is no resolution at this point, the supervisor will re-investigate in the presence of your selected alternative.
6. If there is no resolution at this point, your supervisor **and** you or your worker representative must notify the WCB, which will then investigate. The WCB will issue orders if deemed necessary.

7. You may be temporarily assigned to alternative work at no loss in pay until the matter is resolved.

Scaffolding - Risk Rating 2-C (Medium)

***NOTE:** WSN does not normally construct scaffolding. The client or a qualified scaffolding contractor usually completes the installation of scaffolding. The following scaffolding rules have not been developed to assist WSN personnel with the installation of scaffolding, but rather general rules for working safely on scaffolding)*

1. Each major component of manufactured scaffolding must be marked to identify the manufacturer. A copy of the manufacturer's technical data (load rating, component weight, erection procedures, and applicable standard) for scaffold components in use must be available to the workplace where the scaffolding is being used. If the manufacturer cannot be identified or the manufacturer's technical data is not available, a component may only be used in accordance with written instructions from a professional engineer. Inspection tags will be attached to scaffold for all workers on site to confirm its adequacy for use. The platform of each scaffold must:
 - Be a minimum nominal width of 50 cm (20 inches), except that a nominal 30 cm (12 inches) wide work platform may be used with ladder jacks, pump jack or similar systems,
 - Not leave more than one opening in the work platform, which must be no greater than 25 cm (10 inches) in width, and
 - If not level, be designed to ensure adequate footing for workers using the platform.
2. Inspect all parts of the scaffold before using and regularly during use. Do not use damaged or heavily rusted equipment; the strength of equipment in this condition is not known. If in doubt, do not use the scaffold. Scaffolds may only be erected or dismantled by trained and authorized persons.
3. It is recommended that scaffold frames and components manufactured by different companies not be intermixed. If components from more than one manufacturer are used, ensure they are compatible.
4. Do not climb the outside of scaffold frames between landings. Ladders/stairs will be installed on all scaffolding that is greater than one level.
5. **Do not allow overloading of scaffolds.** Do not keep more material than that required for a day's work on the scaffold. Distribute scaffold loads as evenly as possible rather than concentrating them in the centre of the scaffold.
6. Locking devices (stud and wing nut locks, sliding locks and gravity locks) should be inspected regularly and even more frequently if powered or vibrating equipment is being used on the scaffold.
7. Do not use ladders or other devices on top of scaffolds to increase the working height.
8. Remove snow and ice from the scaffold before work is done.
9. Remove all light-weight materials at the end of the work period so that they will not blow off should a storm develop.
10. Do not throw or drop objects from the scaffold. Use a hand line to raise or lower.

Scissor Lifts and Telescoping/Articulating Boom Lifts - Risk Rating 3-C (Medium)

(Also see "Vehicles and Mobile Equipment" in this Section)

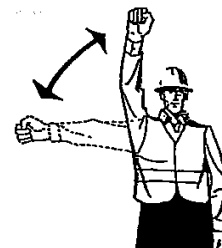
1. Scissor lift, boom and giraffe operators must follow all applicable *Vehicles and Mobile Equipment* safety rules.
2. Only qualified and authorized persons may operate Scissor Lifts and Telescoping/Articulating Boom Lifts.
3. Equipment must be used and maintained in accordance with applicable provincial requirements.
4. Guardrails, toe boards and safety chains must be in place.
5. Fall arrest equipment secured to a suitable anchorage point must be in place and used on all elevating work platforms.
6. The base of the unit may only be repositioned with the platform in the fully lowered or stowed position unless the operator has confirmed the supporting surface is firm, level, clear of depressions or obstructions, and that wheels and/or outriggers are contacting the ground.
7. If a unit is fitted with outriggers, it is to be equipped with notices indicating the circumstances under which the outriggers are to be used.
8. Carrier vehicles of elevated work platforms must be immobilized against inadvertent motion before workers occupy the platform.
9. Scissor lifts must be guarded where there is a possibility of workers inadvertently coming into contact with any hazardous moving parts of the lifting mechanism.
10. All vehicle-mounted giraffes or self-propelled boom-supported elevated work platforms must be subject to inspection in accordance with good engineering practice at least every 12 months and non-destructive testing at least every 24 months.
11. Every elevating work platform must be provided with an emergency stop button on the platform and an emergency lowering control.
12. Every elevating work platform must be fitted with a warning system for forward, reverse, up and down motions.
13. All self-propelled elevating work platforms (except truck-mounted platforms) must be fitted with tilt angle indicators or warning devices as required by provincial regulation.

Signs and Tags

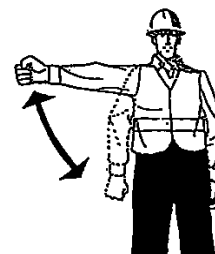
1. Direction or warning signs, tags or tape must be placed where there is an immediate or potential hazard.
2. The only persons authorized to remove an accident prevention sign, tag or tape is the person who placed it or a designate as assigned by the supervisor. Signs, tags, and tape must be removed when their purpose is done.

Traffic Control - Risk Rating 2-C (Medium)

To instruct a partner to halt traffic from the other direction - Raise free hand with fist clenched, straight above the shoulder. Move entire arm slowly from the upright position to a position directly out to the side at shoulder height. Repeat signal as long as necessary.



To indicate an all-clear situation and instruct partner to allow traffic to proceed from other direction - Move the free hand directly out from the side at shoulder height. Lower the entire arm until it rests against the side of the body. Repeat signal as long as necessary.



To instruct a partner to stop all vehicles in event of approach of emergency vehicles or other emergency such as out-of-control vehicles entering the control zone - Drop the STOP/SLOW paddle. Raise both arms to the side at shoulder height, then rapidly move both arms from the shoulder level to a point above the head where the wrists will cross. Continue signal until the partner is seen to take necessary action.



To stop traffic by day - Face traffic and display static STOP paddle in left hand. When approaching vehicle has almost stopped, use right arm to indicate stopping point.



Normal signal

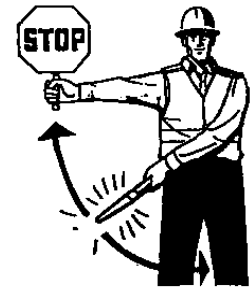


*Alternative - reverse of normal signal

To stop traffic by night - Face traffic and display static reflectorized STOP paddle in left hand and flashlight, with red signalling baton attached, in right hand. Move arm from 3 to 6 o'clock position and back. When approaching vehicle has almost stopped, use flashlight/baton to indicate stopping point.



Normal signal

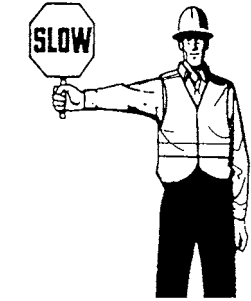


*Alternative - reverse of normal signal

To slow traffic by day - Face traffic and display static SLOW paddle in left hand. If traffic slows below desired speed, give appropriate ?Move Traffic? signal.

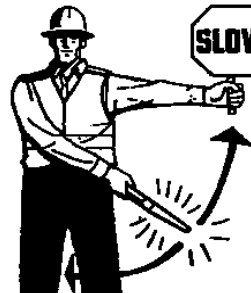


Normal signal

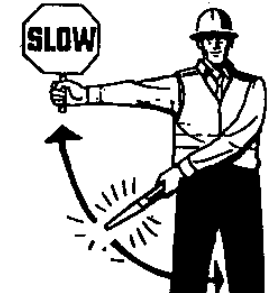


*Alternative - reverse of normal signal

To slow traffic by night - Face traffic and display static reflectorized SLOW paddle in left hand and flashlight, with red signalling baton attached, in right hand. If traffic slows below desired speed, give appropriate ?Move Traffic? signal



Normal signal



*Alternative - reverse of normal signal

To move traffic slowly by day - Face across the approach traffic lane and look across right shoulder at traffic to be moved. Display static SLOW paddle in left hand. Advance traffic by rotating lower right arm in an elliptical manner, in the direction vehicle wheels will rotate.



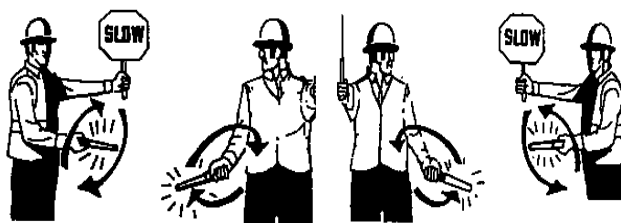
Normal signal



*Alternative - reverse of normal signal



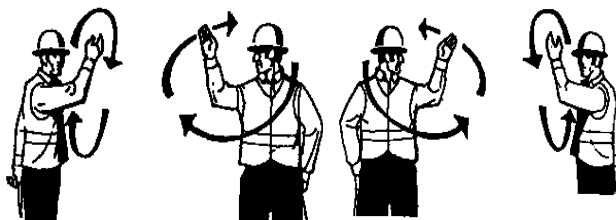
To move traffic slowly by night - Face across the approach traffic lane and look across right shoulder at traffic to be moved. Display static reflectorized SLOW paddle in left hand and flashlight, with red signalling baton, in right hand. Advance traffic by rotating lower right arm in an elliptical manner, in the direction vehicle wheels will rotate.



Normal signal

*Alternative - reverse of normal signal

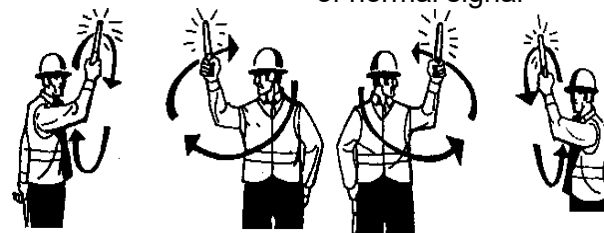
To move traffic at posted speed by day - Face across the approach traffic lane and look across right shoulder at traffic to be moved. Lower left arm to conceal paddle and motion traffic on with right arm at shoulder level.



Normal signal

*Alternative - reverse of normal signal

To move traffic at posted speed by night - Face across the approach traffic lane and look across right shoulder at traffic to be moved. Lower left arm to conceal paddle and hold flashlight, with red signalling baton, in right hand. Motion traffic on with right arm at shoulder level



Normal signal

*Alternative - reverse of normal signal

*** NOTE:** Use alternative signals only when the traffic control person is located on the right side of traffic under his or her control.

Trenching, Shoring and Excavations - Risk Rating 3-C (Medium)

(Also See: *“Excavating Around Underground Utilities”*, *“Locating Underground Utilities”* and *“Utility Day lighting”* in this section)

Trenching and excavating operations present many occasions where there is the potential for serious injury or death. The following rules will be enforced without exclusion:

Excavation work must be carried out in accordance with the specifications and requirements of a registered professional engineer and/or those of the WCB Regulation.

1. Subject to this section, excavation work must be done in accordance with the written instructions of a qualified registered professional if:
 - The excavation is more than 6 meters (20 feet) deep,
 - An improvement or structure is adjacent to the excavation and is located within the anticipated normal sloping affected zone,
 - The excavation is subject to vibration or hydrostatic pressure likely to result in ground movement hazardous to workers, or
 - The ground slopes away from the edge of the excavation at an angle steeper than a ratio of 3 horizontal to 1 vertical.
2. Despite subsection (1), excavation work described in that subsection must be done in accordance with the written instructions of a professional engineer if the excavation requires or uses support structures.
3. The written instructions required by this section must:
 - Be certified by the qualified registered professional concerned,
 - Be available at the site, and
 - Specify the support and sloping requirements, and the subsurface conditions expected to be encountered.
4. The location of underground utility services must be accurately determined and marked before starting excavation work.
5. Excavation work close to a utility must be undertaken in conformity with applicable provincial and federal regulations and with the requirements of the owner of the service.
6. When possible, trenches must be kept less than 1.2 meters (4 feet) deep. Workers must not enter any excavation more than 1.2 meters (4 feet) deep unless:
 - The sides of the excavation are sloped to a safe angle or benched as specified in the WCB Regulation or in accordance with the designs and instructions of a professional engineer, or
 - The sides have been supported by the use of sheet piling, or shoring and bracing meeting the standards set out in the WCB Regulations, or
 - The workers are protected by other means.
7. Sloping of the sides of excavations may be done instead of shoring only where workers have protection equivalent to that provided by shoring. In no case may a slope be steeper than 3/4 horizontal to 1 vertical.

8. Trench support systems must be inspected daily and must be maintained in fully effective condition.
9. Shoring uprights must extend from at least 30 cm (1 foot) above ground level to within 60 cm (2 feet) from the bottom of the trench except where roadway covers are utilized.
10. The work procedures for installation or removal of shoring must ensure that workers are not exposed to undue risk. In general, shoring must be installed from the top down and removed in reverse order.
11. When workers are required to enter excavations more than 1.2 meters (4 feet) deep, a safe point of entry and exit must be provided within 8 meters (25 feet) of the immediate work area.
12. Excavated material must be kept back a minimum distance of 60 cm (2 feet) from the edge of the trench and 1.2 meters (4 feet) from any other excavation.
13. Water must not be allowed to accumulate in excavations where it may affect the excavation's stability or endanger workers.

Utility Day Lighting - Risk Rating 2-B (Medium)

(Also See: “Excavating Around Underground Utilities”, “Locating Underground Utilities” and “Trenching, Shoring and Excavations” in this section)

Sequence

1. Notify utility owner of day lighting activities and request if it is possible for the utility being located to be turned off or rerouted during day lighting so that the service is not live.
2. Concrete saws, jackhammers, machine excavation equipment, hand tools or other similar equipment may be used to break and remove asphalt and concrete on the road surface and sidewalk over an area sufficient for the test hole. (*NOTE: All loose asphalt and concrete pieces along the side of the excavation must be removed, or it could fall in at a later date and damage exposed utility.*)
3. Confirm approximate depth of utility to be located. Care should be taken when removing surface asphalt and concrete with machine excavation equipment not to remove underlying gravel if potential for shallow underground utilities exist. Concrete below road surface should not be removed without consultation with the utility owner representatives, as it may encase services.
4. Test holes should be excavated by using powered excavation equipment immediately outside of the utility trench corridor to within 1 meter of the indicated utility location (both laterally and horizontally.) If possible, avoid excavation of test holes directly above utility, as this could push oversize materials (Rocks/Boulders) into the utility.
5. Ensure the excavation is safe for manned entry. Obtain direction from a geotechnical engineer if excavation slopes cannot be maintained at 2v:1h or use an approved shoring cage.
6. Hand excavate laterally and horizontally in 30 cm 50 cm intervals (hand shovel thickness) to confirm the presence or absence of underground utilities within that interval. Machine excavation equipment may be used to remove overburden material within each hand excavation interval to within 10 cm of the maximum extent cleared through hand excavation.

7. Once located, hand excavate and clear the entire utility to determine its full depth and width.

Additional Guidelines for Hand Excavating:

1. Use blunt shovels. Never use pointed tools such as pickaxes or pointed bars. Spade-shaped shovels, particularly new ones which tend to be sharper, should be used cautiously.
2. Use a prying motion to loosen hard dirt. Avoid striking motions and don't jump on or use your entire body weight on the shovel when digging.
3. Take extra care in the tolerance zones. In the Lower Mainland, all utilities require hand digging within the tolerance or restricted zone immediately surrounding the line. It is recommended that workers dig in cuts of no more than 30 cm deep until the line is exposed.

8. Inspect the utility to determine its composition and condition.
9. Notify utility owner representative of the findings from day lighting and determine specific requirements for continued excavation within 1 meter of the utility.
10. Additional test holes should be dug if alignment changes or changes in elevation are identified by utility representatives.
11. Where test holes in an area have been completed, and the location of the utility visually confirmed, excavation using powered equipment may proceed providing:
12. Machine excavation must take place under the direction of a dedicated spotter within 1 meter of the underground utility. Excavation within 1 meter of the utility without a dedicated spotter is considered a near miss.
13. Whenever possible, machine excavation equipment should be operated parallel to the direction of the utility when the excavation is within 1 meter of the utility.
14. With the exception of a Telus utility, machine excavation equipment may not be used within 50 cm (1.6 feet) of the utility, without the specific authorization of the utility owner. Machine excavation equipment should not be used closer than 1 meter to any Telus utility, without specific authorization from Telus. These are referred to as the "Tolerance/Restriction Zones"
15. Review *SWP: Excavating Around Underground Utilities* for continued excavation along the utility trench.

Additional Precautions:

16. Use an experienced operator and dedicated spotter when working around utilities.
17. A spotter must be utilized any time equipment is working within the Tolerance/Restriction Zones of an underground utility. No equipment shall work in the vicinity of any utility without the authorization of the project superintendent and the presence of a designated spotter.
18. Ensure that the utility owner has been informed of day lighting activities. WCB regulations stipulate minimum distance for machine excavation adjacent to a utility corridor (usually 1 meter). This distance can be reduced in specific circumstances by the utility owner under certain conditions. Use the attached form to record specific communication and verbal instructions from utility owner, which

become part of this SWP. Review utility owner communication with all workers on site on a regular basis.

19. Complete a thorough utility locates.
20. Do not use pointed objects to locate underground utility.
21. Ensure you are confident about the locations of all utilities on and around your work site, including hydro, telephone, cable, sanitary, storm, water, and gas.
22. **Review the location of all utilities with all workers on site on a daily basis.**

Vehicles and Mobile Equipment - Risk Rating 2-C (Medium)

WSN has adopted the following policy regarding the use of Company vehicles:

1. Drivers are responsible for basic vehicle maintenance, including:
 - Maintaining oil and water levels,
 - Ensuring tires are properly inflated,
 - Giving notification for service due, and
 - Keeping the vehicle interior and exterior clean and tidy
2. Failure to perform these basic responsibilities will result in the following:
 - 1st failure - Written notice to driver and supervisor,
 - 2nd failure - Company vehicle operating privileges withdrawn
3. All drivers of Company vehicles must possess a valid, appropriate driver's license.
4. Every worker required to drive a Company vehicle or operate mobile equipment must have read the safety rules applicable to mobile equipment and vehicles.
5. Workers must not operate Company vehicles while impaired by alcohol, fatigue, sickness, or drugs (prescription or illegal).
6. Seatbelts must be worn by drivers and all passengers.
7. Operators must use running lamps or illuminated headlamps at all times.
8. Workers must not operate mobile equipment unless they have been adequately instructed in the safe use of the equipment and have demonstrated to a supervisor that they are competent to operate the equipment. This rule does not apply when a trainee is operating the equipment under the supervision of an authorized instructor.
9. Unauthorized workers must stay off powered mobile equipment while the equipment is in motion.
10. Operators of WSN mobile equipment or vehicles are responsible for the safe operation of the equipment. They must maintain full control of the equipment and must comply with all laws and rules regarding the operation of the equipment.

11. If an operator has reason to believe that the equipment or a load is hazardous they must report it to their supervisor, refrain from operating the equipment, and secure the equipment from movement (i.e., Tag-Out).
12. Immediately before putting mobile equipment in motion, check loads for condition of blockings, hold-downs, lashings and clearance signals. Ensure that loads are adequately secured for transport. Cargo transported by a vehicle shall be contained, immobilized, or secured.
13. Operators must obey all signs governing the movement, operation, or parking of vehicles on any work site or public or private road.
14. The mobile equipment operator is the only worker allowed to ride the equipment unless seats or other safe facilities for other workers are provided and used. Workers must not ride with any part of their bodies outside the vehicle or equipment or stand in or on any vehicle or equipment unless protected against being thrown off balance.
15. Workers must not get on or off a moving vehicle except in an emergency.
16. Operators must not leave the controls unless the equipment or vehicle has been secured against movement by setting parking brakes and transmission locks, lowering any blades, buckets, or forks to the ground and chocking wheels where necessary.
17. Operators of mobile equipment are not permitted to inspect, assemble or disassembly tire and wheel assemblies. Such inspections and repairs may only be made by qualified persons/contractors.
18. Operators must keep the cab, floor, or deck of mobile equipment free of materials, tools or other objects that could create a tripping hazard, interfere with the operation of controls, or interfere with exiting the vehicle.
19. Tools and equipment carried in any part of a vehicle or piece of mobile equipment where workers are riding must be placed or secured to prevent injury to workers.
20. Mobile equipment used for lifting or hoisting must be operated within the safe working load limits.
21. As a minimum WSN will follow the dealer / manufacturer service and maintenance recommendations. Detailed maintenance and service records of all vehicles and mobile equipment are kept in a central repository.

Welding, Cutting, Brazing and Burning (or work in areas that present similar hazards) - Risk Rating 2-C (Medium)

1. Only authorized and qualified persons are permitted to use acetylene or propane fired devices.
2. Equipment must be inspected prior to use. Alert your supervisor if the equipment requires repair or removal from service.
3. Remove or protect combustible materials from the sparks and heat created by the welding operation.

4. Never weld, cut, or do other hot work on drums, tanks, barrels, or other containers until you are absolutely certain that all materials which, when subjected to heat may produce hazardous (poisonous, explosive, flammable, etc....) vapours, have been removed.
5. A Class ABC fire extinguisher of adequate size must be kept nearby, ready for use when welding, cutting, brazing, or burning.
6. Always wear appropriate, approved eye protection when welding, cutting, brazing, or burning to protect against sparks, debris and ultraviolet rays.
7. Workers adjacent to the welding should be protected by non-combustible screens or wear eye protection.
8. Gases and metal fumes present a health hazard to welders. Good ventilation and/or respiratory protective equipment must be present or employed to minimize the hazard.
9. Reverse gas flow (check) valves and flash back arrestors must be used in all oxy-fuel systems.
10. Close all cylinder valves and bleed the lines when work is finished. Hoses with leaks, burns or worn areas must be replaced or repaired.
11. If an arc welding machine is wet, thoroughly dry and test it prior to use.
12. Spread coiled welding cables out and attach the ground lead securely to the work.
13. Never coil welding cables around your body when welding.
14. When performing hot work activities, employees must wear flame resistant outerwear (*WSN's standard coveralls are flame resistant*) and use other PPE appropriate to the hazard. The clothing under such flame-resistant outerwear and against the skin must be made of flame-resistant fabrics or natural fibers that will not melt when exposed to heat. Also fasten collars and sleeve cuffs, and never wear cuffed pants or overalls.
15. The area where hot work is being performed will be adequately guarded to protect other workers in the area from accidentally coming in contact with recently welded or flame cut materials.

Working Alone and/or in Isolation

Recognizing the hazards inherent to WSN projects and the increased risks associated with personnel working alone and/or in isolation, WSN has adopted a policy by which personnel are prohibited from working alone and/or in isolation.

Appendix - 2: Confined Space Entry Program

1.0 CONFINED SPACE ENTRY POLICY

British Columbia (i.e., Occupational Health & Safety Regulation) defines a confined space as an area that:

- a) is enclosed or partially enclosed.
- b) is not designed or intended for human occupancy.
- c) has restricted entry or exit that may complicate first aid, evacuation, or emergency response; and
- d) Is large enough for a worker to enter to perform assigned work.

Alberta (i.e., Occupational Health & Safety Code) defines a confined space as an area that:

- a) is enclosed or partially enclosed.
- b) is not designed or intended for human occupancy.
- c) has restricted means of entry or exit that may become hazardous to a worker entering because of:
 - ⇒ its design, construction, location, or atmosphere,
 - ⇒ the work activities, materials, or substances in it,
 - ⇒ the provision of first aid, evacuation, rescue, or other emergency response service is compromised, or
 - ⇒ other hazards relating to it

ALL CONFINED SPACES ARE CONSIDERED DANGEROUS UNTIL PROVEN OTHERWISE!

No worker is to enter any confined space without reading, understanding, and following the requirements detailed in the WSN "Confined Space Entry Program".

Prior to entering into a confined space, the confined space hazard assessment and written entry procedure/Code of Practice must be reviewed for the space and the hazards of the work to be carried out within the space must be discussed.

The Confined Space Entry Program is intended to ensure that:

- Each person understands their role in executing work in a confined space,
- All of the known and potential hazards have been identified and controlled,
- All persons involved in confined space entry activities are adequately trained, and
- The equipment and supplies required to safely enter a confined space are present and in good working order

NOTE: *This program may not necessarily consider every possible hazard or condition that may exist. It is the responsibility of the Confined Space Entry Supervisor and the workers involved to use due care and attention when entering a confined space. If there is any doubt regarding the safety of an entry into a confined space, **DO NOT ENTER**. Inform your supervisor of the concern, who will ensure that additional actions or investigations are taken to address the issue.*

2.0 DUTIES AND RESPONSIBILITIES

2.1 Management

WSN management will ensure that:

- The confined space entry program is implemented and that it remains effective,
- A program administrator is assigned to manage and maintain the confined space entry program,
- Confined space hazard assessments and written entry procedures are developed for all confined spaces requiring entry by workers,
- Confined space entry training is provided to all workers and supervisors involved in confined space entry activities, and
- All necessary equipment and supplies required to safely enter confined spaces are provided.

2.2 Confined Space Program Administrator

The Confined Space Program Administrator has overall responsibility for the ongoing administration of the WSN Confined Space Entry Program. The Program Administrator will ensure that:

- An inventory of the types of confined spaces that will be entered is maintained,
- Confined space hazard assessments and written entry procedures are developed by a Qualified Person(s),
- Completed entry permits and other records are retained for a period of one year,
- Confined space training provided to WSN personnel is evaluated to ensure adequacy and suitability, and
- The Confined Space Entry Program is reviewed, at least annually, and revised as necessary to ensure that the program remains effective at addressing and controlling confined space hazards.

2.3 Confined Space Entry Supervisors

Supervisors responsible for supervision of workers working in confined spaces will ensure that:

- Only adequately trained and authorized employees enter confined spaces,
- Written confined space entry procedures are understood and followed by all involved personnel,
- Entry Permits are completed and authorized prior to workers entering a confined space,
- Necessary precautions, such as atmospheric testing, ventilation and the control of hazardous energy sources are taken to ensure that the confined space is safe to enter prior to entry by workers,
- All necessary equipment and supplies required to safely enter the confined space are on-site and ready for use,
- A rescue plan is in place to deal with potential confined space emergencies and the extraction of confined space entrants, and
- Confined space activities are inspected/audited throughout the shift, and that inspection/audit discoveries (both positive and negative) are noted on either the confined space permit or on a separate log. ***NOTE: A copy of inspection/audit discoveries must be attached the entry permit and forwarded to the confined space entry program administrator for review/filing.***

2.4 Standby Persons/Air Testers

Personnel assigned as Standby Person or Air Tester will ensure that:

- The accuracy of atmospheric testing equipment is checked by bump testing and/or calibration prior to use,
- They know how to interpret the information from the gas monitor and document the gas testing results on the entry permit,
- They maintain an accurate log of every person who enters/vacates the space,
- They remain on-site and monitor the well-being of confined space entrants at the frequency required by the confined space hazard assessment and written entry procedure,
- There is a continuous means of communication (*i.e., voice, whistle, radio, etc...*) with the entrant(s) is maintained for the summoning of aid in an emergency, and
- They evacuate the confined space whenever the safety of the entrant(s) is or may be compromised.

2.5 Confined Space Entrants

Workers assigned to enter and perform work inside a confined space will ensure that:

- They understand the requirements of the WSN Confined Space Entry Program, and follow the written entry procedure when entering a confined space,
- They notify their supervisor whenever a hazard or condition exists that could endanger the safety of themselves or other personnel,
- They wear all necessary personal protective equipment and clothing required to protect them against potential confined space and work hazards, and
- They vacate the confined space whenever directed by the Confined Space Entry Supervisor or Standby Person, or whenever they feel they are or may be in danger.

3.0 EDUCATION AND TRAINING

The following is an overview of confined space entry related education/training that must be provided to WSN employees.

3.1 General Awareness

All WSN employees are to complete general “confined space awareness” education. Such awareness training will be covered during the general orientation and will review:

- The definition of a confined space, and the types of confined spaces commonly encountered on WSN sites/projects,
- General hazards of confined spaces and general control measures, and

Hazards of Confined Spaces	Common Confined Space Hazard Controls
• <i>Hazardous atmospheres</i> • <i>Toxic substances</i> • <i>Engulfment and entrapment</i> • <i>Physical and safety hazards associated with the space.</i> • <i>Physical and safety hazards associated with the work to be performed in the space.</i>	• <i>Hazard assessments and work procedures prepared by qualified persons</i> • <i>Atmospheric monitoring (pre-entry, periodic and continuous)</i> • <i>Ventilation (general dilution and local exhaust)</i> • <i>Standby persons (i.e., hole watch)</i> • <i>Rescue personnel and specialized equipment.</i>

- Confined Space Program overview, including, but not limited to an overview of the education and training program for entry activities, entry permit requirements, as well as duties and responsibilities of personnel involved in confined space entry activities.

3.2 Confined Space Entrants

All WSN personnel workers who must enter into a confined space must have additional education and training, including:

- Review and comprehension of applicable written hazard assessments, entry procedures, and entry permits,
- Use and limitations air testing equipment,
- Understanding of the need for, operation, setup and use of mechanical ventilation equipment,
- Applicable isolation and lockout procedures,
- Communication requirements (between entrants, standby persons, and rescue personnel) and communication equipment,
- Standby person requirements and activities for low, moderate, and high hazard (rated) atmospheres,
- Applicable emergency response procedures to be taken in the event of a confined space emergency, and
- General emergency response equipment understanding

3.3 Standby Persons

All WSN personnel who will be fulfilling Standby Person duties during confined space entry activities must have additional education and training, including:

- Recognition of potential hazards and dangerous conditions that may exist prior to entry, and that may be generated by work tasks,
- Review and comprehension of applicable written hazard assessments, entry procedures, and entry permits,
- Standby person requirements and activities for low, moderate, and high hazard (rated) atmospheres,
- Duties, responsibilities and procedures for routine and emergency operations,
- Understanding of the need for, operation, setup and use of mechanical ventilation equipment,
- Communication requirements (between entrants, standby persons, and rescue personnel) and communication equipment, and
- Applicable emergency response procedures to be taken in the event of a confined space emergency.

3.4 Confined Space Atmospheric Testing Personnel

All WSN personnel who will be involved in completing atmospheric monitoring must have additional education and training, including:

- Use and limitations of air monitoring equipment,
- Proper calibration and bump testing,
- Proper sampling techniques (prior to and during entry),
- Recordkeeping,
- Hazardous air contaminants and understanding of low, moderate, and high hazard atmospheric ratings, and
- Understanding / interpreting air sample results (comparison to air quality requirements) based on an understanding of work performed.

3.5 Responsible Supervisor

The Responsible Supervisor must have completed the training/education stipulated for: (1) General Awareness, (2) Entrants, (3) Standby Persons and (4) Atmospheric Testing personnel. Additionally, the Responsible Supervisor must have additional education and training, including:

- Review of written hazard assessments and entry procedures,
- Understanding and completing confined space entry permits,
- Understanding of role of responsible supervisor to control and terminate entry operations, and
- Understanding availability of emergency response and rescue personnel

4.0 CONFINED SPACE INVENTORY

As WSN does not “own” any confined spaces, a traditional “inventory” is not required.

An inventory of those confined space that have been entered by WSN employees (along with associated hazard assessments, work procedures, entry permits, atmospheric monitoring records and entry log records) will be maintained at the main office.

5.0 HAZARD ASSESSMENT AND WRITTEN ENTRY PROCEDURES

5.1 Hazard Assessment

A Confined Space Hazard Assessment must be prepared and available for each confined space or group of similar confined spaces. The Hazard Assessment must:

- Identify and assess the hazards the workers will likely be exposed to while in the confined space,
- Specify the type and frequency of inspections and tests necessary to determine the likelihood of worker exposure to any of the identified hazards,
- Specify the safety and personal protection equipment required to perform the work, and
- Identify the personal protection equipment and emergency equipment to be used by a worker who undertakes rescue operations in the event of an accident or other emergency.

The Confined Space Hazard Assessment must be performed by a qualified person (*as defined in the Occupational Health & Safety Regulation and detailed in Section 12.0*).

The hazards inside a confined space must be reassessed whenever:

- Additional hazards are identified that are not referenced on the existing Confined Space Hazard Assessment, or
- Work activities are planned that are not included on the existing Hazard Assessment.

The purpose of the Confined Space Hazard Assessment is to consider and document hazards which may exist prior to entry due to the space’s design, location, or use, or hazards which may develop during planned work activities inside the space.

5.2 Written Entry Procedures

Written entry procedures must be developed for each confined space (or similar type of spaces) based on the information contained in the Confined Space Hazard Assessment. The written procedures specify the necessary precautions and actions required to eliminate or minimize hazards likely to be encountered during the entry and planned work, including provisions for:

- Atmospheric testing,
- Lockout and isolation of energy sources,
- Ventilation,
- Personal protective equipment and clothing, and
- Emergency response and rescue

6.0 IDENTIFICATION AND ENTRY PERMITS

6.1 Identification

All confined spaces on WSN sites will be identified in the HASP (*and identified to personnel during the orientation process*). WSN will also ensure all confined spaces are clearly marked when such are not already marked (by the facility owner or general contractor).

6.2 Entry Permits

Prior to workers entering any confined space, a confined space entry permit may need to be completed (*where required due to the hazards involved*) and authorized by the Confined Space Entry Supervisor.

The entry permit is used to verify that all of the necessary precautions and controls are in place to safely enter the space. The confined space entry permit is used to:

- Record atmospheric testing results,
- Record the names of all personnel involved (*including the time every person entered/vacated the confined space*),
- Verify that required controls have been implemented,
- Verify that all personnel involved in the confined space entry have reviewed the Hazard Assessment and Written Entry Procedures, and
- Indicate the time of expiration of the permit.

Once the planned work is finished, or the permit expires, the Confined Space Entry Supervisor will ensure that the completed permit is submitted to the Confined Space Entry Administrator for recordkeeping. All completed entry permits will be retained for a period of at least five years.

A copy of the Confined Space Entry Permit is presented in the appendices of this document.

7.0 PREPARING A CONFINED SPACE FOR ENTRY

7.1 Lockout and Isolation

Prior to workers entering a confined space, all potentially hazardous energy sources must be de-energized and locked out. Lockout provisions must also consider the potential for hazardous substances to be released into the space.

Lockout requirements/procedures will be detailed in the Hazard Assessments and Entry Procedures.

7.2 Atmospheric Testing

Pre-entry atmospheric testing of a confined space is required prior to any worker entering a confined space. This testing must be performed in a safe manner, in accordance with the requirements detailed in the space specific Hazard Assessments and Entry Procedures. Only workers who have been trained on the safe operation of the atmospheric monitor may perform pre-entry atmospheric testing.

Prior to use, the accuracy of atmospheric monitoring equipment must be checked by bump testing and/or calibration. Refer to the equipment manual for procedures for bump testing and calibrating the monitoring equipment.

CAUTION

Never use atmospheric monitoring equipment if there is any question about the accuracy or dependability of the instrument.

Specific information on the air monitoring devices used by WSN is presented in the appendices of this document.

It is very important that anyone who uses one of these monitors is intimately familiar with the operation of the monitor, how to calibrate/bump test the device, and any other limitations or instructions related to the safe operation of the device.

The initial tests will always be performed prior to entering the confined space and in certain circumstances, prior to opening the confined space (using extension tubes or other methods). When performing the initial pre-entry test, ensure that the air at all levels of the space is sampled to ensure that any gases or vapours that are lighter than or heavier than air are detected.

The air tester must always assume that the space contains a hazardous atmosphere until it is proven otherwise. Pre-entry atmospheric testing must always be performed prior to supplying ventilation to the space.

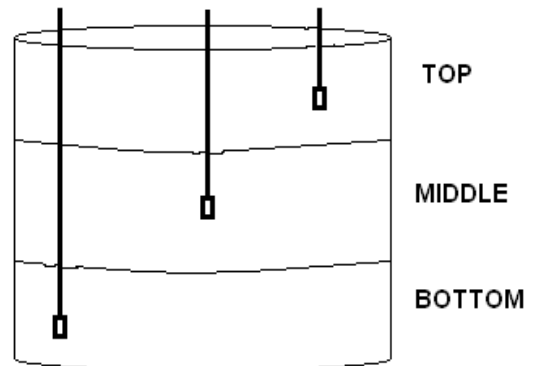
When performing pre-entry atmospheric testing, ensure the following (general guidelines only):

- Oxygen concentrations (O_2) are between **19.5% and 23%**
- Explosive/Flammable gas or vapour concentrations (LEL) are **< 10%**
- Carbon monoxide (CO) is **< 25 ppm**
- Hydrogen sulphide (H_2S) is **< 10 ppm**

The atmosphere inside a confined space may need to be monitored continuously while workers are inside the space. Atmospheric testing must be performed within 20 minutes prior to workers entering the space and prior to each re-entry if all workers have vacated the space for more than 20 minutes.

When gas testing the atmosphere a confined space, ensure that readings are taken in all areas and at all levels of the confined space (see *diagram*).

Record the results of all pre-entry atmospheric testing on the space provided on the Confined Space Entry Permit. During entry, results should be recorded at least every 60 minutes, or when conditions in the confined space change. Exact atmospheric testing requirements are indicated on the entry procedure for each space.



7.2.1 Atmospheric Hazard General Information

Oxygen (O₂)

Hazards due to oxygen can be as a result of oxygen enrichment or oxygen deficiency. Oxygen naturally occurs in the atmosphere at approximately **20.9 %** of the total volume of air.

Oxygen deficiency can occur as a result of chemical processes, operating open flame heaters, or internal combustion engines, as well as any other burning activities using oxygen. Confined spaces can often be oxygen deficient after a fire occurs. The rusting of metal, as well as bacterial action, such as found in sewage systems, can consume oxygen. Oxygen can also be displaced by acetylene, methane, propane, and natural gas.

When the percentage of oxygen in the air is **less than 19.5 %** it can result in disorientation and unconsciousness. At oxygen levels **less than 6 %**, unconsciousness occurs in a matter of minutes, followed by death.

Oxygen enrichment can occur as a result of chemical processes or as a result of leakage from a tanked source such as welding equipment. When the percentage of oxygen in the air is **greater than 23 %**, it significantly increases the rate of chemical reactions and can cause an explosive atmosphere.

Explosion/Flammability (% LEL)

Flammable gases and vapours can result in explosions or fires. Decaying organic matter can produce methane gas. Natural gas can be present due to leaks in the building or home heating gas distribution system. Gasoline can be found in storm drains as a result of inadvertent or intentional disposal. Acetylene can leak from tanks or piping systems from welding. Flammable gases and vapours can become explosive when they are mixed with air in concentrations over a certain range.

If workers are required to enter a confined space, the concentrations of flammable gases and vapours must be maintained **below 10 %** of their lower explosive limit. If any flammable or explosive gas vapours or liquids are present, all sources of ignition must be eliminated. These include cutting, grinding, and burning activities. Non-sparking tools will be used, and equipment will be grounded to prevent static electricity. Be sure that all electrical equipment used in confined spaces is intrinsically safe.

Carbon Monoxide (CO)

Carbon monoxide is a colourless, odourless, tasteless gas that results from incomplete combustion of hydrocarbon fuels (*i.e.*, gasoline). It is most commonly produced by internal combustion engines (vehicles) and sometimes by the decomposition of organic matter. It can cause workers to be disoriented and can cause death. Carbon monoxide has about the same density as air and has an 8-hour exposure limit of **25 ppm** and a 15-min exposure limit of **100 ppm**.

Hydrogen Sulphide (H₂S)

Hydrogen sulphide is a gas that is produced by the decomposition of organic matter. It can be found in sewage systems, but also in stagnant areas in storm drains. It smells like rotten eggs, but even low levels of hydrogen sulphide can paralyze the sense of smell. Hydrogen sulphide can be fatal at very low levels. This gas is heavier than air and will collect in low areas, but it can be moved by strong air currents and so may be at the top of the space as well. In BC, Hydrogen sulphide has a Short-Term Exposure Limit of 10ppm. In Alberta, Hydrogen Sulphide has an 8-hour exposure limit of 10ppm, and a ceiling limit of 15ppm. **WSN has adopted the stricter BC allowances for all projects, workers must not be exposed to a concentration of H₂S exceeding 10 ppm at any time.**

7.3 Ventilation

Every confined space will be continuously ventilated while workers are inside. Two forms of ventilation may be used:

- Forced, mechanical ventilation; or
- Natural ventilation.

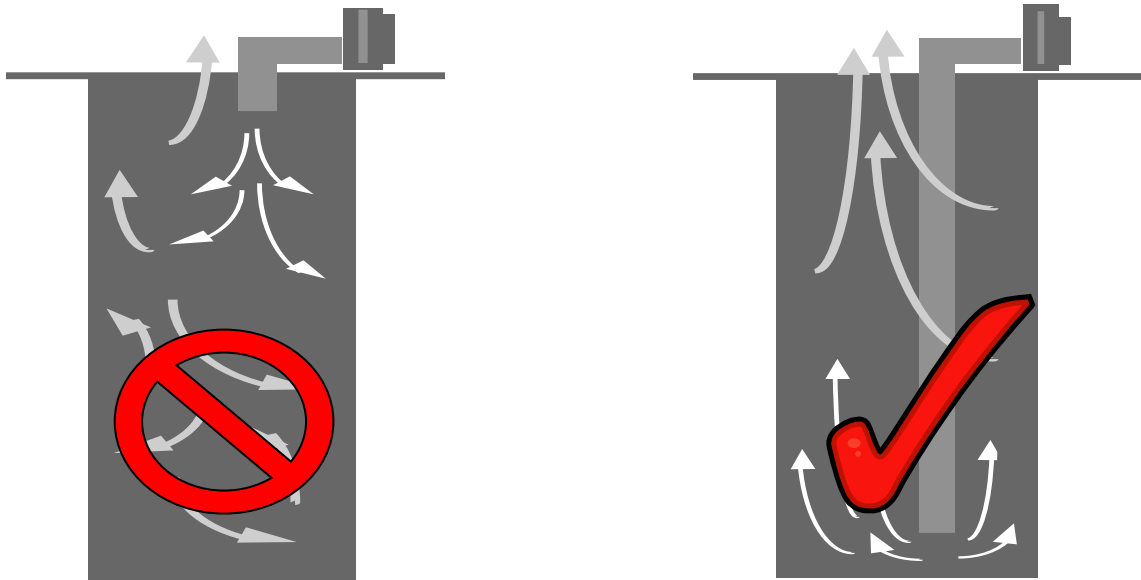
In most cases forced mechanical ventilation is required; however, natural ventilation may be relied upon for low hazard atmosphere confined spaces as long as all of the following conditions apply:

- The workers in the confined space continuously monitor the atmosphere and it is shown to contain clean respirable air.
- The internal volume of the space is greater than 1.8 m³ (64 ft³) per occupant and the workers will be in the space for 15 minutes or less; and
- The work that they are going to do does not generate any contaminants.

When forced, mechanical ventilation is required, a minimum of 85 m³/hr (50 cfm) of clean, respirable air must be provided for each worker in the confined space.

Specific ventilation requirements/procedures will be detailed in the Hazard Assessments and Entry Procedures.

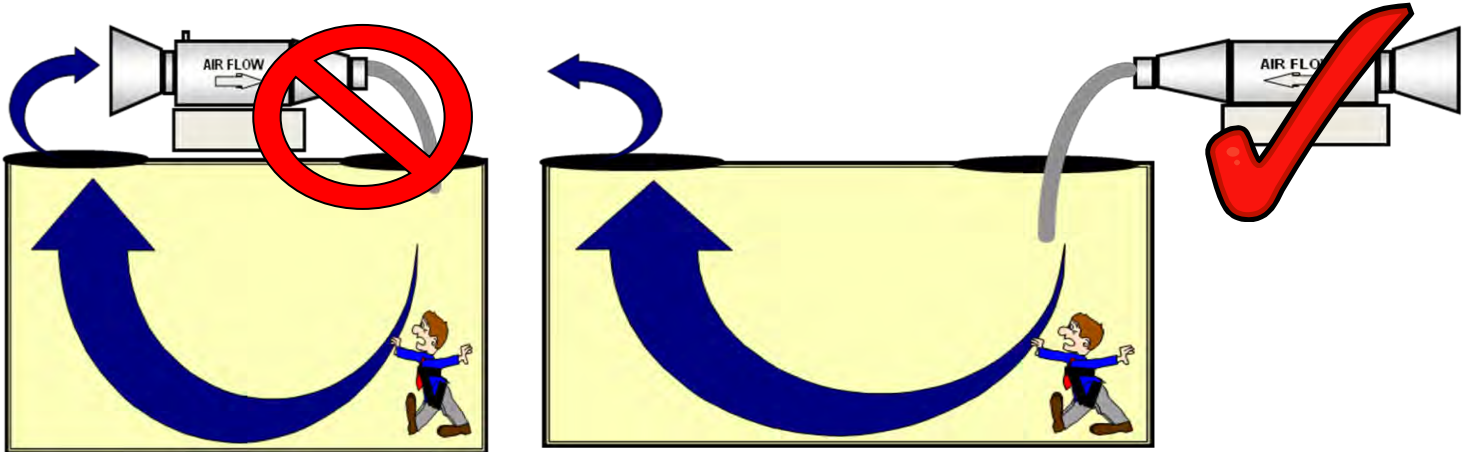
The intake for the ventilation system must be situated in area where clean, respirable air can be assured for the duration of the entry activity. The exhaust end of the ventilation ducting should be located such that the ventilation system will adequately ventilate every occupied area within the space. It may be necessary to relocate or adjust the layout of the ventilation ducting as the work position changes inside the space.



In the event of a failure of the ventilation system, **VACATE THE CONFINED SPACE IMMEDIATELY**. Repair or replace the ventilation system, complete the pre-entry and entry procedures, complete atmospheric testing and resume the confined space entry.

Look for obstructions within the space that could result in pockets of dead air and affect airflow.

Short-circuiting of the airflow can occur because piping has not been used to ensure that air intakes are not too close to air outlets.



Air contaminants, such as welding fumes, produced by the work activities inside the space must be controlled at the source by a local exhaust ventilation (LEV) system if practicable. The exhaust point for the LEV must be positioned well away from the intake for the ventilation air. Typical airflow for LEV systems should be about 100-200 cfm with the exhaust hood less than six inches away from the source.

When activities such as spray painting occur inside a confined space, the ventilation rate must be great enough to ensure that the permissible concentration of the chemicals listed in the Material Safety Data Sheet, is not exceeded. As well, the ventilation rate must be great enough to ensure that flammability limits are not exceeded if there is a component to the paint or chemical that is explosive.

7.4 Cleaning, Purging and Venting

Whenever possible, the Confined Space Entry Supervisor will ensure that a confined space requiring entry by workers contains clean respirable air. If the confined space does not contain clean respirable air, cleaning, purging, or venting will be used to control the hazardous atmosphere.

Purging residual gases in the space may precede cleaning of residual materials within the space. Purging is the removal of a dangerous atmosphere in a confined space by a fluid such as water or non-flammable gas such as nitrogen or carbon dioxide. Prior to entry, the purge gas will be displaced with ventilation, and the atmosphere will be tested to ensure that clean respirable air exists.

8.0 STANDBY PERSON

When a worker enters a confined space, another worker must be assigned as a Standby Person to monitor the well-being of the entrant(s).

At all times, a continuous means of communication must be maintained between the Standby Person and the entrant(s) of the space for the summoning of assistance in case of emergency. Means of communication may include radio, whistle, air horn or other effective means.

In all cases, the Standby Person must remain on site and periodically check the well-being of the entrant(s). The level of diligence required by the Standby Person varies depending on the atmospheric hazard level of the space and the nature of the planned work tasks.

Standby Person requirements are outlined in the **Confined Space Hazard Assessment and Entry Procedure** for each of the spaces that WSN personnel may enter.

- Complete the “Confined Space Entry Permit & Atmospheric Monitoring and Entrants Log” (*Refer to Figure 13*) on page 126.

8.1 Low Hazard Atmosphere Standby Person Requirements

In a confined space with a low hazard atmosphere, there must be continuous means for the entrant to summon the Standby Person. The Standby Person must check on the well-being of workers inside the space at least every 20 minutes and the Standby Person must have a means to immediately summon rescue personnel.

8.2 Moderate Hazard Atmosphere Standby Person Requirements

In a confined space with a moderate hazard atmosphere, the Standby Person must be stationed at or near the entrance to the space. There must be a continuous means of summoning the Standby Person. The Standby Person must visually observe or otherwise check the well-being of the workers inside the space at least every 5 minutes or more often if required. The Standby Person must have a means to immediately summon rescue personnel.

8.3 High Hazard Atmosphere Standby Person Requirements

In a confined space with a high hazard atmosphere, or potential for engulfment or entrapment, the Standby Person must be stationed at the entrance to the space. There must be a continuous means of summoning the Standby Person. The Standby Person must continuously monitor the well-being of the workers in the space. The Standby Person will be equipped and capable of immediately commencing the rescue of the workers in the space.

9.0 PERSONAL PROTECTIVE EQUIPMENT

Workers who enter confined spaces to perform work must wear personal protective equipment (PPE) and clothing deemed necessary to protect them against confined space hazards and the hazards of the work.

PPE and protective clothing requirements are outlined in the **Confined Space Hazard Assessment** and **Entry Procedure** for each of the spaces that WSN personnel may enter.

It is the responsibility of the Confined Space Entry Supervisor to ensure that workers are supplied with the necessary PPE and protective clothing and have received the necessary training. Subsequent to such, it is the responsibility of the worker to wear the necessary PPE and protective clothing when needed.

Typical PPE and protective clothing that may be required to be worn during confined space entry activities includes, but is not limited to:

- Hardhat or other protective headgear,
- Respiratory protection,
- Protective eyewear (safety glasses, goggles, face shields, etc...)
- Protective footwear,
- High visibility apparel,
- Gloves,
- Wet weather gear,
- Disposable or impervious clothing, and
- Hearing protection.

In addition to PPE and protective clothing, workers who enter a confined space may also wear a full-body harness for extraction in case of confined space emergency. In some cases, the harness must be attached to a lifeline and retrieval system prior to entry. Refer to the **Entry Procedure** for more information.

10.0 OTHER CONFINED SPACE ENTRY RULES

- Keep only the necessary tools and equipment required for the planned work at the entrance to the space to prevent anything from falling into the space.
- When it is not possible/practical to eliminate a flammable/explosive atmosphere through another means, the confined space will be inerted. If/when a confined space is inerted, WSN will ensure that: (1) every worker is equipped with supplied air respiratory protection equipment, (2) all ignition sources have been controlled and (3) the atmosphere within the confined space stays inerted while workers are in the space.
- Where a flammable/explosive atmosphere may be present and lighting or other electrical devices are required, this equipment must be intrinsically safe and approved for the use in the hazardous environment (*i.e. explosion proof lighting*).
- Non-sparking tools must be used in a confined space where flammable or combustible hazards are present.
- Compressed gas cylinders (oxygen, acetylene, or other gases) are not permitted inside a confined space (fire extinguishers and compressed breathing air cylinders are the only exceptions). If hoses supplying compressed gas (*i.e., oxyacetylene*) are taken into the confined space, they must be removed whenever the space is vacated.

WHENEVER THERE IS ANY DOUBT ABOUT THE SAFETY OF ANY PLANNED CONFINED SPACE ENTRY, DO NOT ENTER THE SPACE. NOTIFY THE CONFINED SPACE ENTRY SUPERVISOR AND/OR THE PROGRAM ADMINISTRATOR WHO WILL INVESTIGATE THE CONCERN AND ENSURE THAT ANY NECESSARY PRECAUTIONS ARE IMPLEMENTED.

11.0 RESCUE

Prior to engaging in confined space entry activities, WSN will ensure that emergency rescue procedures are in place and understood, and that necessary rescue equipment and personnel are readily available. While WSN will not normally be responsible for confined space rescue services (*i.e., WSN's clients generally maintain Emergency Response Teams for this purpose*), WSN will ensure that client's Emergency Response team are (among other items) adequately trained, equipped (and rescue equipment inspected) and staffed to respond to a confined space entry emergency, and that WSN's employees are versed on their specific confined space rescue related responsibilities (and limitations).

Regardless as to whom (*i.e., Client, WSN or Specialized Contractor*) will be providing confined space rescue services, WSN will ensure a written rescue plan is in place prior to confined space entry activities commencing.

The rescue plan must consider/detail:

- "Self Rescue" Options (*i.e., expectation for personnel to vacate the confined space immediately when/if conditions change (i.e., unfamiliar/new odours are detected, power/lighting failures, ventilation system failures, etc...), when directed by the standby person*), and
- "Assisted Rescue" Options (*i.e., how to activate emergency alarms/ERT personnel, how to use*

available emergency rescue equipment (i.e., lifelines, lifting apparatus, etc...), how to assist ERT personnel (i.e., clearing area around confined space entrance, etc...)

12.0 ANNUAL PROGRAM REVIEW

This program must be reviewed annually, or more frequently as required, to ensure that it remains effective at addressing and controlling identified confined space hazards. The Program Administrator will coordinate the annual review of the Confined Space Entry Program. NOTE: *This review may be completed in conjunction with the annual OHS Program Review.*

13.0 DEFINITIONS

Bump Test: means applying calibration gas across the sensors of an atmospheric monitor to ensure that the monitor's display corresponds to the known concentrations of constituents in the calibration gas.

Calibration: means adjusting the accuracy an atmospheric monitor to a calibration gas with known concentrations.

Clean Respirable Air: when used to describe the atmosphere inside a confined space, means an atmosphere which is equivalent to clean, outdoor air and which contains

- a) About 20.9% oxygen by volume,
- b) No measurable flammable gas or vapour as determined using a combustible gas measuring instrument, and
- c) No air contaminant in concentrations exceeding either 10% of its applicable exposure limit in Part 5 (Chemical and Biological Substances) or an acceptable ambient air quality standard established by an authority having jurisdiction over environmental air standards, whichever is greater

Confined Space: means an area, other than an underground working, that

- a) Is enclosed or partially enclosed,
- b) Is not designed or intended for continuous human occupancy,
- c) Has limited or restricted means for entry or exit that may complicate the provision of first aid, evacuation, rescue, or other emergency response service, and
- d) Is large enough and so configured that a worker could enter to perform assigned work

High Hazard Atmosphere: means an atmosphere that may expose a worker to risk of death, incapacitation, injury, acute illness or otherwise impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.

Local Exhaust Ventilation (LEV): means a type of ventilation system designed to capture and remove an emitted contaminant at or near its source before the contaminant has a chance to disperse into the workplace air.

Low Hazard Atmosphere: means an atmosphere which is shown by pre-entry testing or otherwise known to contain clean respirable air immediately prior to entry to a confined space and which is not likely to change during the work activity, as determined by a qualified person

after consideration of the design, construction and use of the confined space, the work activities to be performed, and all engineering controls required by this Regulation.

Moderate Hazard Atmosphere: means an atmosphere that is not clean respirable air but is not likely to impair the ability of the worker to escape unaided from a confined space, in the event of a failure of the ventilation system or respirator.

Qualified Person: for the purposes of determining qualifications required to perform hazard assessments means:

A certified industrial hygienist (CIH) or registered occupational hygienist (ROH), certified safety professional (CSP), Canadian registered safety professional (CRSP) or professional engineer (P. Eng.), provided that the holder of these qualifications has experience in the practice of occupational hygiene as it relates to confined space entry, or other combination of education, training, and experience acceptable to the WCB.

Regular Communication: means that the Standby Person(s) check the well-being of the confined space entrants based on the following criteria:

- **Low Hazard Atmosphere:** The Standby Person does not have to be located at or near the entrance to the space if there is a "continuous means of summoning the Standby Person". However, the Standby Person cannot be located inside the confined space. The Standby Person must check on the well-being of the worker inside the confined space every 20 minutes or more frequently if required by the Entry Procedures.
- **Moderate Hazard Atmosphere:** The Standby Person is required to be located at or near the entrance of the confined space. At least every 20 minutes, the standby must visually observe or otherwise check the well-being of the workers in the space. The standby can have other duties if they do not interfere with the Standby Person remaining at or near the entrance to the space or interfere with the checking of workers in the space.
- **High Hazard Atmosphere:** The Standby Person is required to be stationed at the entrance to the space and must be dedicated to the task of monitoring the workers in the space. The Standby Person cannot have other duties.

Confined Space Entry Permit

Figure 13: Confined Space Entry Permit & Atmospheric Monitoring and Entrants Log

Appendix - 3: Respiratory Protection Program

1.0 INTRODUCTION AND SCOPE

Although elimination or reduction of respiratory hazards through substitution or engineering controls is preferred, there are instances in which WSN employees require the use of appropriate respiratory protection for work, which involves exposure to potentially hazardous environments, such as airborne contaminants (dusts, fumes, mists, gases, vapours, aerosols, airborne pathogens) or oxygen-deficiency. The Canadian Standards Association (CSA) Standard Z94.4-02 (*Selection, Use and Care of Respirators*) requires a written respiratory protection program to be in place where respiratory protection is used to protect workers from inhaling hazardous atmospheres. The basic elements of the Respiratory Protection Program are:

1. Education of employees on airborne hazards in the workplace,
2. Selection of appropriate respirators,
3. Provision of respirator fit testing,
4. Provision of training in the proper use of respiratory protection,
5. Provision of appropriate procedures for cleaning, inspecting, and storing respirators,
6. Provision of medical surveillance for workers using respiratory protection,
7. Provision for evaluating the effectiveness of this program,
8. Maintenance of training, fit testing, and medical surveillance records, and
9. Control and monitoring of external contractors performing work in environments that require the use of respiratory protection

1.1 Objective

It is the objective of this program to adequately protect the health of all workers coming into contact with hazardous atmospheres, where there is no possibility of implementing engineering or work practice controls. In addition, this program is meant to increase the awareness of respiratory hazards in the workplace and to inform employees of means available to protect themselves and others from those hazards.

1.2 Scope

This program applies to any worker who may be exposed to respiratory hazards during the course of work at WSN.

2.0 DEFINITIONS

- **Accepted Respirator** – a respirator tested and certified by procedures established by the National Institute for Occupational Safety and Health (NIOSH).
- **Air-Purifying Respirator** – a respirator with an air-purifying filter, cartridge, or canister that removes specific contaminants by passing ambient air through the air-purifying element.
- **Atmosphere-Supplying Respirator** – a respirator that supplies the respirator user with breathing air/gas from a source independent of the ambient atmosphere.
- **Fit Test** – the use of qualitative or quantitative method to evaluate the fit of a specific make, model, and size of a respirator on an individual.
- **Hazardous Atmosphere** – any atmosphere that is oxygen-deficient, exceeds occupational exposure limits, presents a fire/explosion hazard, and/or contains an airborne toxic or disease-producing contaminant in concentrations deemed to be hazardous.
- **Health Care Professional** – an individual who is licensed by a provincial licensing authority or equivalent to practice medicine or nursing and who possesses relevant experience and knowledge in the field of occupational health and safety.
- **Immediately Dangerous to Life and Health Atmosphere (IDLH)** – an atmosphere that poses an immediate threat to life, would cause adverse health effects, or would impair an individual's ability to escape.
- **Qualified Person** – an individual who possesses the knowledge, experience, and training to fulfil the competencies of the roles defined in this Program.
- **Quantitative Fit Test** – a test method that uses an instrument to assess the amount of leakage into the respirator in order to assess the adequacy of respirator fit.
- **Qualitative Fit Test** – a pass/fail test method that relies on the subject's sensory response to detect a challenge agent in order to assess the adequacy of respirator fit.
- **Respirator** – a device to protect the user from inhaling a hazardous atmosphere.
- **Service Life** – the period of time during which a respirator provides adequate protection to the user.
- **User Seal Check** – an action conducted by the respirator user to determine if the respirator is properly sealed to the face.
- **Tight-Fitting Facepiece** – a respirator inlet covering that forms a complete seal with the face. This includes a half-facepiece that covers the user's nose and mouth under the chin; and a full-facepiece that covers the user's nose, eyes, and mouth under the chin.

3.0 RESPONSIBILITIES

3.1 WSN Management/Supervisors and All Others in Authority

WSN Management/supervisors and all others in authority shall:

- Identify situations where respirators are required,
- Conduct, in consultation with the site safety officers, other knowledgeable specialists (i.e. occupational hygienists, etc...), assessments for respiratory hazards,
- Determine (using the Respirator Standard or in conjunction with the site safety officer/other knowledgeable specialist) the type of respiratory protection required for the specific respiratory hazard,
- Provide workers with appropriate respiratory protection,
- Ensure that health screening, training and fit testing of workers are completed prior to assigning workers a task that requires a respirator,
- Ensure that workers use the respirators in accordance with the instructions and the training received,
- Ensure that the workers use only those respirators for which they have been qualified,
- Ensure respirators are cleaned, sanitized, inspected, maintained, repaired, and stored in accordance with training and manufacturer's recommendations,
- In case of a tight-fitting facepiece, ensure that respirator users are clean-shaven and do not have any object or material that would interfere with the seal or operation of the respirator,
- Notify WSN management and/or the site safety officer of respirator users' concerns, changes in processes, equipment, or operating procedures that have impact on environmental conditions, and respiratory protection requirements,
- Notify WSN Management and/or the site safety officer of the incidents where the use of a respirator may have prevented or contributed to an accident or injury,
- Provide details of the type of respirator selected and the anticipated working conditions to the health care professional conducting the medical assessment of a respirator user and,
- Ensure that workers wear appropriate respiratory protection at all times in respiratory hazard areas,
- Developing and administering the Respiratory Protection Program,
- Providing technical advice and recommendations regarding assessments for respiratory hazards (*NOTE: Such is generally accomplished with the assistance of an external specialist, such as occupational hygienist*),
- Assisting supervisors in determining the type of respiratory protection required for the specific respiratory hazard(s),
- Providing training and education,
- Fit testing,
- Evaluating of Respiratory Protection Program effectiveness,
- Ensuring that procedures for health surveillance are established,
- Updating the program to maintain consistency with regulatory criteria and consensus standards,
- Creating and maintaining training and fit testing records,
- Determine what tests, evaluations, etc.... are necessary to make the determination whether an employee is medically fit to wear respiratory protection equipment, and
- Maintain medical records

3.2 Workers (Respirator Users)

Workers (Respirators Users) shall:

- Inspect the respirator prior to each use in accordance with the training received,
- Wear appropriate respiratory protection at all times when performing tasks or working in an area where respiratory hazards exist,
- Clean, maintain and store the respirators in accordance with the training received and the manufacturer's instructions,
- Perform negative and positive pressure check after each donning of a tight-fitting respirator,
- Report any damage or malfunction of the respirator to their supervisor,
- Report to their supervisor or other person in authority any condition or change that may impact on their ability to use a respirator safely,
- When using a tight-fitting facepiece respirator, be clean shaven and ensure that no object or material interferes with the seal or operation of the respirator,
- Use the respirator in accordance with the written instructions and training received

4.0 HAZARD ASSESSMENT

In order to determine the presence of a respiratory hazard and to assist in selection of an appropriate respirator, a hazard assessment of the work area shall be conducted by the supervisor/manager (in consultation with specialists as required). The hazard assessment of a respiratory hazard includes the following:

- Identification of contaminants (chemical, biological) that may be present in the workplace,
- Identification of physical states of all airborne contaminants,
- Determination of the likelihood of inhalation of the contaminants,
- Measurement or estimation of the concentration of the contaminants,
- Determination of oxygen level (potential oxygen deficiency),
- Identification of appropriate occupational exposure limit for each airborne contaminant,
- Determination of whether the atmosphere is immediately dangerous to life and health (IDLH),
- Determination of existence of adequate warning properties, and
- Determination of skin or eye absorption and irritation characteristics

In instances where exposure cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH.

5.0 SELECTION OF RESPIRATORS

- 5.1 Respirators shall be selected based on the following criteria:
- Health of the worker and ability to wear a respirator,
 - Review of the hazard assessment,
 - Existing legislation and standards,
 - Work requirements and conditions,
 - Duration of exposure,
 - Characteristics and limitations of respirators,
 - Respirator assigned protection factors (Appendix D)
- 5.2 Only NIOSH approved respirators shall be selected and used.
- 5.3 Respirators shall be selected by supervisors/managers (in consultation with specialists as required).
- 5.4 Respirator Selection Chart (Appendix B) can be used to assist in the selection of an appropriate respirator.
- 5.5 Workers shall be issued only those respirators for which they have been fit tested and medically approved.
- 5.6 For air-purifying respirators for gases and vapours with no end-of-service- life indicator, the supervisor shall establish a change-out schedule for the replacement of the cartridges.
- 5.7 Where an IDLH atmosphere is identified, only pressure-demand self-contained breathing apparatus (SCBA) or a combination pressure-demand supplied air respirator with auxiliary self-contained air supply, with a minimum rated service time of 15 minutes shall be used.
- 5.8 Respirators approved for escape only shall not be used for non-emergency applications.
- 5.9 Atmosphere-supplying respirators that make use of compressed air for breathing shall meet the standards set out in Table 1 of CSA Standard Z180.1-00, Compressed Breathing Air and Systems (March 2000).
- 5.10 Atmosphere-supplying respirators that make use of ambient breathing air system shall have the air intake located in accordance with Appendix B of CSA Standard Z180.1-00, Compressed Breathing Air and Systems (March 2000).

6.0 RESPIRATOR FIT TESTING

- 6.1 The workers must pass an appropriate quantitative or qualitative fit test when using a respirator with a tight-fitting face piece.
- 6.2 The fit testing shall be conducted by site supervisor and/or site safety officer.
- 6.3 A fit test shall be carried out:
- a) Prior to initial use of a tight-fitting respirator
 - b) Every year
 - c) Whenever there is a change in respirator facepiece (make, model, or size)
 - d) Whenever the employee reports, or the health care professional, supervisor, or EHS makes visual observations of changes in the employee's physical condition that could affect respirator fit. Such conditions include, but not limited to:
 - facial scarring
 - dental changes
 - cosmetic surgery
 - obvious change in body weight
 - facial rash (dermatological condition)
- 6.4 The worker shall be fit tested with the same make, model, style, and size of respirator to be used.
- 6.5 The fit test shall be performed only on workers who are clean-shaven where the facepiece seals to the skin.
- 6.6 When a worker is required to wear other personal protective equipment, such as eye, face, head, and hearing protection during his/her course of work, the same protective equipment shall be worn during the fit test to ensure that they are compatible with the respirator and do not break the facial seal.

7.0 TRAINING

- 7.1 All workers whose work requires the use of a respirator shall receive appropriate training and education.
- 7.2 The workers shall receive training prior to the initial use of the respirator.
- 7.3 Training shall be provided by WSN Management/Supervision.
- 7.4 The training shall include the following:
- Why respiratory protection is necessary,
 - The limitations and capabilities of respiratory equipment,
 - Respiratory hazard assessment,
 - Logic for selecting a particular type of respirator,
 - How to inspect, put on and remove a respirator, and how to perform user seals checks,
 - Procedures for maintenance and storage of respiratory equipment,
 - How to recognize medical signs and symptoms that may limit or prevent the effective use of the respirator, and
 - General requirements of the Respiratory Protection Program

- 7.5 Refresher training shall be provided every year to all respirator users.
- 7.6 Records of the training shall be updated and maintained by WSN Management.
- 7.7 Training in the use of self-contained breathing apparatus (SCBA), if required, shall be provided by a qualified external trainer.

8.0 USE OF RESPIRATORS

- 8.1 Prior to being assigned any task that requires the use of a respirator, the worker shall complete all the health screening, fit testing, and training requirements.
- 8.2 Workers with facial hair that may interfere with the facepiece seal or valve function on tight-fitting respirators cannot use a tight-fitting respirator.
- 8.3 Other personal protective devices or equipment shall not interfere with the seal of the facepiece to the face of the worker.
- 8.4 Side arms on eyeglasses or any other material such as hair, cloth, tissue, straps, and jewellery shall not pass between the face and the sealing surface of the facepiece or interfere with the seal of the tight-fitting facepiece to the face or with the operation of the respirator. Workers, who must have corrective eyewear, where the eyewear interferes with the respirator seal, shall be provided with respirator spectacle kits.
- 8.5 The worker shall check the seal of the facepiece immediately after putting on the respirator.
- 8.6 The worker should never break the respirator face-to-facepiece seal to communicate.
- 8.7 Workers shall not remove their facepieces at any time while working in an IDLH atmosphere.
- 8.8 Workers shall be permitted to leave the hazardous area for any respirator related reason. The worker shall leave the hazardous area when:
 - The respirator fails to provide adequate protection,
 - The respirator malfunctions,
 - He/she detects air leakage around the face seal,
 - He/she detects an odour or tastes a chemical,
 - He/she has increased breathing resistance,
 - He/she experiences any illnesses or discomforts such as dizziness, nausea, weakness, breathing difficulties, sneezing, fever, chills, confusion, etc....,
 - He/she experiences extreme discomfort from wearing the respirator,
 - He/she needs to wash his/her face and facepiece to minimize skin irritation, and
 - Components (including air tanks) or purifying devices need change-out
- 8.9 The respirator shall not be altered in any manner.
- 8.10 All cartridges, replacement parts, etc.... shall be from the same manufacturer as the respirator (*i.e., use only NORTH cartridges and parts for a NORTH respirator*).

9.0 CLEANING, INSPECTION, MAINTENANCE, AND STORAGE OF RESPIRATORS

- 9.1 WSN shall provide each worker requiring a respirator with a respirator that is clean, sanitary and in good working order.
- 9.2 Each worker issued a respirator shall properly maintain his/her respirator to retain its original effectiveness. The maintenance shall include:
- Cleaning and sanitizing,
 - Inspection and testing, and
 - Proper storage
- 9.3 The respirator shall be cleaned and sanitized according to the respirator manufacturer's instructions and/or according to procedures found in Appendix D – Procedures for Respirator Maintenance.
- 9.4 The frequency of cleaning shall depend on how many workers use the respirator and what it is used for:
- Respirators issued to individual workers shall be cleaned and disinfected as often as necessary to maintain proper hygiene,
 - A single respirator issued to multiple workers must be cleaned and disinfected before each use, and
 - Respirators designated for emergency use only must be cleaned and disinfected after each use
- 9.5 The worker shall inspect his/her respirator before and after each use. The procedure for respirator inspection is found in Appendix D – Procedures for Respirator Maintenance.
- 9.6 The SCBA cylinders shall be inspected by a qualified person according to the requirements of CSA Standards CAN/CSA-B339 and CAN/CSAB-340, the appropriate CGA publications C-6, C-6.1, and C-6.2 the Transport Canada Regulations under the Transportation of Dangerous Goods Act, and the manufacturer's instructions.
- 9.7 The worker shall report defective or non-functioning respirators to his/her supervisor. These respirators shall be tagged and removed from service by the supervisor until repaired or replaced.
- 9.8 Any respirator and cylinder repairs, and subsequent tests and checks shall be performed by the unit manufacturer or by a qualified external contractor. Defective or non-functioning half mask facepieces shall not be repaired but will be disposed and replaced instead.
- 9.9 The worker shall store their respirators in a clean and sanitary location, in boxes or in plastic bags, marked with each worker's name. The respirators shall be stored in a manner that will protect them from dust, ozone, sunlight, heat, extreme cold, excessive moisture, vermin, damaging chemicals, oils, greases, or any other potential hazard that may have a detrimental effect on the respirator.
- 9.10 When packed or stored, each respirator should be positioned to retain its natural configuration.

- 9.11 Used cartridges/filters to be reused shall be stored in a manner to prevent contamination of the respirator facepiece.

10.0 MEDICAL SURVEILLANCE

- 10.1 Prior to fit testing and respirator use, it shall be confirmed that the worker is free from any physiological or psychological condition that may prevent him or her from being assigned the use of the selected respirator. This shall be achieved through the use of the Respirator User Screening Form.
- 10.2 The worker and his/her supervisor shall complete their respective parts of the Respirator User Screening Form and send the form to the responsible manager for review.
- 10.3 Where, based on the Respirator User Screening Form, the responsible manager is concerned that a physiological or psychological condition exists that may preclude the use of a respirator; the responsible manager shall refer the worker for a medical evaluation.
- 10.4 As part of the medical evaluation, the Occupational Health Physician shall provide WSN Management with a written opinion regarding the employee's ability to use a respirator. The opinion shall indicate one of the following:
- User meets medical requirements to use the selected respirator,
 - User meets medical requirements to use the selected respirator with limitations, or
 - User does not meet medical requirements to use the selected respirator
- 10.5 The re-evaluation of the worker shall not be performed on an annual basis. The re-evaluation shall be performed based on one of the following criteria:
- The worker reports signs or symptoms that are relevant to the worker's ability to use a respirator,
 - The Occupational Health Physician or supervisor considers it necessary for the worker to be re-evaluated, or
 - A change in workplace conditions occurs that may result in substantial increase in the physiological burden that respirator use places on the worker
- 10.8 Workers who do not meet medical requirements to use a selected respirator shall not work in an area where the use of a respirator is required.

11.0 PROGRAM EVALUATION

- 11.1 The Respiratory Protection Program shall be reviewed annually,
NOTE: *This review may be completed in conjunction with the annual OHS Program Review.*
- 11.2 The review of the program shall include:
- A review of program elements against regulatory requirements,
 - A review of definitions of roles and responsibilities,
 - A review of documented program procedures,
 - Examination of records to verify that documented procedures are being followed,
 - Confirmation that workplace practices comply with program requirements,
 - Documentation of performance problems and subsequent resolution or corrective action plans,

- Stakeholder input to verify worker acceptance (comfort, ease of breathing, fatigue, vision, mobility, job interference, utility),
- Proper selection and use of respirators,
- Effective training of all stakeholders,
- Proper inspection of respirators,
- Proper storage and maintenance of respirators, and
- Information derived from the medical monitoring performed, where available

12.0 RECORDKEEPING

12.1 WSN Management/Supervision shall maintain records of the following:

- Training for workers and supervisors related to the Respiratory Protection Program,
- Task Specific Respirator Selection Assessment,
- Fit Testing (*including name and identification of the worker tested, type of test performed, make, model and size of the respirator fitted, date of the fit test, result of the fit test, and name of the person conducting the fit test*),
- Program Evaluations, and
- Medical evaluation results. (NOTE: *These records shall be treated as confidential*)

RESPIRATORY PROTECTION PROGRAM - APPENDIX A

Classification and Description of Respirators by Mode of Operation

1) Air-Purifying Respirators

Air-purifying respirators can be used to protect against airborne contaminants such as dusts, mists, fumes, smokes, aerosols, gases and vapours. **Since these respirators are air-purifying only, this type of respiratory protection must NEVER be used in oxygen-deficient atmospheres or situations that are immediately dangerous to life and health (IDLH).**

The general categories of air-purifying respirators are:

- a) **Particulate (dust, fume and mist)**
- b) **Gas and Vapour**
- c) **Combination of Particulate and Gas/Vapour**

The air-purifying respirators are available in two modes of operation: 1) Non-powered and 2) Powered. The non-powered respirators come in two designs: 1) half mask and 2) full facepiece. The powered respirators contain a blower and are equipped with a facepiece, helmet or hood.

2) Atmosphere-Supplying Respirators

a) Supplied Air Respirators

The supplied air respirator consists of a half-mask, full facepiece, hood or helmet to which respirable air is supplied through a small diameter hose. Two types of flow may be used: 1) continuous-flow to the mask in which the flow maintains the mask under positive pressure at moderate work rates; and 2) pressure-demand, which keeps the mask under positive pressure at moderately high work rates but limits the air quantity used to that required for breathing. Demand airflow, which allows the pressure inside the mask to become negative during inhalation, is not recommended because it does

not provide as much protection. The respirable supplied air comes from A) a compressor or B) compressed air cylinder(s).

Supplied air respirators may be used in IDLH or oxygen-deficient atmospheres only if an auxiliary tank of air is incorporated into the respirator system.

b) Self-Contained Breathing Apparatus (SCBA)

SCBAs comprise of a full facepiece connected to a source of air carried by the wearer. The SCBAs provide respiratory protection in oxygen-deficient environments and in situations where high or unknown concentrations of toxic gases, vapours or particulates are present. The SCBA can also provide protection in emergency situations. When using an SCBA, the user's respiratory system is isolated from the surrounding atmosphere because no outside air is admitted into the respirator facepiece. There are three types: 1) open-circuit devices; 2) closed-circuit (re-breathing) devices; and 3) escape units. Two types of flow are available: 1) pressure demand and 2) demand. The demand SCBAs must not be used in oxygen-deficient atmospheres or IDLH atmospheres because they allow the pressure inside the facepiece to become negative.

3) Combination Atmosphere-Supplying and Air-Purifying Respirators

These devices usually consist of an atmosphere-supplying respirator with an auxiliary air-purifying attachment that provides protection in the event that the air supply fails. A combination atmosphere-supplying respirator with an auxiliary air-purifying element may be used only when the concentration of airborne contaminants in the workplace does not exceed the maximum use concentration of the respirator when used in the air-purifying mode.

RESPIRATORY PROTECTION PROGRAM - APPENDIX B

RESPIRATOR SELECTION CHART



RESPIRATORY PROTECTION PROGRAM - APPENDIX C

Assigned Protection Factors (APF)

Respirator type	Protection Factor
Air purifying	
Half facepiece, non-powered	10
Full facepiece, non-powered	50
Full facepiece, powered (PAPR), equipped with HEPA filters for exposure to asbestos	100
Full facepiece, powered (PAPR), equipped with HEPA filters and/or sorbent cartridge or canister for exposure to contaminants other than asbestos	1 000
Loose-fitting facepiece, powered (PAPR)	25
Air supplying	
Airline - demand (negative pressure)	
Half facepiece	10
Full facepiece	50
Airline - continuous flow	
Loose-fitting facepiece/hoods	25
Half facepiece	50
Full facepiece	1 000
Helmet/hood	1 000
Airline - pressure demand (positive pressure)	
Half facepiece	50
Full facepiece	1 000
Full facepiece, with egress bottle	10 000
Self-contained breathing apparatus (SCBA)	
Demand (negative pressure)	50
Pressure demand (positive pressure)	10 000
Other factors such as warning properties, IDLH levels, and cartridge/canister limitations must also be taken into account when determining the maximum use concentration. Refer to the manufacturer's instructions and standards acceptable to the Board for further information.	

RESPIRATORY PROTECTION PROGRAM - APPENDIX D

Procedures for Respirator Maintenance

The principal aspects of respirator care include cleaning/disinfecting, inspection, storage, and repair.

A. Cleaning and Disinfecting

- 1) Remove filters, cartridges, or canisters. Disassemble facepiece. Discard or repair any defective parts.
- 2) Wash components in warm (43°C maximum) water with mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle brush may be used to remove any dirt.
- 3) Rinse components thoroughly in clean, warm, preferably running water. Drain.
- 4) When the cleaner used to clean the respirator does not contain a disinfecting agent, respirator components should be fully immersed for 2 minutes in one of the following:
 - a) Sodium hypochlorite solution – 1mL of bleach to 1L of water
 - b) Aqueous solution of iodine – 0.8mL of tincture of iodine to 1L of water
 - c) Other commercially available cleaners of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer
- 5) Rinse components thoroughly in clean, warm, preferably running water. Drain.
- 6) Components should be allowed to air dry or be hand dried with a clean, lint free cloth.
- 7) Re-assemble the facepiece, replacing filters, cartridges, and canisters where necessary.

Disinfection (steps 4 & 5) is not required for a respirator used by only one worker. For multiple users, however, the respirator must be cleaned and sanitized before it is transferred to another person for use.

The disinfecting solution must not damage the respirator and must not cause skin irritation to the respirator wearer. Proper rinsing of the respirator is important to ensure that this does not happen.

B. Inspecting

- a) Check the condition of component parts:
 - Check condition of the facepiece, looking for cracks, cuts, tears, holes, and distortion of facepiece,
 - Check head straps to ensure they are properly attached and have elasticity,
 - Check head straps for broken buckles and breaks and tears,
 - Check inhalation and exhalation valves to ensure that they are in place and are not damaged,
 - Check all rubber or flexible parts for cracks and pliability,
 - Check cartridges, canisters, and filters to ensure that they are not spent,
 - Check for cracks or damage to cartridge, filter, or canister,
 - Check the breathing tube (if present) for cracks, holes, missing or loose clamps, and broken or missing end connectors,
 - Check the hood, helmet or, suit (if present) for ripped or torn seams, and for cracks or breaks in the face shield, and

- Check the PAPR assembly (PAPR users only)
- b) Check the tightness of connections between cartridges, filters, and the respirator facepiece.
- c) Check the end-of-service-life indicator (if present).
- d) Check the expiration date on the side of the cartridge, filter, or canister.
- e) Check proper functioning of regulators, alarms, and other warning systems (not required on air purifying respirators).
- e) If using supplied air, check the air quality of the air supply.
- f) All respiratory equipment intended for use in “emergency situations” (*i.e., emergency call out work*) must be inspected on a monthly basis. Such inspections will be the responsibility for Storeroom/Shop personnel.

RESPIRATORY PROTECTION PROGRAM - APPENDIX E

Qualitative Fit Test Procedure

There are several types of qualitative fit tests:

- Odorous chemical types (banana oil) that depend on the wearer's ability to smell the test agent,
- Tests that depend on the wearer's ability to taste the test agent (Bitrex™ and saccharin),
- The irritant smoke test which depends on the wearer's ability to sense irritation of the nose and throat.

For qualitative fit tests that involve the use of test agents such as banana oil, Bitrex™ or saccharin, the chemical is released into a test chamber that fits over the respirator wearer's head. For the irritant smoke test, the irritant smoke is released around the edges of the respirator. While the test is done, the wearer performs actions that simulate movements typically made during work activities such as talking, bending, reaching, nodding, etc... If the wearer detects the test agent, the respirator must be re-adjusted or exchanged and the test repeated until no odours, tastes or irritation are detected. A properly administered qualitative fit test will take about 15 to 20 minutes to perform, assuming a perfect fit during the first attempt.

The specific procedures for conducting these fit tests are described in Appendix B of the CSA Standard.

Irritant Smoke Test

One qualitative fit test is the irritant smoke test. It does not require a special enclosure since the test agent is released around the edges of the respirator. It involves the use of a chemical (stannic chloride or titanium tetrachloride) that reacts with the water in the air to form an acid smoke. The respirator must be fitted with a high efficiency (N100, P100 or R100) particulate cartridge and the wearer's eyes must be protected with appropriate goggles while this test is done. Alternatively, the wearer should keep their eyes closed throughout the complete test. When using lower efficiency respirators, (*i.e.*, N95 style), the irritant smoke test must be performed with the same make, model and size of respirator equipped with high efficiency filters. Otherwise, another type of qualitative fit test must be done.

The tester must ensure that they are protected from the irritant smoke while doing the fit test. The test must be done in a well-ventilated area or outdoors and the tester should stand upwind of the respirator wearer. The tester may need to also wear a respirator and eye protection while conducting the test, if they notice irritation effects from the test agent.

The irritant smoke test procedure is as follows:

1. The wearer dons the respirator along with other protective equipment such as hearing protection, head protection, eye protection, that they will be wearing at the worksite.
2. The wearer performs a negative and positive pressure seal check.
3. The fit tester prepares the irritant smoke tube for the test. This is done by breaking both ends of the glass tube using a tube-breaking tool provided by the manufacturer. A short length of rubber tubing is attached to the outlet end of the tube and the tubing and aspirator bulb provided by the manufacturer is attached to the inlet side. To produce smoke for the test, the aspirator bulb is gently squeezed to force air through the tube.
4. The tester ensures that the respirator wearer is sensitive to the irritant smoke effects and familiar with the distinctive odour of the test agent. Before the fit test is done, the tester generates smoke within one metre of the wearer's face and the wearer then brings a handful of smoke within about 20 cm of their

nose and inhales gently. The results should be an involuntary cough or verbal acknowledgement of the odour of the smoke.

5. The tester releases the irritant smoke around the edges of the mask (from about 50 to 300 mm away), moving around the perimeter of the mask, with particular attention to the areas under the chin and at the bridge of the nose. If the wearer is using a quarter or half face mask, they must keep their eyes closed for this part of the test.
6. The fit tester continues to release smoke around the perimeter of the mask while the wearer does a variety of exercises. These should take about 30 seconds each, be done in the following order and will consist of:
 - normal breathing,
 - deep breathing,
 - turning head from side to side while the wearer inhales,
 - nodding the head up and down while the wearer inhales,
 - talking, and
 - normal breathing
7. The fit test is successful if the wearer does not detect the test agent by odour or coughs.
8. The tester completes the "Respirator Fit Test Form" (*Refer to Figure 14*).

RESPIRATORY PROTECTION PROGRAM - APPENDIX F

Fit Test Form

W.S. Nicholls WESTERN CONSTRUCTION LTD.		
Respirator Fit Test Form		
Name of Worker: _____		
Does the worker wear: ☐ Safety Glasses ☐ Contact Lenses ☐ Dentures		
Fit Test Procedure		
<i>Fit testing must be repeated annually to ensure a proper face seal is maintained.</i>		
Check when completed successfully:		
☐ Correct positioning of respirator and strap adjustment ☐ Positive and negative pressure checks		
 		
Qualitative fit-tested using:		
☐ Irritant Smoke ☐ Banana Oil ☐ Other (specify): _____		
Qualitative fit test result: ☐ Pass ☐ Fail		
Respirator details:		
<i>Fit testing must be conducted for each different make (3M, North, etc.) and model (1/2 mask, full face, etc.) of respirator worn. All the personal protective equipment that would normally be worn with the respirator should be donned during the fit test.</i>		
	Make	Model
1.		Size
2.		
3.		
4.		
Additional Points of Discussion		
<i>The following additional points must be discussed with the worker:</i>		
☐ Respirator Selection ☐ Respirator Limitations ☐ Storage and Maintenance		
☐ Cartridge Dating and Change Frequency ☐ Cartridge Limitations ☐ Replacement Parts/Repairs		
Date of Fit Test: _____ Date of Fit Test Expiry: _____		
Fit Tested by: _____ Workers Signature: _____		

Figure 14: Respirator Fit Test Form

APPENDIX – 4: SAFE WORK PROCEDURES

Assessing Risk

Part of the risk assessment is determining the level of risk associated with a task. The risk is rated as high, medium, and low. The risks that are determined to be most serious should be dealt with first.

Impact	1 = Minor	2 = Moderate	3 = (Major)	4 = Extreme
Probability				
A = Rare	1-A (Low)	2-A (Low)	3-A (Medium)	4-A (Medium)
B = Unlikely	1-B (Low)	2-B (Medium)	3-B (Medium)	4-B (Medium)
C = Moderate	1-C (Medium)	2-C (Medium)	3-C (Medium)	4-C (High)
D = Likely	1-D (Medium)	2-D (Medium)	3-D (High)	4-D (High)
E = Very Likely	1-E (Medium)	2-E (High)	3-E (High)	4-E (High)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property, and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

All W.S. Nicholls employees that are involved in hazard assessment understand this rating system to properly communicate multiple hazards should they be identified.

Critical Job Inventory

A task that has the potential to produce major loss to people, equipment, process, or the environment is considered critical.

Critical Job	Safe Work Procedure Page	Risk Rating
Air Compressor	160	2-B (Medium)
All-Terrain Vehicle (ATV) Use	206	3-C (Medium)
Angle Grinder	216	2-C (Medium)
Bench & Pedestal Grinder	162	2-C (Medium)
Chainsaw	211	3-C (Medium)
Circular Saw	164	3-C (Medium)
Cordless Drill	172	2-C (Medium)
Compound Miter Saw	166	2-C (Medium)
Compresses Gas Regulators	168	2-C (Medium)
Concrete Mixer	170	2-C (Medium)
Extension Ladder	174	2-C (Medium)
Hammer Drill	176	2-C (Medium)
Hand Tools	178-182	2-C (Medium)
Lifting	184	2-D (Medium)
Materials Handling	186	2-C (Medium)
Metal Working Machines	188	2-C (Medium)
Oxygen Cylinder Safety	190	2-C (Medium)
Pipe Removal and Installation	194	3-C (Medium)
Power Washer	192	2-C (Medium)
Rivet Gun	198	2-C (Medium)
Skid Steer	200	2-C (Medium)
Street Sweeper	208	2-C (Medium)
Sure Seal Clamshell Heater	213	2-C (Medium)
Table Saw	202	2-C (Medium)
Tie-in work Hydrocarbon Piping Systems	218	4-C (High)
Titan Additive Injection Skid	221	4-C (High)
Welding Gas Metal Arc Welding	204	3-C (Medium)
Critical Job	Safe Work Process Page	Risk Rating
Asbestos	77	4-A (High)
Compressed Gas Cylinders	78	3-C (Medium)
Confined Space Entry	79	varies
Electrical Safety	80	4-C (High)
Excavating Around Underground Utilities	81	3-C (Medium)
Fall Protection	82	4-C (High)
Flammable & Combustible Liquids	85	3-B (Medium)
Forklifts	86	3-C (Medium)
Hand Signals	88	3-C (Medium)
Loading/Unloading Dump Trucks	98	3-C (Medium)
Lockouts	100	4-C (High)
Pneumatic Tools	103	3-C (Medium)
Rigging, Slings and Hoisting	105	3-C (Medium)
Scissor Lifts & Telescoping Articulating Boom Lifts	110	3-C (Medium)
Silica Exposure	57 - 64	4-C (High)
Trenching, Shoring & Excavations	113	3-C (Medium)

Safe Work Procedure No. WSN-SWP-001 Air Compressor

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-B (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	

Potential Hazards

Unsecured hoses whipping under pressure
Compressed air

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip and trip hazards are present in workplace and walkways
- Check that all fittings and connections are in good condition prior to starting
- Check all fittings are securely connected prior to being pressurized
- Faulty equipment must not be used. Immediately report suspect machinery
- Locate and ensure you are familiar with the operation of the ON/Off starter
- Disconnect power before servicing air compressor

Prohibited Activities

- Do not leave air hose pressurized when unattended

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Make all adjustments with POWER OFF and pressure relieved
3. Start the compressor noting pressure increase and cut-out / cut/in pressure
4. Listen for any leaks from any flexible airlines and immediately report any leaks
5. Adjust pressure regulator to suit work requirements
6. Check the compressor regulator at regular intervals
7. Turn OFF machine
8. Clean work area with Power OFF; ensure trip hazards are cleaned up



WESTERN CONSTRUCTION

A CENTURI COMPANY

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Switch off the equipment
- Leave work area in safe, clean, and tidy state
- Before servicing, cleaning, or removing any parts shut off power and relieve pressure

Date written: Dec. 9th, 2014

Procedure developed by: Laura Wydra

Date last revised:

Revision No.: 0

Approved by: Pat Hunt

Date Approved: Dec. 9th, 2014

Signature:

Safe Work Procedure No. WSN-SWP-002 Bench and Pedestal Grinder

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required
Face-Shield Required
Protective Apron Required
Hearing Protection Required
Hard Hat as Required

CSA Approved Safety Footwear
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Cuts and lacerations
Sparks/Debris irritation
Noise

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Disconnect power supply before changing grinding wheel or making adjustments
- Ensure that the wheels do not touch the work rest and that the gap between wheel and rest is no greater than 1.5mm (1/16 inch.)
- Check that wheels are running true and are not glazed or loaded
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Faulty equipment must not be used. Immediately report any suspect machinery

Prohibited Activities

- Workpiece must never be held with gloves, cloth or apron
- Grinding non-ferrous metals
- Do not leave this equipment running unattended

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Make adjustments with POWER OFF. Adjust tool rest to within 1.5mm (1/16 inch) of wheel face
3. Make sure all guards are in place, properly adjusted, and secured
4. Inspect grinding wheel for cracks or damage before use
5. Ensure area is free of flammable materials. Usage will produce sparks

6. Turn POWER ON, stand to the side, and allow motor to come to full speed before using. Dress grinding wheel with appropriate tool as needed
7. Grind only on the face of the wheel, never the sides
8. Hold workpiece flat against worktable keeping fingers a minimum of 5cm (2 inch) away from grinding wheel face. Hold small pieces of stock in jig or holding device to prevent injuries to the fingers or hands
9. Move the workpiece back and forth across the wheel face
10. Clean up dust and debris with POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the machine and reset all guards to fully closed position
- Clean and inspect tools after each use
- When servicing equipment (ex. Changing a grinding wheel), power must be disconnected
- Leave the tools and work area in a safe, clean, and tidy state

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-003

Circular Saw

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 3-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required	Approved Dust Mask Required
Hearing Protection Required	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose-fitting clothing

Potential Hazards

Cuts, lacerations, and amputations	Forcing the saw
Dust / debris irritation	Over tighten the blade locking nut
Noise	Wrong or dull blade
Obstructions or foreign objects (nails/screws)	Lower guard does not retract properly
Projectile work pieces from improper clamping	Removing the blade guard
Over reaching may cause loss of footing and balance	Pinching the blade

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect equipment
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Ensure level ground surface when cutting
- Check for foreign objects
- Check for proper blade rotation
- Select proper blade
- Secure object/materials being cut to avoid movement
- Check circular saw for loose blades, handle, bolts
- Ensure blade guard is free of saw dust and chips

Prohibited Activities

- Do not leave this equipment running unattended
- Cutting material with embedded nails or screws

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Follow pre use operational safety checks
3. Check irregular retracting lower blade guard frequently to make certain it works freely
4. Make all adjustments with power cord unplugged
5. Set the depth of the blade and lock it at a depth so that the lowest tooth does not extend more than about 3 mm (1/8 inch) beneath the wood
6. Secure stock being cut to avoid movement
7. Keep all cords clear of cutting area
8. Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate
9. Use two hands to operate saws – one on a trigger switch and the other on a front knob handle
10. Check footing and balance
11. Allow the saw to reach full power before starting to cut
12. Check for obstructions or objects prior to cutting
13. Allow it to cut steadily. Do not force it. Do not twist the saw to change, cut or check alignment
14. Keep motor free from accumulation of dust and chips
15. Keep saw blade guard free of saw dust and chips
16. Use approved respirators when exposed to harmful or nuisance dust
17. Turn saw OFF and let blade come to a rest before removing work piece
18. Check that the retracting lower blade guard has returned to its starting position before laying down the saw
19. Unplug saw or turn off the motor when changing the blade or making adjustments
20. Clean up dust and debris POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the machine and reset all guards to fully closed position
- Clean and inspect tools after each use
- When servicing equipment (ex. Changing blade), power must be disconnected
- Leave the tools and work area in a safe, clean, and tidy state

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-004 Compound Mitre Saw

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required	Approved Dust Mask as required
Hearing Protection Required	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose-fitting clothing

Potential Hazards

Cuts, lacerations, and amputations	Projectile work pieces from improper clamping
Dust / debris irritation	Forcing the saw
Noise	Lower guard does not retract properly
Obstructions or foreign objects (nails/screws)	

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect equipment
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Ensure level ground surface when cutting
- Check for foreign objects

Prohibited Activities

- Do not leave this equipment running unattended
- Cutting branches, wood with embedded nails or screws
- Cutting dowel
- Ripping solid timber along the grain
- Cutting short lengths of timber

Safe Work Procedure

1. Open dust chute and turn on dust collector
2. Put on Personal Protective Equipment
3. Follow pre use operational safety checks
4. Make all adjustments with power off
5. Use a crosscut or combination blade

6. Ensure guard is in place
7. Clamp wood piece firmly against the fence (where possible) and align with blade. Do not cut pieces smaller than 20cm (8 inch) in length
8. Keep one hand on the trigger switch and handle; use the other hand to hold the stock against the fence
9. Ensure hands are at least 6 inches away from blade
10. Turn ON; wait for blade to reach maximum speed before using
11. Cut work piece at slow/moderate speed. Do not force the saw
12. Turn off saw and let blade come to a rest before raising
13. Clean up dust and debris POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the machine and reset all guards to fully closed position
- Clean and inspect tools after each use
- When servicing equipment (ex. Changing blade), power must be disconnected
- Ensure ventilation openings and switch levers are kept clean and free of foreign matter
- Leave the tools and work area in a safe, clean, and tidy state

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-005 Compressed Gas Regulators

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required
Hearing Protection as required
Hard Hat as Required
CSA Approved Safety Footwear

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Burns, hot metal
Sparks
Fumes

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Faulty equipment must not be used. Immediately report suspect equipment

Prohibited Activities

- Never leave welder running unattended

Safe Work Procedure

1. Wear appropriate personal protective equipment
2. After removing valve cap, open valve for a moment to clear opening of dust or dirt particles
3. Attach regulator to tank and securely tighten with a wrench
4. Attach hose to regulator outlet and torch. Securely tighten with a wrench
5. After attaching regulator, hose, and torch see that adjusting screw of the regulator is released (backed-off) before cylinder valve is opened.
6. Always keep the acetylene cylinder valve key or wrench on the cylinder while in use
7. Before regulator is removed from cylinder, close the cylinder valve, and release all gas from regulator
8. The wrench used for opening the cylinder valve should always be kept on the valve stem when cylinder is in use
- Testing for Leaks**
9. Turn pressure-adjusting screw in all the way
10. Brush leak detection solution onto tank valve, regulator connectors, torch, and vent hole on regulator inspect for leaks.

11. If there is a leak on a connector try tightening the connection to stop the leak. If the vent hole is leaking the regulator is faulty. Do not use regulator and notify supervisor.
12. If the valve stem leaks, notify supervisor, and tag it to indicate leaking valve system.

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Leave the work area in a safe, clean, and tidy state

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-006 Concrete Mixer

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required
Hearing Protection Required
Hard Hat as Required
CSA Approved Safety Footwear

Approved Dust Mask Required
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Cuts, lacerations, and amputations
Dust/debris irritation
Noise

Fumes
Electric shock

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards are in place and working properly
- Faulty equipment must not be used. Immediately report suspect equipment
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Disconnect power supply before changing or adjusting blades

Prohibited Activities

- Do not smoke (Fire Hazard)
- Do not leave equipment unattended while running
- Do not place hands or any objects inside the mixer drum while it is running
- Do not operate the mixer on a surface that is uneven
- Do not operate the mixer in or around water puddles

Safe Work Procedure

- Wear appropriate personal protective equipment
- Make all adjustments with POWER OFF
- Make sure all guards are in place, properly adjusted and secured
- Put drum in loading position. Rotate the drum wheel until the desired drum position is achieved
- Start mixer
- Add measured amounts of water, cement, and aggregates

Do not put shovel or your hands inside the drum

7. Put drum in discharge position. Rotate the dump wheel until the desired drum position is achieved
8. Clean up dust and debris with POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Ensure equipment is off
- Place all materials in their proper storage areas
- Ensure the equipment is in a safe, clean, and tidy state before you leave it

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-007 Cordless Drill

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing
Fall protection as required

Potential Hazards

Foreign materials in work piece
Cuts, lacerations and amputations

Electrical shock
Dust/debris irritation
Noise

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect machinery
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Disconnect Power supply before changing or adjusting bits
- Ensure insulated gripping surfaces are in working condition

Prohibited Activities

- Do not leave the Cordless Drill running unattended
- Do not use incorrect drill bits for the work material

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Make all adjustments with battery pack not attached
3. Ensure that all attachments (for example: drill bits and auxiliary handles) are secured properly then attach the battery back
4. Remove any wrenches and adjusting tools before turning on a too
5. Mark the center of the hole to be drilled with a center punch
6. Lubricate the drill bit with cutting oil when drilling iron or steel. Use a coolant when drilling nonferrous metals such as copper, brass, or aluminum.

7. Before drilling, clamp down material securely
8. Hold drill by insulated gripping surfaces
9. Drill a pilot hole for wall installations
10. Turn power ON and allow motor to come to full speed before using. Anticipate torque on start-up) Keep drill perpendicular to workpiece and perform operation safely and at a moderate pace
11. Do not touch the workpiece immediately after operation; it may be extremely hot and could burn your skin
12. Turn power OFF and allow machine to stop before setting down.
13. Clean up debris with power OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Set up barricades and warning signs when using ladder on the job site
- Ensure ladder is properly stored in a clean dry area
- Report problems such as broken parts, metal fatigue, etc. To your supervisor

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-008 Extension Ladder

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	Fall protection as required

Potential Hazards

Fall due to lose of balance	Defective ladder
Fall due to improper set up of ladder	Wrong type of ladder
Electrical Wires	Slippery or muddy footwear
Weather Condition i.e., ice, snow	Debris, tools, and other objects around ladder
Injury due to heavy lifting	

Pre-Operational Safety Checks

- Ensure ground area is level and secure
- Inspect ladder for damage
- Get assistance when required
- Secure ladder at top and bottom to prevent from slipping
- Extension ladders should be overlapped a minimum of three rugs
- Make sure the hardware is fully engaged and locked securely in place

Prohibited Activities

- Do not use ladder if it is damaged

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Exercise and stretch muscle groups
3. Complete Pre-Orientation safety checks
4. If ladder is too heavy or long, ask for assistance
5. If ladder is more than 25kg (55lb), or where conditions complicate the task, have two persons set up ladder as follows:
 - Lay ladder on ground close to intended location
 - Brace ladder base use helper's feet

- Grasp the top rug with both hands, raise the top end over your head and walk towards the base of ladder, Gasp the centre of the rugs to maintain stability
- Move the erect ladder to the desired location. Lean it forward against the resting point
- If ladder is short, then one person can erect as follows:
 - Place the bottom of ladder firmly against the base of a building or stationary object
 - Lift the top of ladder and pull upwards to raise to a vertical position
 - Transfer ladder to its required position when it is erect
 - Keep ladder upright and close to the body with a firm grip
 - Leave all tie-off devices in place until they must be removed
- 6. Place ladder ¼ of ladder's working length away from the base of structure
- 7. Erect ladder so that a minimum of 1m (3ft.) extends above landing platform. Tie top at support points
- 8. Raise and lower ladder from ground. Ensure that locking ladder hooks are secure before climbing
- 9. Erect extension ladder so that the upper section rests on the bottom section
- 10. Place ladder on firm, level surface and ensure a secure footing
- 11. Maintain the minimum overlap of sections as shown on ladder instructions and label
- 12. Ensure you are tied off with safety harness when working 3m (10ft.) or more off the ground or when working with both hands
- 13. Maintain three points of contact by keeping two hands and one foot, or two feet and one hand on ladder at all times and gasp the rugs when climbing keeping the center of your body within the side rails
- 14. Face the ladder when going up or down and when moving from it
- 15. Ensure that all electrical equipment used during ladder work is in good condition and properly grounded
- 16. When the ladder cannot be tied off at the top, ensure a person is at the foot of the ladder securing it from slipping. This is only effective for ladders up to 5m (16ft.). The person at the foot of the ladder should face the ladder with each hand at the side rail and with one foot resting on the bottom rug.

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Set up barricades and warning signs when using ladder on the job site
- Ensure ladder is properly stored in a clean dry area
- Report problems such as broken parts, metal fatigue, etc. To your supervisor

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 Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-009 Hammer Drill

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Approved Dust Mask Required
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Foreign material in concrete
Cuts lacerations and amputations
High noise can damage hearing

Dust/debris irritation
Noise
Electrical shock

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip/trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect machinery
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Disconnect power supply before changing or adjusting bits
- Ensure auxiliary handle is securely attached
- Ensure insulated gripping surfaces are in working condition
- Ensure no electrical conduits are present in concrete

Prohibited Activities

- Do not leave the Hammer Drill unattended while running
- Use the correct drill bits for the work material

Safe Work Procedure

1. Wear appropriate personal protective equipment
2. Make all adjustments with battery unplugged
3. Ensure the attachments (example: drill bits and auxiliary) are securely attached
4. Ensure the power switch is on OFF position before plugging in. Check that cord is away from path of tool
5. Remove any wrenches and adjusting tools before turning on tool

6. Before drilling, clamp down material securely
7. Hold hammer drill by insulated gripping surfaces and auxiliary handles
8. Turn power ON and allow motor to come to full speed before using. (Anticipate torque on start-up) Perform operation safely at moderate pace
9. Do not touch the workpiece immediately after operation; it may be extremely hot and could burn your skin
10. Turn power OFF and allow machine to stop before setting down
11. Clean up debris with power OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Switch off the machine and reset all guards to a full closed position
- Leave the machine in a safe, clean, and tidy state
- When servicing equipment (ex. Changing a bit) power must be disconnected

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Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-010 Hand Tools

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.
Hand Tools may only be operated by competent persons

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	

Potential Hazards

Loose knots or foreign materials in wood	Dust/debris irritation
Cuts, lacerations, and amputations	Noise
Musculoskeletal injuries	Finger pinched

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect machinery
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Use with proper posture and body position appropriate to task
- Take breaks from static position often

Prohibited Activities

- Use tools only for their intended purpose

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Select the wright tool for the job. Substitutes increase the chance of having an accident.
3. Ensure that workspace is free of clutter and allows room for task
4. Ensure tool is in proper working order. For example: cutting tools are sharp, hammer heads and file handles are secure
5. Use tools for their designed purpose. Never use cheater bars, handles, or pipes to gain additional leverage. Do not apply excessive force or pressure on tools
6. Ensure workpiece is properly secured
7. During operation, ensure that both hands are positioned safely, and feet are positioned for proper balance. Tool

operation should be directed away from hands and body

8. Pull on a wrench or pliers. Never push unless you hold the tool with your palm open
9. Point sharp tools (e.g., saws, chisels, knives) laying on benches away from aisles and handles should not extend over the edge of the bench top
10. Clean, then put tools away in appropriate spot immediately after use
11. Clean up dust and debris

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Clean and inspect tools after each use
- Leave the tools and work area in a safe, clean, and tidy state

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Procedure developed by: Laura Wydra
Date last revised:
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Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-011 Hand Tools - Hammer

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	

Potential Hazards

Use of hammer that has a damaged loose handle	Use of any hammer with chips, cracks, dents, or excessive wear
Use of hammer with a crack or splintered handle	Use of side of hammer

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Use proper tool for the job, size type
- Ensure no slip trip hazards are present in workplace and walkways
- Ensure hammer heads are secure and handle is free of cracks and damage
- Faulty equipment must not be used. Immediately report suspect equipment
- Use with proper posture and body position appropriate to task
- Take breaks from static position often
- Look behind and above prior to swinging hammer
- Watch the object you are hitting, pay close attention to where you are swinging
- Choose proper hammer 1" larger than the face of tool being struck

Prohibited Activities

- Use tools only for their intended purpose

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Select the wright tool for the job. Substitutes increase the chance of having an accident.
3. Ensure that workspace is free of clutter and allows room for task
4. Check hammer head and handle for any damage
5. During operation, ensure that both hands are positioned safely, and feet are positioned for proper balance. Tool operation should be directed away from hands and body
6. Strike a hammer squarely parallel to the surface being struck

7. Strike with the head of the hammer and do not use the handle or side of the hammer to hit the intended object or surface
8. Hold hammer with a straight wrist with maintain a good grip around handle
9. Check before you swing, ensuring the workspace is clear of other objects and that nobody is standing behind you or too close to when you use the hammer
10. If an emergency situation occurs while using tools, inform your supervisor immediately
11. Report any hazards to your supervisor immediately

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Hammers come in various sizes and types for specific purposes; choose and use the proper hammer for the task/job
- Clean and inspect tools after every use
- Leave the tools and work area in a safe, clean and tidy state

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Procedure developed by: Laura Wydra
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-012

Hand Tools – Hook Knife

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	

Potential Hazards

Unsecure grip on knife and cutting oneself or unintended objects	Cutting too quickly Unstable or slippery

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Use proper tool for the job, size type
- Ensure no slip trip hazards are present in workplace and walkways
- Faulty equipment must not be used. Immediately report suspect equipment
- Use with proper posture and body position appropriate to task
- Take breaks from static position often

Prohibited Activities

- Do not use damaged tools

Safe Work Procedure

1. Put on all required Personal Protective Equipment
2. Follow all Pre-Operational Safety Checks
3. Select the right tool for the job. Substitutes increase the chance of having an accident.
4. Ensure that workspace is free of clutter and allows room for task
5. Always use sharp objects for their designed purpose. Do not apply excessive force or pressure on tool.
6. During operation, ensure that both hands are positioned safely, and feet are positioned for proper balance. Tool operation should be directed away from hands and body
7. If an emergency situation occurs while using tools, inform your supervisor immediately
8. Report any hazards to your supervisor immediately

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Clean and inspect tools after every use
- Leave the tools and work area in a safe, clean, and tidy state

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Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-013

Lifting

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-D (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training N/A

Required Personal Protective Equipment and Devices

Eye protection

Hard Hat as Required

CSA Approved Safety Footwear

Hearing Protection as Required

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards Bodily injury

Pre-Operational Safety Checks

N/A

Prohibited Activities

- Do not lift weights beyond your capabilities

Safe Work Procedure

- Test the weight of the load – if it feels too heavy ask for help, or use a mechanical lifting device – It is your legal right to refuse to lift anything you feel may be a danger to you
- Position your body close to the load
- Take a wide stand, with the load between the knees if possible
- BEND YOUR KNEES**
- Bending at the waist should never be permitted – Never try to catch a falling load
- Keep the lower back straight. The risk of injury increases when the lower back is rounded
- Keep your head up, the more vertical your position, the lower your risk of injury
- Breathe out as you begin to lift – This increases tension in your abdominal muscles – Do not hold your breath during lifting, this increase pressure in the abdomen
- Always keep your shoulders in line with your feet – Twisting significantly increases the risk of injury- Never twist while lifting or carrying anything, even light objects – **NO TWISTING!**
- Proper lowering is as proper lifting – Dropping or throwing loads is hazardous – Bend the knees, keep the back straight, and breathe out as you begin to lower

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

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Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-014 Materials Handling

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Instruction of proper lifting technique Safe Work Procedure WSN-SWP-013
Instructions on equipment available to assist with material handling

Required Personal Protective Equipment and Devices

Eye protection	Long Loose Hair must be tied back or Contained
Hard Hat as Required	No Jewellery, watches, rings, necklaces etc.
CSA Approved Safety Footwear	No loose fitting clothing
Hearing Protection as Required	

Potential Hazards

- Awkward/ Sustained posture/ twisting which increases potential lower back injury or stress on muscles
- Forceful exertion which can potentially injure back
- Repetitive movement which creates fatigue limiting the amount of weight which can be lifted

Pre-Operational Safety Checks

N/A

Prohibited Activities

- Do not lift weights beyond your capabilities

Safe Work Procedure

- Inspect required personal protective equipment and replace if required
- Put on all required personal protective equipment

CAUTION: Back belts are not considered personal protective equipment

Lifting:

- Test the weight of the load before lifting.
- If it feels too heavy ask for help, or use a mechanical lifting device – It is your legal right to refuse to lift anything you feel may be a danger to you

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

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Signature:



Safe Work Procedure No. WSN-SWP-015

Metal Working Machines General Safe Work Procedure

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Approved Dust Mask or Respirator as required
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

High noise can damage hearing
flying cuttings & debris
Tool vibration can damage nerves in hands and wrists

Sudden and unexpected tool movement can cause injury
Tools starting unexpectedly can cause injury

Pre-Operational Safety Checks

- Inspect equipment for damage
- Inform bystanders of potential hazards

Prohibited Activities

- Do not leave any equipment unattended while running

Safe Work Procedure

- Check and adjust all Safety devices before each job
- Ensure that all guards are in position and in good working condition before operating
- Ensure that all stationary equipment is anchored securely to the floor
- Ensure all machines have a start stop button within easy reach of operator
- Each machine should have only one operator at one time
- Everyone should know how to stop the machine in an emergency
- Ensure that keys and adjusting wrenches have been removed from the machine before turning on the power
- Ensure that all cutting tools and blades are clean and sharp
- Stop the machine before measuring, cleaning, or making any adjustments
- Use a vacuum, brush, or rake to remove cuttings. Do not handle cuttings by hand because they are very sharp
- Keep hands away from the cutting head and all moving parts

12. Avoid awkward operations and hand positions. A sudden slip could cause the hand to move into the cutting tool or blade.
13. Return all portable tooling to their proper storage place after use
14. Clean all tools after use
15. Keep work area clean, well swept and well lit. Floors should be level and have a non-slip surface
16. Ensure there is enough room around the machine to do the job safely
17. Obtain first aid immediately for all injuries
18. Understand that the health and fire hazards can vary from material to material. Make sure all appropriate precautions are taken.

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Ensure equipment is off
- Place all materials in the proper storage areas
- Ensure the equipment is safe, clean, and tidy before you leave it
- Report problems such as broken parts, metal fatigue, etc. To your supervisor

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-016 Oxygen Cylinder Safety

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

Oxygen cylinder falling if not secured in purpose-based trolley
Fire and explosion hazard from leaks, damage, or careless operation (supports combustion)

Pre-Operational Safety Checks

- Check that fire extinguishers are operational
- Use cylinder while in its trolley
- Use oxygen in a well-ventilated area
- Clean hands prior to use

Prohibited Activities

- Do not smoke (fire hazard)
- Do not use oil or grease to lubricate the equipment
- Do not use petroleum-based lubricant on a worker who is receiving first aid treatment and is administer oxygen
- Keep 10 feet away from heat source

Safe Work Procedure

To attach and use a regulator on a new tank

1. Remove the green plastic seal from a new tank

CAUTION: the small green plug must be manually removed from the outlet as it is not attached to the seal

2. With "key" supplied, crack the tank by turning the assembly slowly to the left until a hiss escapes, then close immediately. This removes any dust particles from the outlet.

CAUTION: turn the oxygen outlet away from any personal to protect their eyes from the initial force of escaped gas

3. Fit the regulator over the top of the tank, lining up the 2 prongs into their slots, and tighten

4. Using the "key", open the oxygen cylinder valve completely (counter clockwise). Then turn back ¼ turn so that you can always determine an open vs closed valve.
5. Attach oxygen tubing to the regulator
6. Turn flow meter to desired flow

Change a regulator from an empty tank (pressure in the regulator is reduced), to a full one

1. Close the flow meter
2. Close the oxygen cylinder valve (clockwise)
3. Open the flow meter to bleed oxygen from the regulator and then close the flow meter.
4. Remove the regulator
5. Attach regulator to a new tank as described above

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- When storing tanks, ensure flow meter valve and oxygen cylinder valve are turned off
- Check for leaks prior to storing
- Store in an area away from heat source
- Store cylinders in an area free from activity, where they cannot be accidentally knocked over
- Place all materials in storage areas away from immediate student activity
- Ensure the equipment is safe, clean, and tidy before you leave it

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-017 Power Washer

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

High noise can damage hearing
Electric shock
Degreasing fluid

Unsecured hose whipping under pressure
High pressure water

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip/trip hazards are present in workplace and walkways
- Familiarize yourself with and check all equipment operations and controls
- Faulty equipment must not be used. Immediately report suspect machinery.
- Before servicing, cleaning, or removing any parts shut off power and relieve pressure
- Inform bystanders of potential hazards

Prohibited Activities

- Do not leave the power washer unattended while running
- Do not point the gun at anyone or any part of the body
- Do not use with flammable liquids or toxic chemicals

Safe Work Procedure

1. Wear appropriate Personal Protective Equipment
2. Make all adjustments with POWER OFF and pressure relieved
3. Be aware of other personnel in the immediate vicinity and ensure the area is clear before starting equipment
4. Release safety latch on handgun and press lever
5. Switch unit ON
6. Always direct high-pressure jet at objects being cleaned from a greater distance first of all, in order to prevent damage if pressure is too high

7. Clean work area with POWER OFF; ensure slip/trip hazards are cleaned up

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Ensure equipment is off
- Ensure the work area is safe, clean, and tidy before you leave it
- Report problems such as broken parts etc. To your supervisor

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-018 Pipe Removal and Installation

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 3-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

- Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.
- Read and understand Ridgid 300/535 Installing Pipe Safe Work Procedure WSN-SWP-020
- Read and understand Ridgid 300/535 Removing Pipe Safe Work Procedure WSN-SWP-021

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Gloves must be worn when operating this equipment
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Cuts, lacerations, and amputations	Burns
Dust / debris irritation	Fumes
High noise can damage hearing	Hot materials
Projectiles work pieces / tools from improper set up	

Pre-Operational Safety Checks

- Inspect required Personal Protective Equipment and replace if required
- Ensure no slip and trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect machinery
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Disconnect power supply before making any adjustments, changing accessories, or storing the tool
- Do not use if foot switch is missing or broken
- If workpiece extends beyond the machine set up guards or barricades to create a safety zone.
- Use pipe stands to support pipe that extends 1.2m (4 feet) beyond the machine

Required Training

- Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.
- Read and understand Ridgid 300/535 Installing Pipe Safe Work Procedure WSN-SWP-02
- Read and understand Ridgid 300/535 Removing Pipe Safe Work Procedure WSN-SWP-021

Cutting Pipe with Hand Cutter

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Position the pipe cutter on the workpiece with the cutter wheels facing up
4. Align the cutter wheels with the mark on the pipe and rest the pipe cutter's body on the left support bar
5. Hand tighten the pipe cutter to the workpiece using the feed-screw handle while keeping the cutter wheels aligned with the mark
6. Flip the directional switch to FOR (forward)
7. Grasp the pipe cutter's feed-screw handle with both hands
8. Depress and hold down the foot switch with the left foot

CAUTION: Keep a firm grip on the pipe cutter and be sure it is resting on the support bar

9. Tighten the feed-screw handle slowly and continuously until the pipe is cut. Do not force the cutter into workpiece
10. Release the foot switch and remove your foot from the housing
11. Switch pipe cutter back to up position
12. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Cutting Pipe with No. 820 Cutter

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Swing reamer and die head to UP position
4. Move pipe cutter DOWN onto pipe and move carriage with hand-wheel to line up cutter wheel with mark on pipe
5. Tighten cutter feed screw handle on pipe keeping wheel aligned with the pipe
6. Flip the directional switch to FOR (forward)
7. Grasp the pipe cutter's feed-screw handle with both hands
8. Depress and hold down the foot switch with the left foot
9. Tighten the feed-screw handle slowly and continuously until the pipe is cut. Do not force the cutter into workpiece
10. Release the foot switch and remove your foot from the housing
11. Switch pipe cutter back to up position
12. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Installing Pipe

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Check to ensure the cutter, reamer and die head are swung to UP position
4. Mark the pipe at the desired length if it is being cut to length
5. Insert the pipe into the Treading Machine so that the end to be worked or the cutting mark is located about 30cm (12 inch.) to the front of the speed chuck jaws.
6. Insert work pieces less than 2 feet long from the front of the machine. Insert long pipes through either end so that the longer section extends out beyond the rear of the Threading Machine.
7. Make sure all guards are in place, properly adjusted and secure

CAUTION: To avoid equipment tip-overs, position the pipe supports under the workpiece

8. Tighten the rear-centering device around the pipe by using a counter clockwise rotation of the hand wheel at the rear of the Threading Machine. This prevents movement of the pipe that can result in poor thread quality.
9. Secure the pipe by using a forceful counter clockwise spins of the speed chuck hand wheel at the front of the Threading Machine. This action hammers the jaws tightly around the pipe.
10. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Removing Pipe

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Use repeated and forceful clockwise spins of the speed chuck hand-wheel at the front of the Threading Machine to release the workpiece from the speed chuck jaws
4. If necessary, loosen the rear centering device using clockwise rotation of the hand-wheel at the rear of the Threading Machine
5. Slide the workpiece out of the Threading Machine, keeping a firm grip on the workpiece as it clears the Threading Machine
6. To avoid injury from falling parts or equipment tip-overs when handling long workpieces, make sure the end farthest from the Threading Machine is supported prior to removal.
7. Clean up any oil spills or splatter on the ground surrounding the Threading Machine
8. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Reaming Pipe with Hand Reamer

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Flip the directional switch to forward
4. Place the reamer in the end of the pipe
5. Assume the correct operation posture
6. Rest handle on the left support bar and hold the reamer handgrip with the right hand. To avoid pinch point injuries, keep your fingers from coming between the reamer and the support bar.
7. Firmly grasp the end of the reamer handle with the left hand, then depress and hold the foot switch down
8. Push the reamer firmly into the pipe with your right hand until ream is complete. Keep your hand and arm away from any rotating parts and use a firm grip on the handgrip
9. Release the foot switch and remove your foot from the housing while holding the reamer with both hands
10. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Threading Pipe with Hand Threader

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Place the die head of the hand threader on the end of the pipe
4. Position the ratchet knob on the hand threader so that the arrow on the knob points up
5. Rest the hand threader ratchet handle on the left support bar (as viewed when facing the front of the Power Drive)

CAUTION: To avoid pinch point injuries, keep your fingers from coming between the hand threader and the support bar

6. Apply cutting oil to the end of the pipe. Check to ensure the directional switch is in the forward position
7. Hold the die head against the workpiece with the right hand
8. Depress and hold down the foot switch
9. Push the die head against the pipe using the palm of the right hand until the dies engage the workpiece
10. Remove the right hand from the area of the die head and liberally oil the dies while the pipe is threaded
11. Release the foot switch and remove your foot from the housing when the pipe reaches the end of the dies
12. Lift the threader handle slightly with the right hand while sliding the left support bar all the way toward the rear of the drive. Release the ratchet knob
13. Lower the threader handle below the height of the left support bar
14. Slide the left support bar back to its fully extended position in front of the Power Drive
15. Lift and hold the threader handle against the left support bar

16. Flip the directional switch to reverse. Depress and hold the foot switch down until the threader has unscrewed itself from the workpiece
17. Release the foot switch and remove your foot from the housing
18. Set the threader down and, if necessary, wipe the oil and debris off the threads with a rag, taking care not to cut your hand or fingers on any sharp debris or edges
19. Check the thread for length and depth
20. Clean up dust and debris with POWER OFF

Ridgid 300/535 – Threading Pipe or Rod

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. Make all adjustments with Power OFF
3. Install die set.
4. Swing cutter and reamer to UP position
5. Swing die head to DOWN position with throw-out lever set to CLOSE position
6. Check directional switch to insure it is in the FORWARD position. Depress and hold the foot switch down with left foot
7. Turn carriage handwheel to bring dies against end of pipe. Slight pressure on handwheel will start dies
8. Turn carriage handwheel to back die head off pipe
9. Release the foot switch and remove your foot from the housing
10. Swing die head back to UP position
11. Clean up dust and debris with POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Switch off the machine and reset all guards to a full closed position
- Leave the machine in a safe, clean, and tidy state
- When servicing equipment, power must be disconnected
- Ensure switch levers are kept clean and free of foreign matter

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-019

Rivet Gun

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

High noise can damage hearing
Power tools can cause flying debris
Tool vibration can damage nerves in hands and wrists

Sudden and unexpected tool movement can cause injury
Tools starting unexpectedly can cause injury
High pressure air can cause injury

Pre-Operational Safety Checks

- Inspect tool for damage or improper assembly
- Inspect drill bit for breakage and proper installation in tool
- Inspect air supply pressure and hose condition
- Inform bystanders of potential hazards

Prohibited Activities

- Do not leave the Rivet Gun unattended while running

Safe Work Procedure

1. Inspect and put on all required Personal Protective Equipment
2. **CAUTION:** Riveting causes high noise. Hearing protection must be worn at all times by tool user and bystanders.
3. Proper eye protection must be worn at all times by tool user and bystanders
4. Be sure your body position allows you to have control of the tool at all times. Make sure your footing is secure.
5. Control rivet gun with hand
6. Do not push hard on rivet gun while riveting
7. Do not press the trigger unless the rivet snap is engaged with a rivet and bucking bar
8. Always remove tool from air supply and activate trigger to bleed airline before making any adjustments,

changing accessories, or doing any maintenance or service on the tool

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Ensure equipment is off
- Place all materials in the proper storage areas
- Ensure the equipment is safe, clean, and tidy before you leave it
- Report problems such as broken parts, metal fatigue, etc. To your supervisor

Date written: Dec. 9th, 2014

Procedure developed by: Laura Wydra

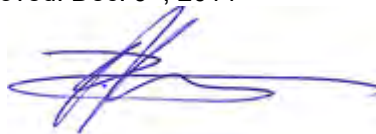
Date last revised:

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Approved by: Pat Hunt

Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-020 Skid Steer

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection
Hard Hat as Required
CSA Approved Safety Footwear
Hearing Protection as Required

Approved dust mask required
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

Cuts, lacerations, and amputations
Working or Standing under a raised loader bucket
Improper entering or exiting
Rollovers

High noise
Dust and debris
Leaning out of the operator compartment into the path of the moving lift arms

Pre-Operational Safety Checks

- Inspect required personal protective equipment
- Clean the work area of by-standers and acquaint yourself with surrounding hazards (e.g., electrical lines, low clearance, uneven terrain, ramp edges, etc.)
- Faulty equipment must not be used. Immediately report suspect machinery
- Inspect the integrity of safety devices, tires, structural components, and engine (e.g., no leaks, adequate fuel, etc.)
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- De-energize machine and attachments before making adjustments

Prohibited Activities

- Do not operate if fatigued, injured or while taking medication or other substances that may impede your ability to operate the equipment safely
- Do not use the operating controls for had-holds or steps
- Do not leave the equipment running unattended
- Operate the loader from the operator compartment, never from the outside
- Avoid traveling across slopes and hills; if absolutely necessary, travel straight up or down with the heavy end of the machine pointed uphill
- Never allow passengers in the operator compartment or bucket of the skid steer loader
- Never allow a person to position themselves under or near the bucket or frame while the skid steer loader is in operation

Safe Work Procedure

1. Wear appropriate personal protective equipment
2. Make all adjustments with power OFF
3. Clear mud, ice, snow and other debris from the controls, operator's compartment, and entry/exit foot-holds
4. Enter the equipment only when the bucket or other attachments are on the ground, or are locked in place with lift arm supports
5. Always wear the seatbelt when operating the equipment
6. Immediately after starting the engine, verify the working nature of the controls, brakes, horn, and alarms.
7. Keep arms, legs and head inside the cab when operating the loader
8. Operate the equipment on stable surfaces. When possible, load, unload and turn the equipment around on level ground
9. For maximum stability, travel and turn equipment when the bucket is in the lowest position possible
10. Never exceed the manufacturer's specified load limit. Take care to evenly distribute the load. In some cases, it might be necessary to secure the load to prevent it from falling or shifting
11. Always look in the direction of travel
12. Before leaving the operator's seat, set the bucket on the ground, set the parking brake and turn the engine off
13. Never work around the equipment when the bucket or fork attachment is raised unless it is supported and the breaks are set, and the key is removed from the ignition. Use lift arm supports when they are present on the equipment.
14. Chock the wheels, if necessary
15. Clean up dust and debris with power off

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Ensure equipment is off
- Ensure the equipment is safe, clean, and tidy before you leave it
- Ensure the ventilation openings and switch levels are kept clean and free of foreign matter
- Report problems such as broken parts, metal fatigue, etc. To your supervisor

Date written: Dec. 9th, 2014
Procedure developed by: Laura Wydra
Date last revised:
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Approved by: Pat Hunt
Date Approved: Dec. 9th, 2014

Signature:



Safe Work Procedure No. WSN-SWP-021 Table Saw

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required
Hearing Protection Required
Hard Hat as Required
CSA Approved Safety Footwear

Approved Dust Mask Required
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Cuts, lacerations, and amputations
Dust / debris irritation
Noise
Loose knots, obstructions, or foreign objects (nails/screws)

Projectile work pieces from improper set up or speed setting
Musculoskeletal injury from manoeuvring long stock
Forcing the saw

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Make sure guards, if present, are installed and are working properly
- If a push stick is required inspect the push stick. If it is damaged or worn replace it
- Faulty equipment must not be used. Immediately report suspect equipment
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Disconnect power supply before changing or adjusting blades

Prohibited Activities

- Do not smoke (Fire Hazard)
- Do not leave this equipment running unattended
- Do not reach across machine
- Do not let your hands come across closer than 10cm (4 inches) to the operating blade
- Do not cut stock free hand
- Do not let small scrap cuttings accumulate around blade

Safe Work Procedure

1. Open dust chute and turn on dust collector
2. Put on Personal Protective Equipment

3. Follow pre use operational safety checks
4. Make all adjustments with power off
5. Make sure all guards are in place, properly adjusted and secured
6. Use a guard high enough to cover the part of the blade rising above the stock and wide enough to cover the blade when it is tilted. Adjust blade height so no more than 4 teeth of the blade are above the height of the piece being cut.
7. Use an anti-kickback device for all ripping or cross cutting operations
8. Ensure that there is adequate support to hold a work piece; use extension tables or roller supports at the side or back for large pieces. If an assistant is at the back (out-feed) end of the saw, an extension table should be in place, so the back edge is about 1.2m (4ft) from the saw blade. The assistant should wait for the workpiece to reach the edge of the extension table and should not reach toward the saw blade.
9. Use a push stick when ripping narrow or short stock (e.g., when the fence is set less than about 10cm (4 inches) from the blade; when the piece is less than 30cm (12 inches) long or when the last 30cm (12 inches) of a long piece is being cut). On larger workpieces use a push stick that pushes the workpiece through.
10. Keep your hands on either side of the blade – not in line with the cutting line and the blade
11. Keep the body and face to one side of the saw blade out of the line of a possible kickback
12. Hold the work piece firmly down on the table and against the fence when pushing the work piece through
13. Feed work piece into the blade against the direction of its rotation. Move the rip fence out of the way when cross cutting. Never use it as a cut off gauge
14. Turn table saw off and let blade come to a rest before removing workpiece
15. Clean up dust and debris POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the machine and reset all guards to fully closed position
- Clean and inspect tools after each use
- When servicing equipment power must be disconnected
- Leave the tools and work area in a safe, clean, and tidy state

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Signature:



Safe Work Procedure No. WSN-SWP-022 Welding (SMAW/GMAW)

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 3-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

- Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.
- Read and understand WSN-SWP-015 Metal Working Machines General Safe Work Procedure
- Read and understand WSN-SWP-014 Material Handling Procedure
- Read and understand WSN-SWP-005 Compressed Gas Regulator Safe Work Procedure

Required Personal Protective Equipment and Devices

Respirator if required
Protective clothes that cover arms and legs
Safety glasses & Welding helmet
Welding gloves

Hearing Protection Required
Hard Hat as Required
CSA Approved Safety Footwear
Long Loose Hair must be tied back or Contained
No Jewellery, watches, rings, necklaces etc.

Potential Hazards

Burns
Sparks
Fumes
Electric shock
Hot metal

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure no slip trip hazards are present in workplace and walkways
- Faulty equipment must not be used. Immediately report suspect equipment

Prohibited Activities

- Do not leave this equipment running unattended

Safe Work Procedure

1. Open fume hood and turn on fume extractor
2. Put on Personal Protective Equipment
3. Follow pre use operational safety checks
4. Make all adjustments with power off
5. Ensure the work area is clean and clear of grease, oil and any flammable materials
6. Ensure welding gun and work leads are in good condition
7. Ensure bystanders are protected from flashes by putting up welding curtains or erecting screens
8. Ensure the weld lead makes firm contact and does not create a tripping hazard

9. Set-up current, voltage, wire feed or gas flow according to the applicable welding procedure(s)
10. Close up welding gun and welding cables
11. Clean-up work area

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the welding machine
- Clean and inspect tools after each use
- Leave the tools and work area in a safe, clean, and tidy state

Date written: March 28th, 2019
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 1

Approved by: Pat Hunt
Date Approved: March 28th, 2019

Signature:



Safe Work Procedure No. WSN-SWP-023 All-Terrain Vehicle (ATV) Use

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 3-C (Medium)

Impact Rating

1 = Minor 2 = Moderate 3 = Major 4 = Extreme	minor injury, requiring first aid or less non-serious injury, illness, or damage severe injury, serious illness, property and equipment damage causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare B = Unlikely C = Moderate D = Likely E = Very Likely	extremely unlikely to occur unlikely to occur could occur at some point reasonably probable to occur probable to occur immediately or soon

Required Training

- Valid Driver's license
- Information on general safe vehicle operation. Ensure the ATV is inspected for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Helmet (DOT Approved)
 Eye protection
 Gloves
 Seasonal suitable clothing
 Appropriate footwear

Potential Hazards

Rollovers
 Collisions

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Faulty equipment must not be used. Immediately report suspect equipment

Prohibited Activities

- Do not leave ATV running while unattended
- Excessive Speeding
- Horseplay

Procedures for loading and unloading

1. Load at a purpose-built stationary ramp or use a portable Ramp or dirt berm
2. If using portable ramps secure ramps to truck using tie-down straps
3. Once loaded, secure ATV fore and aft using proper tie-down straps

Driving Procedures

1. Do a pre-trip check of machine-breaks, throttle, steering linkage, sufficient fuel, oil level
2. Complete WSN ATV Start Up Checklist
3. Check for spares – spark plugs and tools
4. Only one passenger except if ATV is designed for two
5. Never carry passenger on fore or aft racks
6. Drive at safe speed according to conditions
7. When braking use both brakes together

8. Gear down for hill decent
9. Reduce speed for ditches, berms and obstacle climbing
10. Lean into turns; lean into hills
11. Keep your feet on the pegs at all times - (Do not use your feet to control the ATV)
12. If riding on pavement shift out of 4WD and use extra caution
13. Be alert for branches or overhead hazards
14. Do not operate an ATV if it is mechanically defective
15. Conduct a post trip check and have deficiencies rectified

Report Hazardous situation to your supervisor immediately

Housekeeping

- Park ATV in a safe location
- Turn off ATV
- Clean and inspect ATV after each use
- Leave the ATV in a safe, clean, and tidy state

Date written: March 13th, 2015
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: March 13th, 2015

Signature:



Safe Work Procedure No. WSN-SWP-024 Street Sweeper

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your Supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor 2 = Moderate 3 = Major 4 = Extreme	minor injury, requiring first aid or less non-serious injury, illness, or damage severe injury, serious illness, property and equipment damage causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare B = Unlikely C = Moderate D = Likely E = Very Likely	extremely unlikely to occur unlikely to occur could occur at some point reasonably probable to occur probable to occur immediately or soon

Required Training

- Valid class 5 Driver's license with Air Brake Endorsement 15
- Information on general safe vehicle operation. Ensure the Street Sweeper is inspected for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations

Required Personal Protective Equipment and Devices

While driving

- Seasonal suitable clothing
- Appropriate footwear

During cleaning and dumping

- Gloves
- Eye protection

Potential Hazards

- Vehicle Collision - Pedestrian Collision - Cyclist Collision	- Pinch Points - Sharp rubbish - Other obstacles

Pre-Operational Safety Checks

The Street Sweeper must be inspected before and after every use, at least once every 24 hours.
(No driver shall exceed 13 hours of driving time in a day)

W.S. Nicholls does not required drivers to complete a logbook because (a) the driver operates a commercial vehicle within a radius of 160 km of the home terminal; (b) the driver returns to the home terminal each day to begin a minimum of 8 consecutive hours of off-duty time.

- Complete WSN Street Sweeper Pre-Trip Inspection Checklist
- Faulty equipment must not be used, immediately report any defects to your Supervisor
- Ensure defects that might affect the safe operation of the vehicle are repaired before the vehicle is operated on a public road

Pre-Trip Inspection of Unit:

- Check rear engine and front engine fluid levels
- Check rear engine hydraulic level
- Check rear engine and front engine air filters weekly
- Check water filter (weekly)
- Check bearings for fan (50 hours, unit gets as many pumps of grease to the equivalent of 1 tablespoon)
- Check condition of dirt shoes
- Check condition of gutter brooms (length of bristles min. 5" and check play in pins and bushings)

- Check how pick-up head is riding to the ground: head should be checked on level ground, head down, drive forward, get out of machine and have a minimum 1/4" between road and bottom of dirt shoes (weekly)
- Check water nozzles (weekly)
- Check condition of pressure slot (very important - gap should be 1/2" wide with no blockages)

Prohibited Activities

- Do not leave Street Sweeper running while unattended
- Speeding
- Do not operate the Street Sweeper if it is mechanically defective

After completing a pre-trip inspection and air brake inspection:

Outside

1. Switch on Sweeper with on/off switch on passenger side (open panel door to locate on/off switch)
2. Open water valves (two valves not the water intake valve, all valves are located on passenger side)

Inside cabin

3. Turn on operating lights with switch on dashboard
4. Turn on water
5. Extend both brooms
6. Lower heads down
7. Then start operating turning brooms
8. Press red button down to start vacuum suction

Driving General Sweeping Procedures

1. Use of water any time roads are dry, ensure nozzles are working, pick-up head water should be used at all times when roads are dry
2. Gutter brooms should have flicking action, too much down pressure results in premature wear to gutter brooms and does not move the material
3. Gutter brooms should leave a half moon contact pattern, left broom is 9 to 2, right broom is 10 to 3 with the front wheel being 12 o'clock
4. Sweeping RPM is material dependant: light is 1800 RPM, heavy is 2200-2300 RPM. Sweeping speed is also material dependant: light is 5-7 km/h, heavy is 1-3 km/h
5. Vacuum enhancer is open for light materials: leaves, twigs, etc.... otherwise closed for sand, gravel, dirt etc....
6. * **Avoid over-filling hopper, this causes debris to carry over in behind screens and into impeller, debris body should be dumped more often (no more than 3/4 full)**
7. Drive at a safe speed, never drive faster than 5-7km/h while sweeping
8. When the Street Sweeper is not sweeping drive at a safe speed according to posted street signs and local conditions
9. Operators of WSN's Street Sweeper are responsible for the safe operation of the equipment. They must maintain full control of the equipment and must comply with all laws and rules regarding the operation of the Street Sweeper
10. Operators must obey all signs governing the movement, operation, or parking of vehicles on any work site, or public or private road
11. Conduct a post-trip inspection check (logbook)

Post-Trip End of Day Inspection/Wash Down:

12. Unit should have box cleaned (box down while cleaning to avoid contamination / splashing over to power belt and rear engine)
13. Once box is cleaned rear engine should be started, screens in box dropped down and washed in behind to clear any debris and wash down impeller (Daily after every shift)
14. A walk-around of the unit should then follow to check for any damages that may have occurred, as well as a general wash down of entire sweeper

Report Hazardous situation to your Supervisor immediately

Housekeeping

- Park Street Sweeper in a safe location
- Turn off Street Sweeper
- Clean and complete post-trip inspection of Street Sweeper after each use
- Complete post-trip inspection checklist
- If any defects are found, ensure Street Sweeper is locked out and not used until all defects have been repaired
- Leave the Street Sweeper in a safe, clean, and tidy state

Date written: May 14th, 2015

Procedure developed by: Laura Wydra

Date last revised:

Revision No.: 0

Approved by: Pat Hunt

Date Approved: May 14th, 2015

Signature:



Safe Work Procedure No. WSN-SWP-025 Chainsaw (Gas or Electric)

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 3-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Eye protection Required
Face Shield Required
Hearing Protection Required
CSA Approved Safety Footwear
Leg Protection required, safety pants or pull-on chaps

Hard Hat
Long Loose Hair must be tied back or Contained
High Visibility Safety Apparel as required
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Chainsaw Safety Features

- Safety chain – use side traps or drive links specially designed to reduce kickback. Depending on manufacturer, either the drive link or the side trap has high curve or a rise that keeps the chain from catching in the wood.
- Chain break – a device used to stop the chainsaw chain.
- Throttle control trigger – part of the chainsaw, usually a lever, activated by the operator's hand or finger, that controls the throttle control valve.
- Throttle trigger lock – prevents the chain from speeding up if the throttle trigger is touched unintentionally.
- Chain catcher – keeps the chain from hitting the operator in the event the chain breaks. All chainsaws are required to be equipped with a chain catcher.
- Rear hand guard – sometimes called a "rear handle guard", protects the operator's trigger hand if the chain breaks and flies towards the operator. The rear handle shall be designed, or positioned, so that the operator's hand is protected if the chain breaks or degrooves.

Potential Hazards

Cuts, lacerations, and amputations
Dust / debris irritation
Noise
Loose knots, obstructions, or foreign objects (nails/screws)

Projectile work pieces from improper set-up or speed setting
Musculoskeletal injury from manoeuvring long stock
Forcing the saw, saw jams, kickback

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Ensure all chainsaw safety features are in place and intact
- Make sure guards are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect equipment

- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Turn chainsaw off before changing or adjusting any parts

Prohibited Activities

- Do not smoke (Fire Hazard)
- Do not leave this equipment running unattended
- Do not reach across machine
- Do not let your hands come across closer than 10cm (4 inches) to the operating chain
- Do not let small scrap cuttings accumulate around blade

Safe Work Procedure

1. Put on Personal Protective Equipment
2. Follow pre-use operational safety checks
3. Make all adjustments with power off
4. Make sure all guards are in place, properly adjusted and secured
5. Do not refuel saw when hot or running, and use proper spout or funnel
6. Refuel in a well-ventilated area
7. Only use CSA approved containers for transporting fuel
8. Use correct methods for starting, carrying or storage and use of the saw as directed by manufacturer
9. Make sure chain is properly sharpened, correctly tensioned, and adequately lubricated
10. Ensure that chain brake is functioning properly and adequately stops chain
11. Do not cut above shoulder height of the operator
12. Do not saw items on ground
13. Use proper safe cutting techniques
14. Keep your hands away from moving chain – not in line with the cutting line and the chain
15. Do not carry/transport saw without bar guard in place or if the engine is running
16. Clean up dust and debris POWER OFF

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Turn off the chainsaw and reset all guards to fully closed position
- Clean and inspect tools after each use
- When servicing equipment power must be disconnected (Electrical Saw only)
- Leave the tools and work area in a safe, clean, and tidy state

Date written: March 1st, 2016
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: March 1st, 2016

Signature:



Safe Work Procedure No. WSN-SWP-026 Sure Seal – Catalytic Clamshell Heater Unit

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Sleeve Shrink Unit - Description

The Sure Seal Clamshell Heating Unit consists of eight infra-red catalytic heaters mounted in a clamshell frame. The heaters are suspended via an aluminum cross member that is hinged in three spots. For ease of use, the aluminum frame has an adjustable extension and an integral roller. The adjustable extension is to allow the unit to be centered on various diameters of pipe. The rollers are to aid in the transport of the unit along the pipeline.

Additional Equipment:

- Propane bottle (10lb minimum bottle recommended)
- Temperature Probe

Required Personal Protective Equipment and Devices

Eye protection required
Hearing Protection required
Hard hat as required
CSA approved safety footwear

Leather gloves
Long sleeved clothing
Long loose hair must be tied back or contained
No jewellery, watches, rings, necklaces etc.
No loose fitting clothing

Potential Hazards

- Burns, prolonged exposure to bare skin can cause burns
- Pinch points

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Put on Personal Protective Equipment
- Set up work area with barricades so only personnel immediately involved in the Heating Unit operation have access
- Ensure no slip, trip hazards are present in workplace and walkways
- Inspect equipment for damage. Faulty equipment must not be used. Immediately report suspect equipment
- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Before firing, place the unit on the pipe. Adjust the legs so that the heaters are centered around the pipe. Remove from pipe and place the unit on the ground in closed position.

- Connect the propane bottle to the Heating Unit hose assembly

Prohibited Activities

- Do not smoke (Fire Hazard)
- Do not leave this equipment running unattended
- Do not touch the heater box when unit is in operation as it will become very hot and may cause burns
- Do not leave this equipment running unattended

Safe Work Procedure

Start-Up

1. Follow pre-use operational safety checks
2. Make all adjustments with power off
3. Light torch or open flame which will be used to light the heater faces
4. Turn regulator down to minimum setting and turn on gas supply
5. Set regulator to read 4.5 psi
6. Light all eight heater faces with an open flame until noticeable heat is felt, approximately one minute

Operating Procedure

7. Place unit on the ground and start as per the start up instructions previously listed
8. Increase regulator pressure to read 7 psi
9. Winch open heater assembly and place the unit onto the pipe such that the rollers are in contact with the pipe surface (proper lifting equipment must be used)
10. Prepare joint area as per manufacturer's specifications
11. Roll the unit over the pipe weld joint area and lower heaters
12. Heat the pipe weld joint area with the Sure Seal Unit until the manufacturer's recommended temperature is reached
13. Raise the heater boxes and lock into the open position
14. Move unit off the pipe weld joint area
15. Apply field coating as per the manufacturer's specifications
16. The Sure Seal Unit should then be repositioned and then be centered over the pipe weld joint
17. Close heater and begin curing the coating
18. Once completed, winch open heaters and move unit down the line
19. When moving heaters forward, lift rear roller to avoid damaging the pipe coatings
20. Move to next pipe weld joint area and repeat procedure

Cool Down

21. Turn off gas supply
22. Turn regulator off
23. Let Heating Unit cool down in a secure area prior to storing

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock out procedure.

Report Hazardous situation to your supervisor immediately

Housekeeping

- Let Heating Unit cool down before storing it
- Separate the propane bottle
- Store the propane bottle upright and secure it from falling over
- Store the propane bottle in a well-ventilated area
- Ensure the Heating Unit is protected from rain and snow when not in use

- Leave the Heating Unit and work area in a safe, clean, and tidy state

Date written: Nov. 6th, 2017
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: Nov. 6th, 2017

Signature:



Safe Work Procedure No. WSN-SWP-027 Angle Grinder

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 2-C (Medium)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

Required Personal Protective Equipment and Devices

Face shield Required
Hearing Protection Required
CSA Approved Safety Footwear
Hardhat
Long sleeved shirt

Long Loose Hair must be tied back or Contained
High Visibility Safety Apparel
No Jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Angle Grinder Safety Features

- Anti kick back safety clutch
- Soft start vibration reducing handle
- Restart protection
- Grinder fitted with braking system to rapidly stop the wheel
- Noise reduction grinding disk

Potential Hazards

- Kickbacks happen when the angle grinder suddenly thrusts back towards the operator, as a result of it grabbing or jamming on the materials being worked on.
- Exposed moving parts and electrical hazard with potential to cause harm through entanglement, impact, and abrasion.
- Exposure to heat, projectiles, sharp objects, friction, and sparks causing cuts, lacerations and abrasions.
- Projectile work pieces from improper set-up or speed setting
- Musculoskeletal injury from repetitive motion
- Dust / debris irritation
- Noise

Pre-Operational Safety Checks

- Inspect required personal protective equipment and replace if required
- Put on all appropriate Personal Protective Equipment
- Inspect the grinding disk and ensure it has a speed rating greater than or equal to the grinder's speed rating
- Ensure the appropriate disk is in good condition, cracked or chipped disks must be replaced
- Ensure the grinding disk is correctly in place
- Make sure guards are installed and are working properly
- Faulty equipment must not be used. Immediately report suspect equipment
- Ensure the work piece is securely clamped down and is free of any loose portions which could damage the grinding wheel or disk.

- Locate and ensure you are familiar with the operation of the ON/OFF starter
- Inspect electrical cord

Prohibited Activities

- Do not smoke (Fire Hazard)
- Do not leave this equipment running unattended
- Do not let your hands come across closer than 10cm (4 inches) to the operating blade
- Do not let small scrap cuttings accumulate around blade

Safe Work Procedure

1. Follow the pre-use operational safety checks.
2. Ensure all other workers stay clear of immediate work area.
3. Keep fingers, hands and cables clear of the grinding disk.
4. Check that the disk runs true and does not wobble. Excess vibration must be identified and addressed immediately.
5. Do not make adjustments while the wheel is running.
6. Un-plug the grinder from electricity source before making any adjustments.
7. Ensure guarding is in place before re-starting the angle grinder.
8. Allow the grinder wheel to reach working speed before applying it to the work piece. Increase working loads gradually. Never abruptly. Use smooth fluid motions.
9. Be aware of flying sparks and particulate. Aim debris away from self and other workers as well as flammable materials.
10. Turn the angle grinder off when not in use
11. Ensure the machine has been isolated from power sources before cleaning, adjusting, or repairing any parts.
12. Un-plug when not in use
13. Clean up dust and debris

Report Hazardous situation to your supervisor immediately

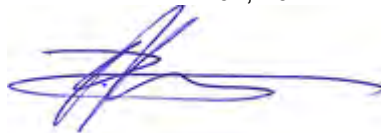
Housekeeping

- Turn off the grinder
- Clean and inspect tools after each use
- Ensure disk is still in good condition before putting away
- Store in such a way that the cord is not in contact with the grinding disk
- Never carry any power tool by the cord
- Leave the tool and work area in a safe, clean, and tidy state

Date written: November 10th, 2017
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: November 10th, 2017

Signature:



Safe Work Procedure No. WSN-SWP-028 Tie-in work on Hydrocarbon Piping Systems

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 4-C (High)

Impact Rating

1 = Minor	minor injury, requiring first aid or less
2 = Moderate	non-serious injury, illness, or damage
3 = Major	severe injury, serious illness, property and equipment damage
4 = Extreme	causing deaths, widespread occupational illness, loss of facilities

Probability Rating

A = Rare	extremely unlikely to occur
B = Unlikely	unlikely to occur
C = Moderate	could occur at some point
D = Likely	reasonably probable to occur
E = Very Likely	probable to occur immediately or soon

Required Training

Information on safe operation of atmospheric testing gas monitors. Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

- Read and understand Safe Work Procedure No. WSN-SWP-008 Extension Ladder.
- Read and understand Safe Work Procedure No. WSN-SWP-010 Hand Tools
- Read and understand Safe Work Procedure No. WSN-SWP-013 Lifting
- Read and understand Safe Work Procedure No. WSN-SWP-014 Materials Handling
- Read and understand Safe Work Procedure No. WSN-SWP-016 Oxygen Cylinder Safety
- Read and understand Safe Work Procedure No. WSN-SWP-022 Welding (SMAW/GMAW)
- Read and understand Safe Work Procedure No. WSN-SWP-027 Angle Grinder

Required Personal Protective Equipment and Devices

Eye protection	No loose fitting clothing
Hard hat	Half-facepiece respirators with OV cartridges if Jet A1 reading is >180 mg/m ³ (25 ppm)
CSA approved safety footwear	
Hearing protection as required	Full-facepiece respirators if Jet A1 reading is >1,800 mg/m ³ (250 ppm)
Long loose hair must be tied back or contained	
No jewellery, watches, rings, necklaces etc.	

Potential Hazards

Atmospheric conditions	Cuts, lacerations
Burns	Dust / debris irritation
Sparks	Noise
Fumes	Musculoskeletal injury
Electric shock	Hot metal

Pre-Operational Safety Checks

Atmospheric conditions in the work area shall be tested with the Multi RAE gas monitor before any work starts. The Multi RAE gas monitor tests for O₂, CO, NO, NO₂ and for Jet A1 fuel. Acceptable atmospheric conditions to safely perform work in the excavation are listed below:

Criteria	Clean Respirable Air	Acceptable Working Condition
Oxygen (O₂)	20.5 to 21.1%	19.5 to 21.1 %
Carbon monoxide (CO)	< 3ppm	< 25ppm
NO OEL 25ppm		< 25ppm
NO₂ ceiling limit 1ppm		< 1ppm
Jet fuel A1		< 4,200 mg/m³ or 600ppm

If Jet A1 Fuel readings are:

- a) Greater than 180 mg/m³ (25 ppm) half facepiece respirators (minimum) with OV cartridges must be worn.
- b) Greater than 1,800 mg/m³ (250 ppm) full facepiece respirators with OV cartridges must be worn (can be used up to a maximum of 8,400 mg/m³ (1,200 ppm) however work is limited to less than 4,200 mg/m³ (600 ppm) without a review and amendment of the hazard assessment and this work procedure).
- c) No work will be permitted if the Jet fuel A1 reading is in excess of 4,200 mg/m³ (600 ppm).
If > 4,200 mg/m³ (600 ppm), the Project Superintendent will be contacted, and the conditions verified prior to entry/re-entry. **No hot work will be permitted above this level.**
 - Ventilate the work area with an air mover with a 15'-0" to 25'-0" duct with one 90° bend delivering 840/770 CFM or 1427/1308 CMH of clean air into the work area.
 - Ensure the air mover is set to blow and that the air intake is pointing away from any equipment exhaust or other air contaminants.
 - Ensure atmospheric conditions are in the range outlined in the acceptable working conditions.
 - **If the gas monitor readings exceed the acceptable range leave the work area and do not enter the work area again until acceptable conditions are verified.**
 - Inspect required personal protective equipment and replace if required.

Safe Work Procedure

1.0 Line Depressurization and Draining

- 1.1 The system Operator and/or Owner's representative shall lock-out the applicable system, WSN will assist as required. Lock-out valve locks shall be applied by the system Operator and/or Owner's representative, as well as all WSN employees involved shall lock out on a centrally located lockout board or box. Note that either the system Operator's, Owner's or WSN's lock-out procedure must be strictly adhered to at all times.
- 1.2 Once the lock-out has been performed the system Operator and/or Owner's representative shall drain down the system, (WSN to assist as required). A vacuum truck must be provided on a stand-by basis at all times during drain down activities.
- 1.3 Once the line has been drained, the system Operator and/or Owner's representative can then authorize WSN to commence work.

2.0 Cold Cutting and Tie-In Procedure (Welding/Bolting/Threaded Connections)

- 2.1 Once the system is completely drained and the tie-in location has been accurately measured and marked on the pipe, the pipe will be inspected for residual product by either breaking an adjacent flange, inspection through an existing service point, or by drilling a small pilot hole in the portion of the piping to be cut out, to visually verify that the pipe is free of any product. The vacuum truck shall thoroughly remove any residual product found. Only after visual confirmation and after it has been determined that the line is empty, the cold cutting activities can commence. Drip pans must be placed under the cutter to catch scrap material and any potential remaining residual product. Once the line is cut, the old pipe section shall be removed and discarded, and/or set aside for visual inspection by the Owner (do not re-use the existing section of removed pipe unless authorized by the system Operator or Owner's representative). The new section(s) of pipe, or fitting(s), can then be installed. The Contractor must ensure that the internal and external coatings on the new pipe(s), or fitting(s), are in good condition and that the inside surfaces are thoroughly cleaned prior to installation.
- 2.2 Once the cold cutting activities have been completed, WSN shall mechanically plug, mud plug, or inert gas by means of dry ice, or nitrogen purge, the line upstream and downstream of the work location to suppress residual vapours (vents must be opened upstream and downstream of the welding zone to vent gases caused by the sublimation of the dry ice or product vapours, otherwise pressure will build-up during welding operations which could adversely affect the weld quality or create an explosive atmosphere inside the

system). Prior to commencing any hot work, verify that the atmosphere is safe for hot work and welding activities. Please review the safe working conditions outlined above. Air quality shall be continuously monitored during all hot work tie-in activities.

- 2.3 All welding, bolting and connecting of tie in pieces shall be completed in accordance with applicable codes and standards as provided by the system Operator and/or Owner's representative. As a minimum, all connections shall be physically inspected and or tested dependent on the system Operator and/or Owner's requirements. In addition, all connections must be constantly monitored during initial re-pressurization, and inspected immediately after of the system has reached operating pressure and re-inspected within 24-hours. All non-destructive weld testing must be completed by a qualified independent third-party inspection company. All tie-in welds, bolt ups and threaded connections must be inspected and passed by the system Operator and/or Owner's representative prior to the system being re-commissioned.
- 2.4 After final acceptance/inspection of the connections, by the system Operator and/or Owner's representative, the system shall be ready to be re-filled.
- 2.5 At this point the system Operator and/or Owner's representative and WSN shall jointly perform a thorough system inspection to ensure all opened valves, vents and drains on the affected section have been closed and the system is tight prior to commencing with re-filling activities.
- 2.6 After the system inspection and acceptance by the system Operator and/or Owner's representative, WSN employees shall remove their locks.

3.0 Re-Filling of Line

- 3.1 To re-commission the system, the system Operator and/or Owner's representative shall remove or reposition their locks as required.
- 3.2 The fuel system Operator and/or Owner's representative shall then fill the system (WSN to assist as required). At the same time, the vent valves shall be re-opened at suitable locations to remove air from the system (WSN to assist as required). At all times WSN employees are to follow the procedures established by the system Operator and/or Owner's representative.

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock-out procedure.

Report Hazardous Situations to Your Supervisor Immediately

Housekeeping

- Switch off all equipment
- Leave work area in a safe, clean, and tidy state

Date written: March 26th, 2019
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: March 26th, 2019

Signature:



Safe Work Procedure No. WSN-SWP-029 Titan Additive Injection Skid

DO NOT Perform this procedure until you have been appropriately trained and authorised to do so by your supervisor.

Risk Rating 4-C (High)

Impact Rating

- 1 = Minor** minor injury, requiring first aid or less
- 2 = Moderate** non-serious injury, illness, or damage
- 3 = Major** severe injury, serious illness, property and equipment damage
- 4 = Extreme** causing deaths, widespread occupational illness, loss of facilities

Probability Rating

- A = Rare** extremely unlikely to occur
- B = Unlikely** unlikely to occur
- C = Moderate** could occur at some point
- D = Likely** reasonably probable to occur
- E = Very Likely** probable to occur immediately or soon

Required Training

Information on safe operation of atmospheric testing gas monitors. Information on general safe hand tool operation. Ensure proper procedure for the control of safe tools is demonstrated by inspecting the tool for wear and defects prior to use. Supervisor demonstration of proper specific safe work operations.

- Read and understand Safe Work Procedure No. WSN-SWP-008 Extension Ladder.
- Read and understand Safe Work Procedure No. WSN-SWP-010 Hand Tools
- Read and understand Safe Work Procedure No. WSN-SWP-013 Lifting
- Read and understand Safe Work Procedure No. WSN-SWP-014 Materials Handling

Required Personal Protective Equipment and Devices

Eye protection
Hard hat
CSA approved safety footwear
Hearing protection as required

Long loose hair must be tied back or contained
No jewellery, watches, rings, necklaces etc.
No loose-fitting clothing

Potential Hazards

Cuts, lacerations
Dust / debris irritation
Electric shock

Noise
Musculoskeletal injury

Preparing to mobilize trailer

1. Remove electrical power from source
- 2.
3. Disconnect electrical cord from trailer
4. Roll up cord and place in storage box in back of trailer
5. Unhook ground wire located at the back of the trailer (trailer ground)
6. Raise jacks on rear of the trailer and insert pins
7. Attach vehicle to pintle hitch (Shown Above)
8. Attach towing chain to truck
9. Attach breakaway brake cable
10. Attach trailer/vehicle electric
11. Roll up jack
12. Verify battery is good but pressing green button on brake controller
13. Start tow vehicle
14. Turn on lights and hazard lights
15. Perform 360 degree walk around to assure lights are working

16. Turn hazard lights off
17. Pull forward/activate trailer brake controller on tow vehicle to verify function of brakes
18. Verify all safety precautions necessary for safe travel have been attended to

Pre-Operational Safety Checks

Park and Secure the Trailer

1. Stage trailer in designated area and if parking is required use a spotter
2. Turn off tow vehicle
3. Place chocks under tires
4. Wing down jacks in rear and front (pull pins and then crank handle)
5. Get trailer stable and level.
6. Unhook truck and unhook electrical – then move truck.

a) Prepare the Trailer

1. At rear of trailer, connect ground cord to eliminate static and buildup
2. Open storage box on trailer and take-out electrical cable, inspect cable
3. Plug cable into electrical outlet on trailer
4. Plug cable into power source (120 vac.)
5. Turn breaker to ON position – breaker located on breaker box trailer

b) Verify the Tote is Empty

1. Get 8' ladder and gauging stick
2. At top of the tote remove 3" center cap
3. Stick the tank – verifying level before adding additive
4. Replace 3" center cap

c) Preparing to load the tote

1. Turn motors – motor 1 move to hand position for one second, verify motor turns on
2. Repeat step 1 for second motor
3. Verify PLC panel powers up and goes to "idle screen" (which indicates last load and totalizer)
4. Pull hose and stinger out of storage box on back of trailer
5. Pull 1" plug from fill line at front of trailer
6. Teflon tape threads and connect hose to ball valve on front of trailer
7. Insert stinger into supply tank – verify level
8. Close valve at bottom of tote (#3)
9. Open both fill line valves (#1 and #2)
10. Verify that valves on either side of pump are open (#4, #5, #6, and #7) to remain open except when servicing pumps (normally open)

Safe Work Procedure

1.0 Preparing the tote

- 1.1 Verify that tank return valve (#10) is in open position
- 1.2 Turn both motor 1 and motor 2 HOA switches to the "hand position"
- 1.3 Tote should begin to load from supply tank
- 1.4 Allow motors to lose prime – it lets' you know when hose is completely empty (allow pressure to fall to zero)
- 1.5 Turn off pump motors
- 1.6 Close both valves going to fill line (#1 and #2)

2.0 Completing the process

- 2.1 Remove hose from front of trailer and drain both ends into bucket
- 2.2 Roll hose up and place back in storage box in back of trailer
- 2.3 Open supply valve at bottom of tote (#3)

2.4 Re-stick tank to verify level

3.0 Calibration

Note: Step ladder may be required

Note: If supplied, hold DEAD MAN SWITCH during this process

- 3.6 Verify PLC power up and is on "Idle Screen"
- 3.2 Take glass cover off to access touch screen
- 3.3 Remove black rubber cap from SaFTPac calibration stem
- 3.4 Verify inlet valve open
- 3.5 Verify that motor of choice is in "auto" position
- 3.6 Press F1 key two times (2x) on PLC screen
- 3.7 Calibration screen will appear and say calibration will inject 80cc
- 3.8 Turn output valve on SaFTPac to calibrate
- 3.9 Turn return valve on SaFTPac to calibrate
- 3.10 Push start button on PLC TOUCH SCREEN
- 3.11 Unit will inject and piston will extend out of SaFTPac
- 3.12 Take reading from SaFTPac cylinder (may need ladder)
- 3.13 PLC screen will now show Metered, Measured and Accept Button and Exit Button
- 3.14 Touch measured box on PLC pad (Number pad will appear)
- 3.15 Using the PCL pad, enter the amount indicated on SaFTPac cylinder
- 3.16 Press "Enter" on PCL number pad
- 3.17 Then press "Accept button" on PCL screen
- 3.18 Press F1 key for times (4x) on PCL screen
- 3.19 Verify new K-factor
- 3.20 Repeat calibration process until you have two "verified" calibrations within 1-5% of target depending on customer requirements
- 3.21 Press F1 key three times (3x) PCL pad will return to "idle screen"
- 3.22 Turn return valve on SaFTPac to return
- 3.23 Turn outlet 3way valve on SaFTPac back to outlet
- 3.24 Replace glass covering PCL screen
- 3.25 Replace black cover on SaFTPac cylinder
- 3.26 This completes the calibration process

Note: Repeat as required – Titan recommends calibration every time tank is loaded

4.0 Loading Additive into Truck

- 4.1 Verify unit has power
- 4.2 Breaker on "On" position
- 4.3 PLC screen power up

Note: Record initial totalizer reading, if required

- 4.4 Connect ground wire on front of trailer to truck (truck ground)
- 4.5 Open storage box in front of trailer to access DRY BREAK
- 4.6 Go to truck – pull DRY BREAK cover/cap from side of truck
- 4.7 Take female DRY BREAK out of box connect to male DRY BREAK in first compartment on truck
- 4.8 Close DRY BREAK box on front of trailer
- 4.9 Run out the Stainless-Steel braided hose – assuring that slack is out so hose lays flat on ground
- 4.10 Attach female quick connect on hose to male quick connect on DRY BREAK
- 4.11 Talk to driver to determine size of load, and that driver has allocation at that terminal
- 4.12 Verify motor of choice is in AUTO position
- 4.13 Press green "Start Button" on time (1x) this will bring up Load Screen which will read zero
- 4.14 Using 4 black buttons located under the PLC screen (labeled with number +10, +100, +1,000, +10,000), enter desired load size

For example: for load size of 5,500 gallons, press the +1,000 button 5 times and +100 button 5 times

- 4.15 PLC screen will indicate remaining total which is required for total load
- 4.16 Verify outlet valve turned to outlet position
- 4.17 Verify inlet valve is in open position

NOTE: HOLD DEAD MAN SWITCH IF SUPPLIED

- 4.18 Press green "Start Button" located on box below PLC screen and second time, solenoid will open and pump will start
- 4.19 Monitor current and remaining total on PLC screen – Current Total will move up and Remain Total will move down
- 4.20 When load is complete, pump will automatically stop, solenoid will close, and PCL unit will return to "Idle Screen"
- 4.21 Record current total and last load total for BOL, if required
- 4.22 Go to truck – remove quick connect and roll stainless hose black up
- 4.23 Disconnect DRY BREAK from truck and return to storage box on front of trailer
- 4.24 Disconnect ground from truck
- 4.25 Give BOL to driver

5.0 Process to Empty Tank

- 5.1 Stick tank to gauge fluid
- 5.2 Remove stinger from storage box in back of trailer
- 5.3 Place stinger in off-loading tank (receiving tank)
- 5.4 Attach other end of stinger hose to discharge "T" at top of tank (labeled valve #7)
- 5.5 Open valve #7
- 5.6 HOLD DEAD MAN SWITCH (IF SUPPLIED)
- 5.7 Turn on motor of preference to "Hand"
- 5.8 Allow pump to start until pump loses prime or tank is full (pressure Gauge reads zero)
- 5.9 Release DEAD MAN SWITCH (IF SUPPLIED)
- 5.10 Remove stinger from Receiving Tank
- 5.11 Close drain line (Valve #7)
- 5.12 Drain hose into off-loading tank (receiving tank)
- 5.13 Return hose to storage box in back of trailer
- 5.14 Turn breaker box to "Off" position (breaker box located on trailer)

If an emergency situation occurs while conducting this task, or there is an equipment malfunction, shut the equipment off immediately and follow the lock-out procedure.

Report Hazardous Situations to Your Supervisor Immediately

Housekeeping

- Switch off all equipment
- Leave work area in a safe, clean, and tidy state

Date written: April 26th, 2019
Procedure developed by: Laura Wydra
Date last revised:
Revision No.: 0

Approved by: Pat Hunt
Date Approved: April 26th, 2019

Signature:



SECTION - 8.0

Sub-Section 8.2

Company Safety Certifications
(ISNetworld, Comply Works, Avetta, COR)

Certificate of ISNetwork® Membership



W.S. Nicholls Western Construction Ltd.

851 Derwent Way | Delta, British Columbia V3M 5R4

ISN ID Number: 400-184098

A member of ISNetwork since November 29, 2011

A stylized, handwritten signature in black ink, likely belonging to Joseph Eastin.

Joseph Eastin, CEO



A stylized, handwritten signature in black ink, likely belonging to Brian Callahan.

Brian Callahan, PRESIDENT & COO



COMPLYWORKS

Get ready to work.®

THIS CERTIFIES THAT

W.S. Nicholls Western Construction Ltd.

Subscriber Number 1114223

IS A SUBSCRIBER OF COMPLYWORKS

VALID UNTIL 2023-03-01

Subscriber Since 2012-03-01



CAL FAIRBANKS, PRESIDENT & CEO
COMPLYWORKS LTD.

05/02/22



W.S. Nicholls Western Construction Ltd.

Became a member of the Avetta Consortium on:

04/19/17

This document certifies that the company above is a Member of the Avetta Consortium. Being an Avetta Consortium Member signifies that you are part of a global effort to advance company and worker safety, sustainability, and operational excellence. Consortium Members represent a pursuit of excellence in delivery, safety and sustainability.

Arshad Matin

Arshad Matin, President and CEO



Taylor Allis

Taylor Allis, Chief Product Officer

Certificate of Recognition

HEALTH & SAFETY

This certificate is awarded to

W. S. Nicholls Western Construction Ltd.

For developing, implementing, and successfully auditing a health and safety management system that meets the approved industry standards, and for demonstrating a continuous commitment to raising the standard of worker health and safety in the province of British Columbia.



AL JOHNSON
Head of Prevention Services



Certificate Number: 000654351120210608HS
WorkSafeBC Legal Name: W. S. NICHOLLS WESTERN CONSTRUCTION LTD.
WorkSafeBC Account Number: 654351



MIKE MCKENNA
Executive Director



Classification Unit(s): 721038
Certified as Large / Small Employer: Small
Expiry Date: 5-May-2024



SECTION - 8.0

Sub-Section 8.3

Company Sample Environmental Protection Plan

W.S. Nicholls' Ref. No. M-001-943

Osoyoos Airport

Request for Quotation

Avgas Fuel Tank and Cardlock Fueling Cabinet



W.S. NICHOLLS WESTERN
CONSTRUCTION LTD.

ENVIRONMENTAL PROTECTION PLAN
VANCOUVER INTERNATIONAL AIRPORT
RUNWAY 26R RESA FUEL HEADERS
RELOCATION PROJECT

August 2018 – April 2019

(Revision No. 04)

Prepared by:

W.S. Nicholls Western Construction Ltd.
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EPP - RUNWAY 26R RESA FUEL HEADERS RELOCATION

1.0 INTRODUCTION

This document is the Environmental Protection Plan (EPP), it is to be followed by W.S. Nicholls Western Construction Ltd. (Contractor) during the Runway 26R Fuel Headers Relocation Installation Project at YVR. The Client is Vancouver Airport Fuel Facilities Corporation, represented by FSM Management Group (Project Manager). The design of the Works has been undertaken by Hatch - Nova Scotia (Engineer). This document addresses the activities of the Contractor in constructing the Works. This plan in its entirety will be on-site in a conspicuous location at all times.

1.1 Site Location

The Vancouver International Airport is located within the Fraser River Delta, on Sea Island between the North Arm and Middle Arm of the Fraser River in Richmond, British Columbia. Work will be airside adjacent to the North Runway 26R.

1.2 Hazardous Construction Materials

Hazardous Materials which will be in use on-site during construction include the following:

- Diesel Fuel;
- Hydraulic Fluid;
- Gasoline;
- Propane;
- Potable Water;
- Concrete;
- Grout;
- Paint;
- Paint Thinners;
- Coolants; and
- Welding / Cutting Gases.

1.3 Environmental Issues List

The following is a list of environmental issues which relate to the construction of the Works:

- Off-site habitat area - Fraser River and Fraser River Estuary;
- On-site soil and ground quality;
- On-site surface water quality;
- Sediment control in storm water run-off;
- On-site air quality and dust control;
- Disposal of wastes and excess soils;
- Hazardous materials handling and storage; and
- Response to fuel spills and leakage.

1.4 Environmental Standards, Codes and Regulations

YVR's Construction Standards have been reviewed in preparation of this plan. Additional regulations include the CCME Codes of Practice, Environment Canada's Petroleum and Allied Petroleum Products Storage Tanks Regulations, and BC Ministry of Environment Water Quality Guidelines. Works are to be conducted in compliance with the conditions, recommendations and mitigation measures described in the:

- Airport Authority Environmental Construction Standards;
- Airport Authority Fill Quality and Fill Placement Standards;
- Airport Authority Surface Water Quality Guidelines;
- Environmental Impact assessment Report by Golder & Associates, June 2018;
- Soil and Groundwater Investigation Report by Hemmera, January 2018;
- Environmental Review of North RESA. VAA, June 2017;
- Archaeological Assessment Review of Proposed Runway End Safety Area, June 2017;
- CSA Standard Z662-15 Oil and Gas Pipeline Systems;
- CSA Standard B836 – Storage, Handling and Dispensing of Aviation Fuels at Aerodromes; and
- CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

2.0 CONSTRUCTION ENVIRONMENTAL RATIONALE

2.1 Project Objectives

Project objective is to relocate the two (2) existing 20" underground fuel supply headers to facilitate the Runway 26R End Safety Area (RESA) by the installation of approximately 3300 meters of relocated 20" pipe, High Point Vents and Low Point Drains as required.

The installation of the Fuel System is to be guided by the latest environmental codes and regulations. In order to provide a rationale for the selected environmental protection components of construction, it is necessary to consider the environmental objectives, the site characteristics, the activities to be undertaken and the materials to be used. A system which meets the environmental objectives can then be designed.

2.2 Environmental Objectives

The overall environmental objective is to reduce the environmental risk of the project. Risk, broadly defined, is comprised of two (2) component factors: 1) the probable frequency that an event will occur; and 2) the consequence of that event. Environmental protection measures to be incorporated into the project are designed to reduce one, or both, of these risk factors. Probability of occurrence can be reduced by increasing the reliability of components of the system and of the system as a whole. Consequence can be reduced through protection of sensitive environmental areas, early detection of an occurrence, and advanced preparation for mitigation measures. Project specific objectives consider the geology and sensitivity of areas on the site, and the characteristics of the materials in use. This document discusses the environmental protection controls to be implemented during construction.

2.3 Geology and Environmentally Sensitive Areas

The site is relatively flat having been formed as a delta of the Fraser River. The site geology consists of over bank silty to silt clay loam normally less than 2.0 meters thick overlaying up to 15.0 meters of interbedded fine to medium sand and minor silt beds, of the Fraser River Sediments Group.

The weather during the expected construction period will vary depending on the season. There will be fluctuations of the water table during each season. A low groundwater table will increase infiltration of precipitation, resulting in lower levels of storm water runoff in the drainage ditches. While a high groundwater table will have the alternate affect.

The following environmentally sensitive areas have been identified:

- The Sea Island Conservation Area;
- Drainage ditches which drain to the North Arm of the Fraser River;
- Airport soil and groundwater; and
- Airport surface water.

2.4 Construction

2.4.1 Technical Operations

Technical operations to be conducted during construction include the following:

- Excavation;
- Pipe Welding;
- NDT of Pipe Welds;
- Media Blasting and Painting;
- Backfilling;
- New Low Point Drain/High Point Vent Pit Installation;
- Concrete for Pit Housekeeping pads;
- Pilot Tube Guided Boring;
- Grouting/Abandonment of Existing 20" U/G Fuel Lines; and
- Monitoring Well Decommissioning.

2.4.2 Construction Materials

The following are expected to be in use during construction:

- Heavy Equipment;
- Diesel Fuel;
- Hydraulic Fluid and Grease;
- Gasoline;
- Propane;
- Aggregates;
- Potable Water;
- Concrete;
- Grout;

- Steel;
- Paint;
- Paint Thinners;
- Wood;
- Plywood;
- Coolants;
- Welding Rod;
- Welding/Cutting Gases;
- Blast Media; and
- Bentonite.

2.4.3 Environmental Objectives - Construction

Waste management, waste water management, water conservation, sediment control and spill response are environmental components of this ECM. Specific objectives for environmental protection for this project during construction are to:

- Control disturbance of off-site habitat areas;
- Avoid contamination of on-site soils and groundwater;
- Avoid contamination of surface water;
- Responsibly manage excavated soils contaminated by historical sources;
- Reduce the risk and occurrence of spills of fuel and potentially deleterious construction materials;
- Reduce silt content in storm water run-off;
- Provide environmentally responsible Best Management Practices (BMP's) for the handling, disposal, and/or treatment of waste, excavated contaminated soils, and contaminated water (as applicable);
- Monitor for potential environmental effects; and
- Monitor compliance with the approved environmental plans.

2.4.4 Environmental Protection Technologies for Construction

Technologies which have the potential to meet the environmental objectives, given the site characteristics, activities and materials, are presented along with potential advantages and disadvantages for their use. Technologies are broken down by applicability to site specific environmental objectives.

The advantages and disadvantages of potentially applicable technologies are presented under the heading of the site specific environmental objectives.

Control Disturbance of Off-Site Habitat Areas

The construction process must not affect off-site habitat through the production of turbid / silt-laden storm water runoff. This objective is achieved by minimizing the size and duration of surface excavating, and by reducing the potential for silty storm water runoff from the activities to storm water systems leading to the Fraser River.

Environmental risk will be reduced by:

- Minimizing disturbance to natural areas and vegetation that may contribute to fish and wildlife.
- Limiting project activities to designated work areas to reduce potential effects to surrounding areas.
- Vegetation clearing boundaries should be delineated in a highly visible manner prior to clearing such that vegetation outside of the boundaries is not accidentally removed.
- Utilize existing disturbed areas and cleared areas, such as parking, paved or gravel areas, as designated laydown areas to reduce the amount of vegetation removed or disturbance of habitat that may be utilized by wildlife.
- Vehicles and equipment should be restricted to designated work and laydown areas to reduce vegetation disturbance.
- Any accidentally disturbed areas are to be restored to a pre-disturbance condition and in a manner that reduces colonization and the spread of noxious weeds. Seeding should occur as soon as possible and in the appropriate season (Spring [April – May] or Fall [September – October]).
- Pumping trench water directly into YVR supplied tankage on site, if required.
- Installing sumps to detain water as a component of on-site, passive treatment and / or directing discharge water to vegetated areas for infiltration.
- Temporarily suspending works during intense rainfall events if the environmental monitor deems the existing / available erosion and sediment control measures as not adequately mitigating potential adverse effects.
- As required, actively treating turbid / silt-laden water via the implementation of an active treatment system.
- Conducting regular testing, by VAFFC's Approved Environmental Consultant (AEC) to test discharge water to ensure compliance with the YVRAA Surface Water Quality Guidelines.
- Installing well point dewatering systems, if required, to control water infiltration from high water tables.
- Reducing water infiltration into the trench by directing water away from trenches in green field installations (if required).
- WSN has reviewed Hemmera's study No. 500-058.02 relating to soil and groundwater testing at the RESA north airfield. Based on the report findings, all soils are expected to be excavated and used as backfill in the immediate area of their excavation.
- For potential contaminated soils, should impacted soils be encountered and should the impacts be significantly different from Hemmera's characterization, inspection by the VAFFC's AEC and/or YVRAA to ensure disposal compliance for re-use, disposal on Sea Island, or disposal off-site. Final disposal decisions are expected to be made by YVRAA.
- For all clean soils, stock piling on-site adjacent to the work zone for re-use during backfill.
- Alternatively, should unexpected contamination be encountered, soils will be tested in-situ to determine disposal requirements at a qualified landfill.

Reduce the Risk of Spills of Fuel and Potentially Deleterious Construction Materials

Fuels and small quantities of lubricants will be utilized in the construction process. Risk from these substances will be reduced through actions to reduce the probability and consequences of a spill. The probability of a spill is reduced through precautionary preparations, including facilities, appropriate equipment maintenance at the prescribed maintenance intervals, and pertinent training. The site Health and Safety Plan will address the training of workers in the safe handling of dangerous goods. Additionally, visual inspections and designated checklists will be completed by equipment operators to reduce the potential for leaks and spills resulting from damaged hosing, loose connections, or other apparent signs of 'wear-and-tear' that could result in a spill.

Equipment and material arriving on-site will be clean and generally free of fines, organic materials and deleterious substances. To reduce the introduction of invasive species, equipment should be washed and free of soil and vegetation matter prior to arriving on-site.

Storage of fuels will be located away from drainage systems including ditches, kept within secondary containment with adequate capacity, protected from precipitation, and stored to permit inspection. Local fire protection equipment will be provided and spill response kits will be kept in the area. Compliance with preventative measures will be monitored by the Contractor's construction superintendent.

The potential consequences of a spill will be reduced through awareness and inspections by the Contractor's Superintendent and staff, and the implementation of the Contractor's Environmental Emergency Response Plan.

W.S. Nicholls will also provide environmentally responsible disposal of waste and excess soils. Only clean soils will be disposed offsite to minimize disposal costs.

Environmental Sampling/Monitoring

An Approved Environmental Consultant (AEC; Golder), appointed by VAFFC, will be available to assist in the determination of the chemical characteristics of soils should the condition differ from Hemmera's report. Where warranted, sampling of waste soils will be conducted by the AEC to determine the proper disposal option. Any documentation required for the disposal will be prepared by the AEC and a copy provided to VAFFC, the Contractor and YVRAA.

Prior to off-site discharge, surface water samples will be collected by the AEC to ensure compliance with the Airport Authority's Surface Water Quality Guidelines and discharge will be monitored for turbidity, suspended solids, erosion, and other

parameters, as deemed to be required by the AEC. Copies of all analytical results will be provided to VAFFC, the Contractor and YVRAA if required.

The AEC will conduct environmental monitoring as required. Any reports generated will be submitted to the Contractor, the VAFFC project manager and YVRAA with suitable recommended remedial actions.

Backfill Compaction

All excavated soils will be re-used in the immediate vicinity of their original excavation. Should material be in excess, only clean soils will be disposed offsite. Backfill will be compacted to densities approved by the Engineer. Upon completion of work, the compaction will be tested. Records will be available from the Contractor and issued as part of the turnover package. The use of CDF to enhance construction schedule may also be used.

Restore the Site to Previous or Better Conditions

Restoration of the site includes completion of the Works as per the drawings and specifications and removal of waste materials and deleterious substances collected during construction.

Monitor Compliance with the Approved Environmental Plans

W.S. Nicholls will work cooperatively with the AEC, the VAFFC project manager and YVRAA to ensure the Work is in compliance with YVRAA expectations. Work which is observed to be not in compliance will be brought to the attention of the W.S. Nicholls Western Construction Ltd. and YVRAA and VAFFC will be vested with the authority to halt the construction activities.

3.0 GENERAL ENVIRONMENTAL PRACTICES AND PROCEDURES

3.1 General Sediment Control

Multiple systems will be utilized throughout the construction phases to control sediment. Silt bags, silt fences, and a return to ground (re-absorption) method will be used. YVRAA tankage for ground water to control and contain all sediment or contamination in the discharged groundwater has not been contemplated, but in some phases, may also be utilized, if required.

3.2 General Equipment Cleanliness and Maintenance

All fuel, hydraulic, and lubricating systems will be kept in good repair to avoid leakage of deleterious substances. Leaking equipment will be immediately removed from the vicinity of watercourses or wet areas, repaired and inspected before being returned to the work site. Fueling will take place away from sensitive areas. Where remote fueling must be accomplished, additional measures will be taken to prevent and contain any potential spillage.

3.3 Small Leaks or Spills

Small leaks or spills of deleterious substances (hydraulic oil, fuel) will be immediately contained and cleaned up. Sorbent materials such as pads and booms will be kept on-site at all times. A total of one bag of sorbent particles will be kept in the construction area, near the fuel storage area and the active construction zone. Sorbent materials will be transported with the fuel to remote fueling locations. Separate temporary collection and storage drums will be provided for incompatible materials (fuels, lubricants).

3.4 Potentially Toxic Construction Materials

Construction materials used in wet areas will be appropriate for these applications as determined by YVRAA / VAFFC and its consultants. The Contractor will review the construction materials for possible inclusion in the site Health and Safety Plan. Material Safety Data Sheet (MSDS) information shall be maintained on site by the contractor for all potentially toxic construction materials.

3.5 Fuel Storage

Areas for storing fuel and/or potentially deleterious or toxic materials will be located at a minimum distance of 30 m from any watercourse (including drainage ditches) or ignition source and kept within secondary containment of adequate capacity (110% capacity minimum) for the tank volume. When fueling, care will be taken to prevent overfilling machines. Emergency response and spill containment and absorbent materials will be available on site at all times.

3.6 General Clean-up

The construction site will be kept clean to assist in controlling bird populations at the airport. Construction waste, rubbish and debris will be cleaned up periodically during construction. A final clean-up will occur following construction.

3.7 Waste and Recyclables Disposal

Construction waste and recyclable materials will be removed off-site on a regular basis by the contractor for proper disposal and / or recycling where applicable.

3.8 Excavation

Should abnormal soil conditions be encountered, soils will be stockpiled on poly to prevent run-off of wet soil. Following completion of construction, excavated or new import fill will be placed back into the excavations and the original elevation will be restored. If available, YVRAA will provide an on-site disposal location for uncontaminated excess soil or soil unsuitable for compaction. Suspect soil will be sampled in a manner consistent with B.C. Environment Guidelines and CCME for classification. Similarly, any groundwater encountered that contains an odour and/or sheen will require appropriate management, including potential testing and appropriate disposal.

3.9 Emission Control

Construction activities undertaken at the Project Site by W.S. Nicholls and their contractor, have potential, depending on activity type and proximity, to affect noise and light sensitive receptors such as, nearby residences and sensitive wildlife. W.S. Nicholls is responsible for assessing and documenting construction activities that may generate noise and light emissions at the Project Site. Noise generation, vibrations and ambient lighting, resulting from equipment and associated activities during construction will be addressed, if required by notifying property owners / tenants of neighboring areas, implementing a Noise and Light Monitoring Program, retaining or erecting acoustic / visual barriers and reducing light scatter and off-site noise migration, which may have negative effects on sensitive habitat and animal behavior. If measured noise exceeds the British Columbia Noise Control Best Practices Guidelines (BC Oil and Gas Commission, 2009), additional mitigation measures such as changes in construction schedule, changes in construction methods or system controls, will be implemented to address the issue.

3.10 Sensitive Wildlife and Species at Risk (SAR)

W.S. Nicholls will prevent, detect, monitor, and control wildlife species observed within and adjacent to construction sites. Potential impacts to terrestrial wildlife, sensitive species, and associated habitats include increased worker-wildlife interactions, temporary displacement of wildlife and temporary or permanent loss of wildlife. All construction site workers should ensure wildlife interactions are limited by appropriately removing and storing food waste generated on-site. If wildlife is a problem at the Project Site, auditory and physical deterrents such as kites, balloons, flashers, bangers and predatory models may be utilized, if required.

If nesting raptors are observed within 200 m of the Project Area, or if nesting herons are observed within 400 m of the Project Area, no-disturbance buffers should be established under the guidance of an appropriately qualified biologist

To protect SAR, W.S. Nicholls will conduct a pre-work SAR survey, conducted by a QEP, to assess the potential occurrence for SAR on-site. If a SAR is located, a SAR report will be filed and submitted to BC Conservation Data Center (CDC), a salvage will occur with efforts to relocate the SAR during Project works and the remaining undisturbed area(s) will be demarcated to prevent encroachment during work.

3.11 Vegetation Management

Vegetation management will reduce disturbance, protect existing native plants, reduce invasive seed transfer, and control invasive plants. Where possible vegetation, especially trees, should be retained to increase soil stability, increase infiltration of surface water and increase available habitat for wildlife. Trees to remain within the confines of a construction site must be isolated to restrict access and to isolate trees from construction related equipment. The Migratory Bird Convention Act, 1994 prohibits the destruction of migratory birds, their nests or eggs. Risks to migratory birds can be reduced by ensuring construction

related works are undertaken at a time of year when the risk of negative impacts to migratory birds are low. If work is to occur within a high-risk window, a QEP will be retained to conduct a survey that will be completed in accordance with the Canadian Wildlife Service [CWS] survey recommended methodology.

3.12 Invasive Species

On-site vegetation management will aim to prevent, detect, monitor, and control invasive species, if documented at the Project Site. Invasive plant species out-compete native vegetation, and cause damage to the natural environment. If invasive species are encountered at the Project Site, W.S. Nicholls will limit clearing and excavation to the immediate work area, limit the transfer of invasive plant material between work sites and clean all contact equipment, disposing of the process water as appropriate.

4.0 COMPREHENSIVE SOIL AND WATER MONITORING PROGRAM

4.1 Soil Monitoring

Excavated soil samples exhibiting visual or odiferous evidence of contamination, different from what is identified in Hemmera's report, will be stockpiled, or left *in situ*, for examination by the AEC and/or YVRAA.

4.2 Surface Water Monitoring

Surface water flowing in the construction area (sheet flow from storm events) will be directed away from the excavation by a method conducive to the conditions, this may include the use of sand bags and other methods of diverting water. The water will ultimately find its way into YVR's drainage system.

5.0 DEWATERING AND STORM WATER RUN-OFF MANAGEMENT PLAN

As a default, trench/excavation water will be considered clean and monitored for turbidity only. In areas of known or suspect contamination, water will be monitored and tested by the AEC for applicable parameters outlined in the YVRAA Surface Water Quality Guidelines by YVRAA and disposed of in a responsible manner. The tested parameters will be contingent on the potential type(s) of suspect contamination. Possible disposal may include on-site tanks and skimming or filtration of contaminants prior to disposal, off-site disposal, or disposal through YVRAA's on-site treatment facility (none of which have been contemplated for this project).

Surface water flowing in the construction area (sheet flow from storm events) will be directed away from the excavation by a method conducive to site conditions, which may include the use of sand bags and other methods of diverting water. The run-off will ultimately find its way to YVR's drainage system. Any runoff finding its way into the excavation will be handled as described in 3.1 for sediment control.

6.0 ARCHAEOLOGICAL MONITORING PLAN

Ground disturbance activities, regardless of size, depth or location, have the potential to result in the discovery of previously unrecorded archaeological resources. The following “Encounter Protocol” will be implemented if construction activities encounter potential archaeological / cultural materials:

Encounter Protocol

1. If construction encounters actual or suspected archaeological or historical materials, workers will immediately STOP WORK in that location, subject to safety considerations, and notify their supervisor(s). The supervisor(s) will then immediately notify YVRAA and the AEC who will contact the Archaeological Consultant to organize a site visit.
2. In the case of discovery of an isolated artifact, whenever possible leave the artifact on the ground where it was found; however, if the artifact is in imminent danger of being destroyed or damaged, collect it and mark its location with a stake or flag and provide it to the Archaeological Consultant, or to the appropriate construction supervisor if the Archaeological Consultant cannot make a prompt on-site visit.

7.0 WASTE MANAGEMENT PLAN

W.S. Nicholls adheres to a stringent Waste Management Plan consisting of the following while working at the Project Site:

- Foreign Object Debris (FOD) abatement is of a primary concern to W.S. Nicholls; therefore, site clean-up is done on a daily basis and any debris that may become FOD is cleaned up as it is generated and put in the suitable on-site waste storage bags / receptacles / bins.
- All waste generated on site by construction activities is removed from site and disposed of off-site at approved disposal facilities.
- All waste generated on site by construction activities is temporarily stored on-site in waste storage bags / receptacles / bins and disposed of off-site at approved disposal facilities on an on-going basis (probably daily).
- W.S. Nicholls, wherever possible, is committed to reducing the quantity of construction waste through reduction, re-use and recycling. Where materials cannot be re-used, they are recycled where practical, such as all waste metals and plastics.
- Upon completion of the Project, W.S. Nicholls will remove all construction related equipment, materials and debris from the Project Site to the satisfaction of the Owner and YVRAA.

8.0 DUST CONTROL AND CONSTRUCTION VEHICLE FOD

W.S. Nicholls does not anticipate any dust generation issues from project equipment or activities. However, jet blast in certain areas may be of concern. Requesting a change to aircraft push back locations, wetting or watering systems, covering the area, or tack coating may be used to control dust if required.

Construction Vehicle FOD tracked on Apron surfaces will be mitigated through vehicle inspections, and by manually cleaning the vehicles prior to movements. When conditions during activities dictate constant monitoring and controls, Sweeper Trucks may be used to follow vehicles to and from the work areas to the groundside entry point. In the event additional controls are required, a type of wheel wash system may be utilized.

9.0 WORK AROUND EXISTING UNDERGROUND SERVICES

To mitigate risks of spills caused by contact with existing underground services it is W.S. Nicholls' procedure to use hand digging, hydro-excavation and machine digging to daylight and locate existing lines and utilities during excavation.

Knowing the probable depths and locations of services to be exposed through the study of as-build drawings and / or utility locates; the services are then exposed by hand digging and physical probing in advance of the Excavator which carefully excavates with a clean-up bucket only to the depth and locations that have been cleared by the hand excavation and physical probing in advance. All persons performing this work are constantly vigilant and spotting for the operator of the equipment to ensure that no contact with machine and services occurs.

Once the underground services have been physically located they are hand excavated and exposed for 1 meter in all directions in which area the machines are not to dig.

The services are then carefully backfilled and compacted in the reverse order with the same slow and meticulous approach to ensure that they are not disturbed in any way.

If there is any contact with Services in any way by the powered excavation equipment, the Superintendent will then immediately contact YVRAA and the VAFFC Project Manager and request immediate inspection of the contact area.

10.0 SPILL RESPONSE PLAN

All spills, regardless of size, shall be reported to YVR Airport Operations at 604-207-7022 and the VAFFC Project Manager, the AEC and EM.

Special attention must be given to containment, clean up and removal of any product or material. The established spill containment procedure must be rigidly maintained, e.g. any oil, etc. spilled on the ground must be properly contained, cleaned up and the contaminated substance properly disposed of. A large emergency spill containment kit will be located on site.

Potential Hazards associated with light density fuel spills include:

- Fire;
- Explosion;
- Vapor asphyxiation; and
- Poisonous to animal life (aquatic and terrestrial).

All fuel technicians and agents shall be trained for, and prepared to respond to, any environmental emergency that could occur during fuel storage, handling, and dispensing operations (or during actual storage).

In the event of any spill, the worker must first ensure the safety of themselves and their co-workers. Contain the spill if possible. He / She is to report to the Superintendent on-site immediately:

- That there was a spill;
- The type of material spilled;
- The location of the spill; and
- The amount of the material spilled.

The Superintendent shall then either have the spill cleaned up immediately (small spills only) or shall inform the security escort to contact the YVR Duty Manager and contact Swissport (see the following contact list in this situation) and ask for immediate spill response mobilization. The Swissport Aviation Spill Response Leader upon arrival will take control of the spill site and contact appropriate contacts and resources. The Superintendent will mobilize their forces to assist the Swissport Spill Response Team.

The general response procedures are as follows:

- Ensure personnel safety;
- If safe stop the source of the spill;
- Remove all ignition sources;
- Immediately notify the site Superintendent of the type of material spilled, the location, and the volume;
- Access the emergency spill response kit on site;
- Remove fire extinguisher from the mobile equipment or spill kit and place them up wind; do not perform any function that could create a spark;
- Let all vehicles in the immediate area continue in their current safe operation, either running or off, to prevent backfire;
- Contain spill with resources at hand; and
- Place barriers around the spill area to divert vehicular and pedestrian traffic until help arrives and can initiate clean up procedures.

The spill response kit contains materials necessary to perform an immediate response including:

- Oil compatible, dry chemical, portable fire extinguishers;
- Personal protective clothing including goggles, Tyvek suits, rubber gloves, tape and rubber over-boots;
- Mud bags and shovels, rope and knife to contain the movement of the spill;
- Oil absorbent booms/pads, oil sorb particles, stakes and hammers to collect and intercept the hydrocarbons;
- Drums and shovels to collect and contain contaminated absorbents and soil; and
- Stakes and hammers, rope and knife to cordon off the area.

The Superintendent is to assess the need for support and first aid and arrange, if required. The Superintendent is also to inform YVRAA, VAFFC's project manager, and the AEC of the spill. Following the consultation with YVRAA, the VAFFC Project Manager, and the AEC, the Superintendent is to organize his crew and assist with containment and disposal procedures as directed by the Swissport Spill Response Leader. Following a response to a spill, the Superintendent shall inspect the spill response kit and replenish the supplies to the specified quantities.

EMERGENCY RESPONSE CONTACT LIST

Contact	Organization	Position	Telephone	Cell
Swissport Tank Farm	Swissport		(604) 273-5723	
Swissport Dispatch	Swissport		(604) 214-3550	
Swissport Ground Operations	Swissport		(604) 278-2118	
Swissport Ground Maintenance Manager	Swissport		(604) 278-2118	(778) 772-5897
YVR Operations (Fire Trucks (foam), etc...)	YVR Airport		(604) 207-7022	
911 (if required)	Emergency Response Services	<u>EMERGENCY</u> 24-hour	911	
Graham Napier	W.S. Nicholls	Superintendent	(604) 521-2004	(604) 970-0478
Jim Wheatley	W.S. Nicholls	Superintendent	(604) 521-2004	(604) 970-2056
Darrell Dyck	W.S. Nicholls	Superintendent	(604) 521-2004	(604) 970-2726
Brent Easter	W.S. Nicholls	Project Manager	(604) 521-2004	(604) 970-2569
Pat Hunt	W.S. Nicholls	Project Manager	(604) 521-2004	(604) 970-4257
Chris Lee	AquaTerra	Environmental Monitor (EM)	(604) 357-3475	(604) 765-2993
	Golder	Approved Environmental Consultant (AEC)	(604) 296-4200	
Peter Jarvenpaa	FSM Management /VAFFC	Project Director/Manager		(604) 760-7524
Rosa Henriquez	FSM Management /VAFFC	Environmental Manager	(514) 244-8091	
Provincial Emergency Program (PEP)		24-hour Spill Reporting	1-800-663-3456	
Environment Canada		24-hour Spill Reporting	(604) 666-6100	
Fisheries and Oceans Canada		24-hour Hotline	1-800-465-4336	(604) 666-3500
Richmond Emergency Response Services		<u>EMERGENCY</u> 24-hour	(604) 244-1262	
Richmond Emergency Response Service (FIRE)		Fire Non-Emergency	(604) 278-5131	

11.0 FIRE RESPONSE PLAN

IN CASE OF FIRE

Upon Discovery of Fire At / Or Near the Project Site:

- Leave fire area immediately;
- Raise the alarm for all site personnel. Yell "FIRE";
- Inform the Security Escort and Call 911 (from a safe location); and
- Call YVR Operations (Fire Trucks (foam), etc...) telephone (604) 207-7022

Upon Hearing of a Fire Condition:

- Leave building or area via nearest exit (if applicable);
- Close doors behind you as you exit (if applicable);
- Safely stop work on-site;
- Mobilize people and applicable equipment to the appropriate prepositioned Fire Fighting Equipment closest to the fire and begin to either fight or suppress the spread of the fire as appropriate if it is safe to do so;
- Continue to fight / suppress the spread of the fire until directed otherwise by Richmond Fire or YVR Fire Services personnel; and
- Stop and evacuate all personnel to a safe muster area if at any time it is unsafe to continue fighting the fire.

'REMAIN CALM AT ALL TIMES'

SECTION - 9.0

Quality Management

- 9.1 Company Quality Management System (QMS)
- 9.2 Company Quality Control Manual



Section - 9.0

Quality Management

Operations of WSN Western Construction (WSN) are guided by documented objectives. Our policy is to provide our customers with products and services of the highest quality and the greatest possible value, thereby gaining and holding their respect and loyalty. The essence of customer satisfaction is our commitment to quality, a commitment that extends to every phase of our operation. We must work closely with suppliers to ensure that we receive the highest quality materials on time to meet our construction schedules. Once in the construction phase the project must be completed with superior workmanship at a competitive cost. Careful attention to quality enables us to meet or exceed our customer's expectations. Completing a job properly the first time, and doing it consistently, allows us to employ fewer assets, reduce costs and contribute significantly to higher productivity. We believe that continuous improvements in what we do and the services that we offer can be achieved by increased quality.

Systems are in place to control, verify and correct activities and materials during the construction process to ensure that events occur in an orderly and timely manner. To assist in this process, information necessary to do the job is available at appropriate points during construction to ensure consistent quality. Testing and recording during construction using equipment with valid calibration certification verifies the performance of the final product.

This Inspection and Test Plan (ITP) is a beneficial tool to ensure the standards and performance required by WSN, the Client and Codes are met. The standards are set out in the project contract specifications, drawings and procedures by the Client to ensure a high level of quality. The Contractor must coordinate activities to conform to the committed standards. The ITP will assure that the end product meets the applicable requirements.

The ITP will identify the items, materials and work to be inspected or tested, by whom and at what stage or frequency. As well as (H) Hold, (W) Witness, (V) Verify, (I) Inspect, (N) Notification and (S) Surveillance points and references to relevant standards and records to be maintained.

Some examples of captured items included in an ITP are as follows:

Control of Customer Supplied Products

Upon receipt or acknowledgement of Customer supplied products that are lost, damaged, or are otherwise unsuitable for use, they are recorded and reported to the customer immediately through the use of a non-conformance report. A documented procedure has been established and maintained for the control, verification, storage and maintenance of Customer supplied components.

Product Identification and Traceability

Most components and equipment are identified using numbering or lettering systems to uniquely identify each part back to the manufactured process. Identification numbers are recorded and maintained throughout construction. A documented procedure has been established and maintained for identifying a product or lot by suitable means from receipt through final installation.



Receiving Inspection and Testing

Incoming supplies are source controlled, deliveries are checked against inspection instructions and purchase orders. Defective supplies are clearly identified as non-conforming and segregated from good materials. Non-conforming supplies are reviewed to determine appropriate corrective action by the Quality Control Supervisor and/or other designated groups. Documented procedures are established and maintained for inspection and test activities that verify product compliance with specifications. Product is inspected to ensure that it conforms to the purchase order or contract, drawings and specifications. When certification test reports are utilized to accept materials, data in these reports are reviewed for acceptability according to applicable specifications. Test reports are periodically validated.

In-Process Inspection and Testing

The quality of every process is the direct responsibility of each person performing the work. Each product is inspected as required within product or process documentation. Completed items that meet specification are either delivered to site for subsequent installation or delivered to the next stage in the fabrication process. Inspection and test results are gathered at various monitoring points. Assemblies produced are inspected or otherwise verified for quality fitness at each stage prior to progressing to the next.

Indication of Inspection Status

A system will be maintained for indicating the inspection status of components and services. Inspection status may be accomplished by means of flagging or other means of identification. Indications will not be applied in anyway that may damage or compromise the function or quality of the components or services.

Drawing and Change Control

Deliverable items and services will be fabricated, inspected and tested to the latest drawings and/or specifications. All approved changes will be incorporated into each deliverable item or service prior to delivery or performance, and the revised identification number will be exhibited on inspection records.

Final Inspection and Testing

Product assembly and test operations are carried out in accordance with controlled procedures. Testing is conducted with calibrated test equipment according to establish controlled test procedures. Records are maintained for finished products and finished components. Constructed products are released only after completed testing and/or inspection and verification indicating planned tests have been completed successfully. Any points identified as requiring Customer inspections are held until released by the Customer.

Inspection and Test Records

Records of inspection providing evidence of on-receipt inspection, in-construction inspection and final testing are retained and given to the Customer as per contractual requirements.

Checklists

Tests and Inspections will be recorded on checklists that will become part of the final Quality Control Package for submission. Prior to contract execution the development and approval of all (H) Hold Points, (W) Witness Points, (S) Surveillance, (V) Verify, (I) Inspect, and (N) Notifications will be detailed on the checklists in the ITP, pre-task review of the ITP and inspections will ensure the task is carried out to the specified quality.

W.S. Nicholls' Ref. No. M-001-943
Osoyoos Airport
Request for Quotation
Avgas Fuel Tank and Cardlock Fueling Cabinet

SECTION - 9.0

Sub-Section 9.1

Company Quality Management System (QMS)

Head Office:
851 Derwent Way
Annacis Business Park
Delta, B.C. V3M 5R4
Tel: 604-521-2004
Email:wsnwest@wsnicholls.com



Quality Management System Manual

in accordance with

**ISO
9001:2008**

Scope: For Shop and Field fabrication / installation of piping systems, pipelines, pressure vessels, above ground tanks and equipment.

	Name and Title		Date	Signature
Author #1:	Richard Mazur	QA/QC Mgr.	Nov-01-2016	
Author #2:	Pat Hunt	President	Nov-01-2016	
Reviewed by:	Richard Mazur	QA/QC Mgr.	Nov-01-2016	
Approved by:	Pat Hunt	President	Nov-01-2016	
Revision: 001	Richard Mazur	QA/QC Mgr.	Nov-01-2016	

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Date printed: Nov-01, 2016 @ 12:36 PM

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10.0 Appendix

Scope and Exclusions

1.1 Scope

This Quality Manual contains policies that have been implemented at:

***W.S. Nicholls Western Construction Ltd.
851 Derwent Way
Delta, British Columbia, Canada
V3M 5R4***

This manual pertains to processes relating to:

- The Shop and Field site fabrication, repair, alteration of piping systems,
- The Shop and Field site fabrication, repair, alteration of pipelines,
- The Shop and Field site fabrication, repair, alteration of pressure vessels,
- The Shop and Field site fabrication, repair, alteration of equipment, and
- The Shop and Field site fabrication, repair, alteration of above ground storage tanks.

The manual and related quality system documentation are written to comply with the requirements of ISO 9001.

1.2 Exclusions

The organization has one exclusion:

8.3 Design and Development

Justification: W.S. Nicholls Western Construction Ltd. does not design or develop products for our customers.

2.0 Company

2.1 Quality Policy

W.S. Nicholls Western Construction Ltd. is committed to consistently meeting our customers' requirements for quality construction, fabrication work and project excellence.

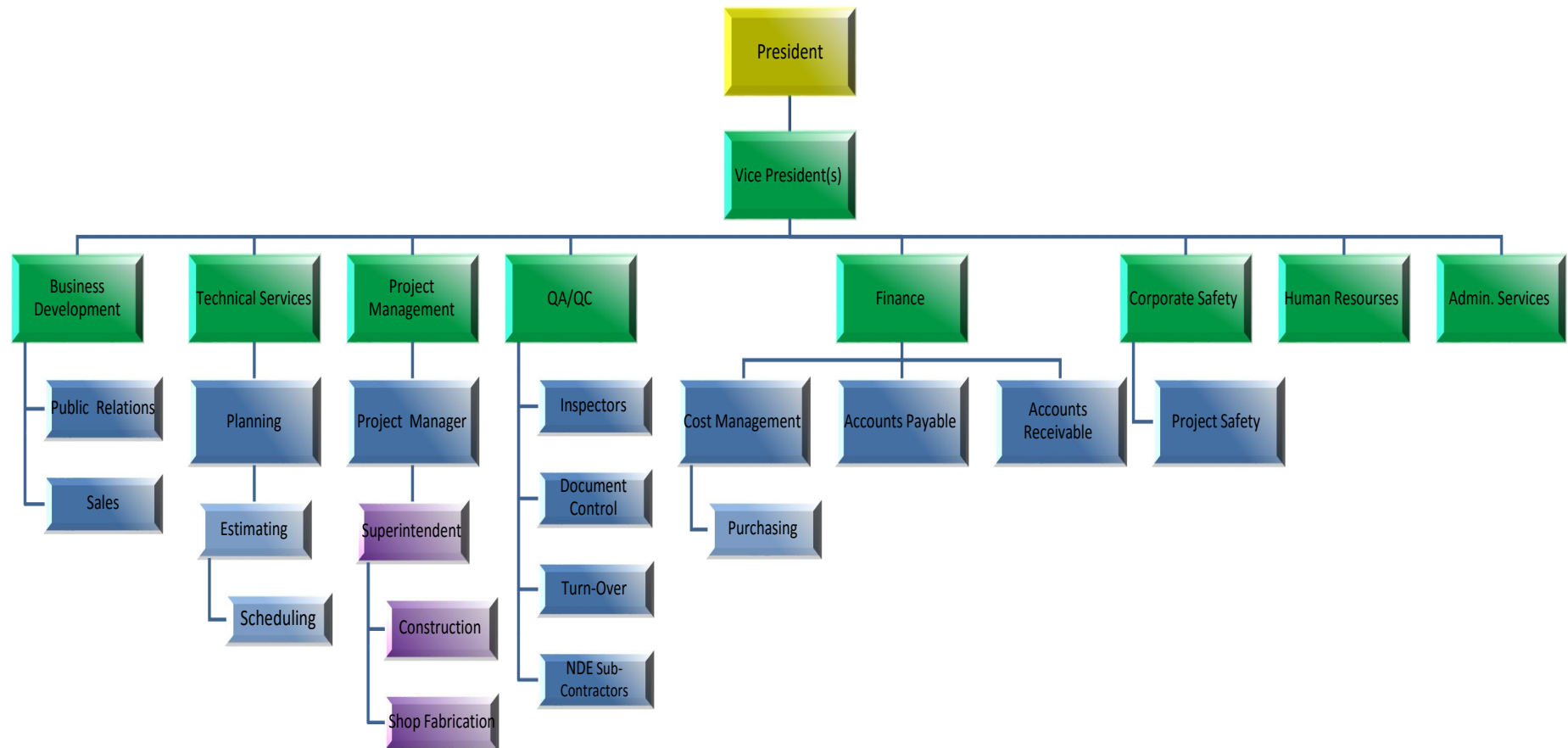
W.S. Nicholls is also committed to comply with the Quality Management System requirements of ISO 9001:2008, and to continually improve the effectiveness of these systems.

2.2 Quality Objectives

The Senior Management of W.S. Nicholls Western Construction Ltd. has identified the following Quality objectives. These are measurable and relevant to the successful completion of construction and fabrication projects and are consistent with the quality policy.

- 1. Customer satisfaction measured by the completion of projects which meet all Customer and Governmental standards.**
- 2. Work closely with all suppliers to ensure we use the highest quality materials.**
- 3. Ensure proper testing, recording and certification is completed and documented to verify and preserve the quality of the final product.**
- 4. Continually improve with the most current ISO 9001 systems in order to maximize cost effectiveness and market share.**
- 5. Communicate our commitment to Quality and the Health and Safety of all our employees and subcontractors at time of orientation and throughout their employment with W.S. Nicholls Western Construction Ltd.**

3.0 Corporate Organization Chart

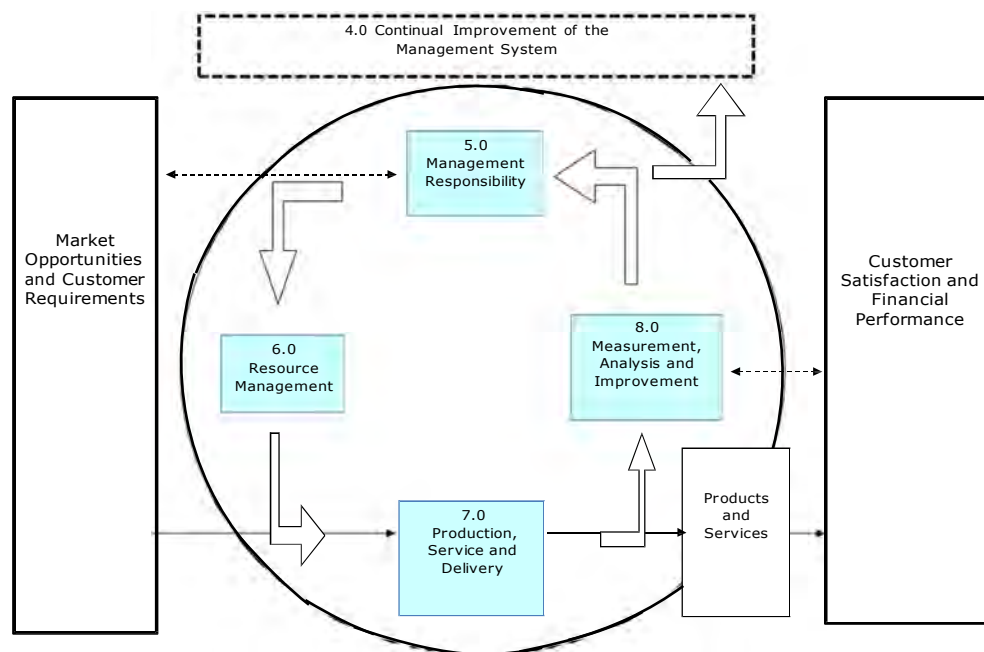


4.0 Terms and Definitions

Throughout this Quality Manual the term “**Organization**” refers to W.S. Nicholls Western Construction Ltd.

Quality Management System (QMS) refers to a system that considers the three main components: Quality Control, Quality Assurance and Quality Improvement. Quality Management is focused not only on product or service quality, but also the means to achieve it. A QMS, therefore, uses quality assurance and control of processes, as well as products/services to achieve more consistent quality.

ISO 9001 Quality Management System Model



Code	Generally the relevant ASME Boiler and Pressure Vessel Code Section, API, CSA Standards or other contractual construction Code.
Contract	The written covenant and other documents agreed to and legally binding between the customer and contractor with specific requirements and conditions that must be complied with to successfully complete the work.
Quality Manual	The policy document prepared by W.S. Nicholls Western Construction Ltd. outlining the Quality Program in effect.
Inspection	Any or all of the careful examination, measurement and testing of characteristics of items to ensure they meet Code, jurisdictional and contractual requirements.
Jurisdiction	The Federal, Provincial, Territorial or Municipal agency having lawful right and power to interpret the law and exercise regulatory authority.
Non-Conformance	A deficiency in characteristic, documentation or procedure which renders the quality of an item unacceptable, undetermined or not according to all applicable Code or Customer requirements, including those detailed in this Quality Manual.
Functional Manager	The manager responsible for the activity or function in question as defined in the Organization chart and indicated by the context
Company	Refers to W.S. Nicholls Western Construction Ltd.
Pronouns	He / She is genderless, and pronouns are singular or plural as the context requires.
Quality Manager	Variously referred to as QA Manager, QC Manager, Manager QA/QC - Official Titles understood to include designates as needed

5.0 Quality Management System

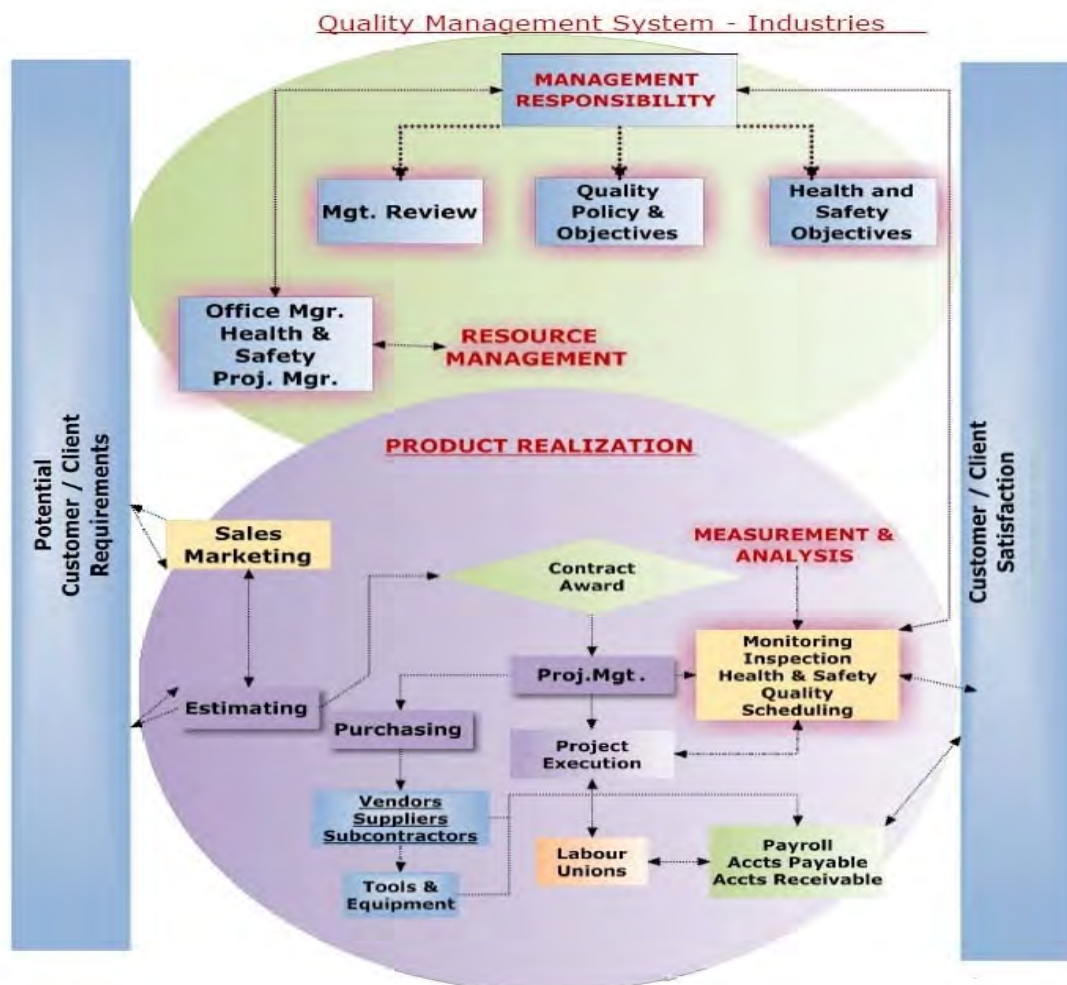
5.1 General Requirements

The organization has established, documented, implemented and currently maintains a Quality Management System. We continually strive to improve its effectiveness to the requirements of ISO 9001.

The organization:

- has determined the processes needed for the Quality Management System and their application throughout the organization,
- determined the sequence and interaction of these processes,
- determined criteria and methods needed to ensure that both the operation and control of these processes are effective,
- ensures the availability of resources and information necessary to support the operation and monitoring of these processes,
- monitors, measures where applicable and analyzes these processes, and
- implements actions necessary to achieve planned results and continual improvement of these processes.

These processes are managed by the organization in accordance with the requirements of ISO 9001 and are depicted on the following process flow chart.



Where the organization chooses to outsource any process that affects product conformity to requirements, the organization ensures control over such processes. The type and extent of control to be applied to these outsourced processes are defined within the Quality Management System.

W.S. Nicholls' Outsourced Processes

Outsourced Process	Provider	Controls
NDT Inspection	As required	Refer to Section-11 of the Quality Manual
Heat Treatment	As required	Refer to Section-12 of the Quality Manual
Calibration	As required	Refer to Section-13 of the Quality Manual

5.2 Documentation Requirements

5.2.1 General

The Quality Management System documentation includes:

- documented statements of a quality policy and quality objectives,
- a quality manual,
- documented procedures, forms and records required by Code and ISO 9001, including Procedure Generation and Control, Inspection and Test Plan Generation and Control, Internal Quality Audits and Contract Review.
- documents, including records, determined by the organization to be necessary to ensure the effective planning, operation and control of its processes.

5.2.2 Quality Manual

The organization has established and currently maintains a quality manual that includes:

- the scope of the quality management system, including details of and justification for any exclusions,
- the documented procedures established for the Quality Management System, or reference to them, and
- a description of the interaction between the processes of the Quality Management System.

The Quality Manager is responsible for maintaining the Quality Manual.

5.2.3 Document Control

Documents required by the Quality Management System are controlled. Records are a special type of document and are controlled according to the requirements given in section 4.2.4.

A documented procedure has been established (see Control of Documents Procedure) to define the controls needed:

- to approve documents for adequacy prior to issue,
- to review and update as necessary and re-approve documents,
- to ensure that changes and the current revision status of documents are identified,
- to ensure that relevant versions of applicable documents are available at points of use,
- to ensure that documents remain legible and readily identifiable,
- to ensure that documents of external origin determined by the organization to be necessary for the planning and operation of the Quality Management System are identified and their distribution controlled, and
- to prevent the unintended use of obsolete documents and to apply suitable identification to them if they are retained for any purpose.

The Quality Manager is responsible to maintain the Document Control Procedure, to ensure that relevant versions are available at points of use, to remove obsolete documents and to control external documents. Documents are reviewed and approved, including re-approval as required, by the appropriate Functional Manager along with the Quality Manager.

Controlled documents will be stored electronically on a secure server and available in read only format. Revisions to Controlled documents will be archived in a read only format in a separate directory available only by password access to authorized personnel.

5.2.4 Control of Records

Records established to provide evidence of conformity to requirements and of the effective operation of the Quality Management System shall be controlled.

A documented procedure has been established (see Control of Records Procedure) to define the controls needed for the identification, storage, protection, retrieval, retention and disposition of records.

Records are legible, readily identifiable and retrievable.

The Quality Manager is responsible to maintain the Control of Records Procedure.

6.0 Management Responsibility

6.1 Management Commitment

The President provides evidence of his commitment to the development and implementation of the Quality Management System and continually improve its effectiveness by:

- communicating to the organization the importance of meeting customer, as well as statutory and regulatory requirements,
- establishing the quality policy,
- ensuring that quality objectives are established,
- conducting management reviews, and
- ensuring the availability of resources.

Top management is considered to be the Quality Management Team and includes the following members: President, Vice President/s and Quality Manager.

6.2 Customer Focus

The President ensures that customer requirements are determined and are met with the aim of enhancing customer satisfaction.

6.3 Quality Policy

The President ensures that the quality policy:

- is appropriate to the purpose of the organization,
- includes a commitment to comply with requirements and continually improve the effectiveness of the Quality Management System,
- provides a framework for establishing and reviewing quality objectives,
- is communicated and understood within the organization, and
- is reviewed for continuing suitability.

The stated quality policy is as follows:

W.S. Nicholls Western Construction Ltd. is committed to consistently meeting our customers' requirements for quality construction, fabrication and project excellence.

W.S. Nicholls is also committed to comply with the Quality Management System requirements of ISO 9001:2008 and to continually improve the effectiveness of these systems.

The Quality Manager is responsible for ensuring the quality policy is reviewed during the Management Review process.

6.4 Planning

6.4.1 Quality Objectives

The President ensures that quality objectives, including those needed to meet requirements for product, are established and maintained at relevant functions and levels within the organization. The quality objectives are measurable and consistent with the quality policy.

The current quality objectives are available on the secure server.

6.4.2 Quality Management System Planning

The President ensures that:

- the planning of the Quality Management System is carried out in order to meet the requirements given in section 4.1, as well as the quality objectives, and
- the integrity of the Quality Management System is maintained when changes to the

Quality Management System are planned and implemented.

6.5 Responsibility, Authority and Communication

6.5.1 Responsibility and Authority

The President ensures that responsibilities and authorities are defined and communicated within the organization. This is achieved by Job Descriptions, Procedures and Work Instructions.

6.5.2 Management Representative

The President may appoint a member of management who, irrespective of other responsibilities, has responsibility and authority that includes:

- ensuring that processes needed for the Quality Management System are established, implemented and maintained,
- reporting to the President on the performance of the Quality Management System and any need for improvement, and
- ensuring the promotion of awareness of customer requirements throughout the organization.

The appointed management representative is the Quality Manager. The Quality Manager serves as the liaison to external parties on matters relating to the quality system.

6.5.3 Internal Communication

The President ensures that appropriate communication processes are established within the organization and that communication takes place regarding the effectiveness of the Quality Management System. This is achieved by training, e-mails and meetings.

6.6 Management Review

The President reviews the organization's Quality Management System at planned intervals (at least annually), to ensure its continuing suitability, adequacy and effectiveness. This review includes assessing opportunities for improvement and the need for changes to the Quality Management System, including the quality policy and quality objectives.

Records from management reviews are maintained by the Quality Manager.

The input to management review includes information on:

- results of audits,
- customer feedback,
- process performance and product conformity,
- status of preventive and corrective actions,
- follow-up actions from previous management reviews,
- changes that could affect the quality management system, and
- recommendations for improvement.

The output from the management review includes:

- any decisions and actions related to improvement of the effectiveness of the Quality Management System and its processes,
- improvement of product related to customer requirements, and
- resource needs.

The following individuals attend Management Reviews: President, Vice President/s and Quality Manager.

7.0 Resources Management

7.1 Provision of Resources

The organization determines and provides the resources needed to implement and maintain the Quality Management System and continually improve its effectiveness and to enhance customer satisfaction by meeting customer requirements. Resource needs are discussed during management review.

7.2 Human Resources

7.2.1 General

Personnel performing work affecting conformity to product requirements are deemed competent on the basis of appropriate education, training, skills and experience. The President is responsible for assessing competence. Competency requirements are defined in Job Descriptions.

7.2.2 Competence, Training and Awareness

The organization:

- determines the necessary competence for personnel performing work affecting conformity to product requirements,
- where applicable, provides training or takes other actions to achieve the necessary competence,
- evaluates the effectiveness of the actions taken,
- ensures that personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives, and
- maintains appropriate records of education, training, skills and experience.

The Project Manager/s, are responsible to determine competency requirements and to oversee the training process. Training requirements are defined in Trade Union Documents and Job Descriptions.

The Safety Officer maintains appropriate records of education, training, skills and experience. As of the initial release of this document, all current employees are considered to be competent.

7.3 Infrastructure

The organization determines, provides and maintains the infrastructure needed to achieve conformity to product requirements.

Infrastructure includes, as applicable:

- buildings, workspace and associated utilities,
- process equipment (both hardware and software), and
- supporting services (such as transport, communication or information systems).

Scheduled maintenance, including data backup, is performed on the following: computer server, construction and shop equipment (e.g. lift trucks, overhead cranes, welding machines, etc...), and company vehicles.

7.4 Work Environment

The organization determines and manages the work environment needed to achieve conformity to product requirements. The Project Manager/s are responsible to identify and control work environment requirements. There are no special work environment controls needed at this time. If required in future, they will be established.

8.0 Product Realization

8.1 Planning of Product Realization

The organization plans and develops the processes needed for product realization.

Planning of product realization is consistent with the requirements of the other processes of the Quality Management System.

In planning product realization, the organization determines the following, as appropriate:

- quality objectives and requirements for the product,
- the need to establish processes and documents, and to provide resources specific to the product,
- required verification, validation, monitoring, measurement, inspection and test activities specific to the product and the criteria for product acceptance, and
- records needed to provide evidence that the realization processes and resulting product meet requirements.

The output of this planning is in a form suitable for the organization's method of operations. Planning output includes Specifications and Drawings.

The Project Manager is responsible for planning production or service provision and for maintaining associated records.

8.2 Customer-Related Processes

8.2.1 Determination of Requirements Related to the Product

The organization determines:

- requirements specified by the customer, including the requirements for delivery and post-delivery activities,
- requirements not stated by the customer but necessary for specified or intended use, where known,
- statutory and regulatory requirements applicable to the product, and
- any additional requirements considered necessary by the organization.

The Project Manager is responsible for determining all customer requirements, whether specified; not stated, but necessary; or statutory and regulatory. Requirements are determined by Customer e-mail or RFQ, Regulatory documents, Purchase Orders, Contracts and Specifications.

8.2.2 Review of Requirements Related to the Product

The organization reviews the requirements related to the product. This review is conducted prior to the organization's commitment to supply a product to the customer (e.g. submission of tenders, acceptance of contracts or orders, acceptance of changes to contracts or orders) and ensures that:

- product requirements are defined,
- contract or order requirements differing from those previously expressed are resolved, and
- the organization has the ability to meet the defined requirements.

Requirements are reviewed by e-mail/RFQ review and Purchase Order review.

Records of the results of the review and actions arising from the review are maintained. The Project Manager is responsible for the review and for maintaining the records.

Where the customer provides no documented statement of requirement, the customer requirements are confirmed by the organization before acceptance. Confirmation of verbal orders is done in writing.

Where product requirements are changed, the Project Manager ensures that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

8.2.3 Customer Communication

The organization determines and implements effective arrangements for communicating with customers in relation to:

- product information,
- enquiries, contracts or order handling, including amendments, and
- customer feedback, including customer complaints.

Product information includes capability descriptions and is maintained by Contracts department approval sheet updates.

Customer enquiries, contracts, orders, etc... are received by either phone, e-mail, fax and/or hard copy.

Customer feedback is recorded and managed by either telephone discussion, e-mail and/or customer surveys.

8.3 Design and Development

Exclusion - W.S. Nicholls does not design or develop products.

8.4 Purchasing

8.4.1 Purchasing Process

The organization ensures that purchased product conforms to specified purchase requirements. The type and extent of control applied to the supplier and the purchased product is dependent upon the effect of the purchased product on subsequent product realization or the final product.

The organization evaluates and selects suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection, evaluation and re-evaluation are established.

Criteria	Selection	Evaluation/ Re-evaluation
System performance and reliability data	x	x
Capabilities and experience	x	
Project completion		x
Technical specifications	x	x
Price and availability	x	x
Product quality		x
On time delivery		x

Records of the results of evaluations and any necessary actions arising from the evaluation are maintained in supplier reviews and management review.

The Project Manager is responsible for controlling the purchasing process and for maintaining appropriate records.

8.4.2 Purchasing Information

Purchasing information describes the product to be purchased, including where appropriate:

- requirements for approval of product, procedures, processes and equipment,
- requirements for qualification of personnel, and
- Quality Management System requirements.

Purchasing information includes purchase orders and specifications.

The organization ensures the adequacy of specified purchase requirements prior to communication to the supplier.

8.4.3 Verification of Purchased Product

The organization establishes and implements the inspection or other activities necessary for ensuring that purchased product meets specified purchase requirements. Purchased product is verified by following the (Materials Inspection Procedure) and the (Control of Materials Procedure) by reviewing the supplier documentation and Material Test Reports (MTR's) if applicable.

Where the organization, or its customer, intends to perform verification at the supplier's premises, the organization states the intended verification arrangements and method of product release in the purchasing information.

8.5 Production and Service Provision

8.5.1 Control of Production and Service Provision

The organization plans and carries out production and service provision under controlled conditions. Controlled conditions include, as applicable:

- the availability of information that describes the characteristics of the product,
- the availability of work instructions, as necessary,
- the use of suitable equipment,
- the availability and use of monitoring and measuring equipment,
- the implementation of monitoring and measurement, and
- the implementation of product release, delivery and post-delivery activities.

The Project Manager is responsible for controlling all phases of product and service provision and for maintaining appropriate records.

8.5.2 Validation of Processes for Production and Service Provision

The organization validates any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement and, consequently, deficiencies become apparent only after the product is in use or the service has been delivered.

Validation demonstrates the ability of these processes to achieve planned results.

The organization establishes arrangements for these processes including, as applicable:

- defined criteria for review and approval of the processes,
- approval of equipment and qualification of personnel,
- use of specific methods and procedures,
- requirements for records, and
- revalidation.

Process	Control
Welding	Operator certification and equipment inspections / calibrations
Non-Destructive Testing	Operator certification
Heat Treating	Heat charts and calibration

8.5.3 Identification and Traceability

Where appropriate, the organization identifies the product by suitable means throughout product realization. Products are identified by means of paint marking, weld maps and tags.

The organization identifies the product status with respect to monitoring and measurement requirements throughout product realization.

8.5.4 Customer Property

The organization exercises care with customer property while it is under the organization's control or being used by the organization. The organization identifies, verifies, protects and safeguards customer property provided for use or incorporation into the product. If any customer property is lost, damaged or otherwise found to be unsuitable for use, the organization shall report this to the customer and maintain records. Customer property can include intellectual property and personal data.

Customer property includes components and drawings. Customer property is controlled by means of segregation and tagging.

The Project Manager is responsible for controlling and recording customer property. The Project Manager is responsible for all communication with the customer regarding their property.

8.5.5 Preservation of Product

The Project Manager is responsible for preserving the product during internal processing and delivery to the intended destination in order to maintain conformity to requirements. The (Control of Materials Procedure) describes the preservation requirements, including identification, handling, packaging, storage and protection. Preservation also applies to the constituent parts of a product.

No special handling techniques are indicated unless by customer request.

8.6 Control of Monitoring and Measuring Equipment

The organization determines the monitoring and measurement to be undertaken and the monitoring and measuring equipment needed to provide evidence of conformity of product to determined requirements. The organization establishes processes to ensure that monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements. The Quality Manager is responsible for all aspects related to the system of controlling monitoring and measurement.

Where necessary to ensure valid results, measuring equipment is:

- calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification is recorded,
- adjusted or re-adjusted as necessary,
- identified in order to determine its calibration status,
- safeguarded from adjustments that would invalidate the measurement result, and
- protected from damage and deterioration during handling, maintenance and storage.

In addition, the organization assesses and records the validity of the previous measuring results when the equipment is found not to conform to requirements. The organization takes appropriate action on the equipment and any product affected. Records of the results of calibration and verification are maintained.

Equipment requiring calibration and /or verification are identified in Section-13 of the Quality Manual.

When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application is confirmed. This is undertaken prior to initial use and reconfirmed as necessary.

9.0 Measurement, Analysis and Improvement

9.1 General

The organization plans and implements the monitoring, measurement, analysis and improvement processes needed:

- to demonstrate conformity to product requirements,
- to ensure conformity of the quality management system, and
- to continually improve the effectiveness of the Quality Management System.

This includes determination of applicable methods, including statistical techniques, and the extent of their use. The Quality Manager is responsible for systems related to monitoring, measurement, analysis and improvement.

9.2 Monitoring and Measurement

9.2.1 Customer Satisfaction

As one of the measurements of the performance of the Quality Management System, the organization monitors information relating to customer perception as to whether the organization has met customer requirements.

Customer satisfaction is monitored by means of e-mails, surveys and interviews.

The methods for obtaining and using this information are determined by the President.

9.2.2 Internal Audit

The organization conducts internal audits at planned intervals to determine whether the Quality Management System:

- conforms to the planned arrangements, to the requirements of ISO 9001 and to the Quality Management System requirements established by the organization, and
- is effectively implemented and maintained.

An audit program has been planned, taking into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits. The audit criteria, scope, frequency and methods are defined. This selection of auditors and conduct of audits ensures objectivity and impartiality of the audit process. Auditors do not audit their own work.

A documented procedure has been established (see Internal Audit Procedure) to define the responsibilities and requirements for planning and conducting audits, establishing records and for reporting results. Records of the audits and their results are maintained. The Quality Manager is responsible to oversee the internal auditing system and for maintaining appropriate records.

The management responsible for the area being audited ensures that any necessary corrections and corrective actions are taken without undue delay to eliminate detected non-conformities and their causes. Follow-up activities include the verification of the actions taken and the reporting of verification results.

9.2.3 Monitoring and Measurement of Processes

The organization applies suitable methods for monitoring and, where applicable, measurement of the Quality Management System processes. These methods demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action is taken by the appropriate personnel to ensure conformity of the product.

Methods for monitoring and measuring of processes include internal audits, weld maps, customer surveys and corrective actions.

9.2.4 Monitoring and Measurement of Product

The organization monitors and measures the characteristics of the product to verify that product requirements have been met. This is carried out at appropriate stages of the product realization process in accordance with the planned arrangements.

Methods for monitoring and measuring of products include weld maps, inspection results and testing.

Evidence of conformity with the acceptance criteria is maintained. Records indicate the person(s) authorizing release of product for delivery to the customer. Product and service release is indicated by means of work order sign-offs, tagging and packing slips.

The release of product and delivery of service to the customer does not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, where applicable, by the customer.

9.3 Control of Non-Conforming Product

The organization ensures that product which does not conform to product requirements is identified and controlled to prevent its unintended use or delivery. Refer to (Control of Non-Conforming Product Procedure) as well as the WSN Quality Manual Section-9 for the controls, related responsibilities and authorities for dealing with non-conforming product.

Where applicable, the organization deals with non-conforming product by one or more of the following ways:

- by taking action to eliminate the detected non-conformity,
- by authorizing its use, release or acceptance under concession by a relevant authority and, where applicable, by the customer,
- by taking action to preclude its original intended use or application,
- by taking action appropriate to the effects, or potential effects, of the non-conformity when non-conforming product is detected after delivery or use has started.

When non-conforming product is corrected, it is subject to re-verification to demonstrate conformity to the requirements.

Records of the nature of non-conformities and any subsequent actions taken, including concessions obtained, are maintained.

9.4 Analysis of Data

The organization determines, collects and analyzes appropriate data to demonstrate the suitability and effectiveness of the Quality Management System and to evaluate where continual improvement of the effectiveness of the Quality Management System can be made. This includes data generated as a result of monitoring and measurement and from other relevant sources.

The analysis of data provides information relating to:

- customer satisfaction,
- conformity to product requirements,
- characteristics and trends of processes and products including opportunities for preventive action, and
- suppliers.

Data analysis is conducted by means of internal audits and management review.

The President is responsible for determining the data requirements and coordinating with other departments to collect and subsequently analyze the data in order to make improvements.

9.5 Improvement

9.5.1 Continual Improvement

The organization continually improves the effectiveness of the Quality Management System using the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

9.5.2 Corrective/Preventative Action

The organization takes action to eliminate the cause of non-conformities in order to prevent their recurrence.

Corrective actions are appropriate to the effects of the non-conformities encountered.

A documented procedure has been established (see Corrective and Preventive Action Procedure) that defines requirements for:

- reviewing non-conformities (including customer complaints),
- determining the causes of non-conformities,
- evaluating the need for action to ensure that non-conformities do not recur,
- determining and implementing action needed,
- recording and maintaining records of the results of action taken, and
- reviewing the effectiveness of the corrective action taken.

The Quality Manager is responsible for maintaining the procedure and the associated records.

10.0 Appendix

Control of Documents Procedure	WSNPR001
Control of Records Procedure	WSNPR002
Materials Inspection Procedure	WSNPR003
Control of Materials Procedure	WSNPR003
Internal Audit Procedure	WSNPR004
Control of Non-Conforming Product Procedure	WSNPR005
Corrective/Preventative Action Procedure	WSNPR006

SECTION - 9.0

Sub-Section 9.2

Company Quality Control Manual



QUALITY CONTROL MANUAL

**For work performed in the
Province of British Columbia**

CLASS AU CONTRACTOR

Licence No.: LBP0002177

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DO NOT COPY



Date of Issue: Oct 15, 2019
Revision: 2

QUALITY CONTROL MANUAL

For the

Fabrication, Assembly and Repair of Pressure Piping in accordance with ASME B31.1
and ASME B31.3 Codes for Pressure Piping and the Boiler and Pressure Vessel Safety
Act of British Columbia

The

Repair and or Alteration of Pressure Vessels in accordance with Section VIII Division 1
ASME Boiler & Pressure Vessel Code and the Boiler and Pressure Vessel Safety Act of
British Columbia

And the

Installation and Repair and or Alteration of POWER BOILERS In accordance with
Section I Power Boilers ASME Boiler & Pressure Vessel Code and the Boiler and
Pressure Vessel Safety Act of British Columbia

By

W.S. NICHOLLS WESTERN CONSTRUCTION LTD.
851 Derwent Way
Annacis Business Park
Delta, BC
V3M 5R4

Edition No. 1

Controlled Manual #:	002
Uncontrolled Manual:	YES
Assigned to:	

SECTION - A

TABLE OF CONTENTS

Description	Section	Rev.	Description of Revision
Cover Page	--	2	Class and licence added
Table of Contents	A	1	Sections Added
Statement of Authority	1	1	QC Mgr. to Quality Mgr.
Introduction and Scope of Work	2	1	
Glossary of Terms	3	2	BCSA changed to TSBC
Organization Chart	4	2	QC Mgr. to Quality Mgr. (All) / Safety Added
Drawings, Design Calculations & Specification Control	5	1	
Material Control	6	1	
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Examination & Inspection Program	8	1	
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Heat Treatment	12	1	
Calibration of Test Equipment	13	1	
Records Retention	14	1	
Inspecting Power Engineer	15	1	
Installation, Repair and Alteration Methods	16	1	New Section Added
Method of Performing Work	17	1	New Section Added
Manual Revision Control	18	1	
Index of Exhibits	19	1	Exhibits added



Date of Issue: Oct 15, 2019
Revision: 2

Approved by QM: R. Mazur  Date: October-16-2019

Accepted by TSBC: _____ Date: _____

SECTION - 1

STATEMENT OF AUTHORITY

The Management's objectives in producing this Quality Control System is to satisfy the requirements of the Boiler and Pressure Vessel Safety Act of British Columbia.

The Quality Manager shall be responsible for the implementation of the Quality Control System throughout the entire organization. He has the authority, and the organizational freedom to identify quality control problems and to initiate, recommend and provide solutions. Any quality control problem that cannot be resolved to the satisfaction of the Quality Manager shall be brought to the President of the W.S. Nicholls Western Construction Ltd. for a final resolution, in compliance with Code Requirements and this Manual. Any changes made in the Quality Control System shall be approved by the Quality Manager and are subject to acceptance by the Inspecting Power Engineer prior to implementing, his acceptance shall be indicated on the Table of Contents.

The Quality Manager may appoint an assistant. The assistant will have the authority of the Quality Manager to perform quality activities, but the Quality Manager shall retain the overall responsibility.

In carrying out these responsibilities the Quality Manager has my full support.

Signed by:

A handwritten signature in blue ink, appearing to be 'Pat J. Hunt', written over a light blue circular stamp.

Name: Pat J. Hunt

Title: President - General Manager

Date: Oct 8, 2019



Date of Issue: Oct 15, 2019
Revision: 2

SECTION - 2

INTRODUCTION and SCOPE of WORK

W.S. Nicholls Western Construction Ltd. was established to provide a Contracting Service to Industry, this includes: the fabrication, assembly and repair of pressure piping systems; the repair of pressure vessels; and the field erection, installation and repair of power boilers.

This manual describes the program used by W.S. Nicholls Western Construction Ltd. to fulfil the requirements of Technical Safety B.C. For work beyond the scope of this licence or capability of W.S. Nicholls Western Construction Ltd. qualified contractors will be retained who will work to the requirements of a registered Quality Assurance Program.

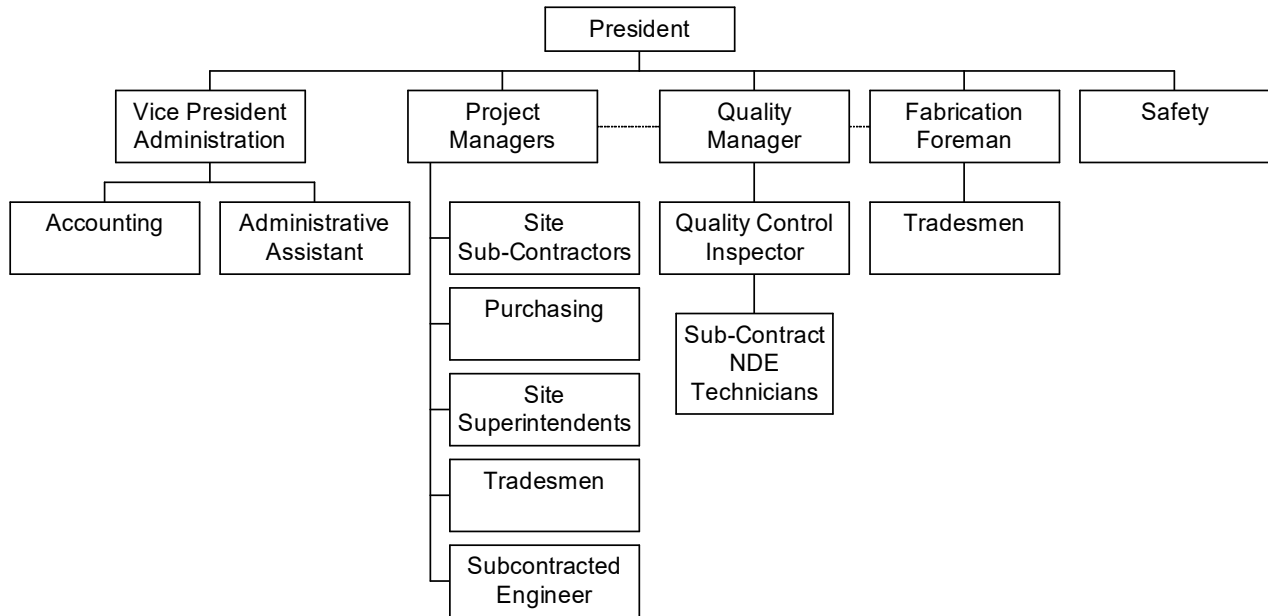
SECTION - 3

GLOSSARY OF TERMS

IPE	Inspecting Power Engineer
TSBC	Technical Safety British Columbia
BM	Bill of Materials
Code	ASME Code, Section I and Section VIII Division and other referenced documents, B31.1 and B31.3, CSA 51
DE	Design Engineer
HOLD POINT	No work to proceed beyond this point without written approval which is documented on the Inspection and Test Plan.
MT	Magnetic Particle Examination
NDE	Non-Destructive Examination
PA	Purchasing Agent
PO	Purchase Order
PQR	Procedure Qualification Record
PT	Liquid Penetrant Examination
QCI	Quality Control Inspector
QM	Quality Manager
RT	Radiographic Examination
UT	Ultrasonic Examination
VERIFICATION POINT	No work to proceed beyond this point without approval given verbally and documented on the Inspection Checklist.
VT	Visual Examination
WPS	Welding Procedure Specification

SECTION - 4

ORGANIZATION CHART



Line of Authority _____

Line of Communication -----

SECTION - 5

DRAWINGS, DESIGN CALCULATIONS AND SPECIFICATION CONTROL

All design calculations, specifications and drawings will be completed by the Design Engineer (DE) or the subcontractor in accordance with the applicable section of the required Code. Job numbers shall be assigned by the Project Manager and shall be the controlling number on drawings, calculations, and documentation.

1. Code drawings, Code calculations and specifications shall be reviewed by the Quality Manager (QM).
2. The DE shall prepare a bill of materials for all Code work and QM is responsible for reviewing and approving the bill of materials.
3. Upon completion of these drawings, calculations and specifications, and prior to work commencing, copies shall be submitted to the TSBC for registration if required.
4. The QM is responsible to issue revisions, specifications and drawings. These are to be listed on the Drawing and Document Transmittal (Exhibit 'QCG-013) with instructions as to the disposition of superseded documents.
5. For Code work the drawings will show, but not be limited to, the following information:
 - drawing number and level, or revision
 - design calculations showing the relevant paragraphs of the Code Section, year and addenda
 - working pressure
 - MAWP
 - design temperature
 - hydrostatic test pressure
 - non-destructive examination
 - welding procedures
 - heat treatment
 - approval signature and date
 - job number

SECTION - 5

DRAWINGS, DESIGN CALCULATIONS AND SPECIFICATION CONTROL (Cont'd.)

In addition, items manufactured under Section VIII Division 1 shall include:

- a statement as to why or why not impact testing is required referring to the Code paragraph
 - minimum design metal temperature at the MAWP
6. For Code work all materials listed in the Bill of Material will be identified as required by Code to SA, SB or SFA specification (or other materials accepted by the Code) also supplementary information concerning test requirements. The purchasing documentation shall be distributed as described under material control.
 7. All documentation shall be available to the IPE for review.
 8. For designs requiring Canadian Registration the QM will submit the required documentation to the Provincial Jurisdiction. Registered designs are to be filed on receipt. Exhibit 'QCM-011' is to be used when applying for Canadian Registration.

SECTION - 6

MATERIAL CONTROL

1. All materials used in construction and fabrication must be as described in the Bill of Materials as shown on the drawings or on a separate Bill of Materials (Exhibit 'QCG-019') appended to the drawings or specification.
3. Copies of the Bill of Material are made available to the Quality Manager, Purchasing Agent and the Receiver.
4. Purchase orders will be written and authorized from the B/M by the PA. The Purchase Order (PO) must describe the materials using correct code designations and require the supplier to provide Mill Test Certificates or Certificates of Compliance for all material certificates indicating their acceptability. Copies of the PO shall be distributed to the Vendor, DE, Receiver and QCI and filed in job file.
5. The Purchasing Agent shall not substitute any materials specified in the B/M without obtaining the approval of the Design Engineer or the QM.
6. Purchase Orders for carbon steel cold formed heads and shells and other formed parts will include the following:

"This order for cold formed heads, shell sections and/or formed parts is placed with this firm understanding that they will be manufactured to ASME Code Section VIII Division 1, paragraph UG-79 and a Certificate of Compliance shall be required for all of these items."
7. Any formed fabricated pressure parts purchased, and which contain welds must have been manufactured by a supplier who is currently authorized to apply the appropriate Code symbol stamp and where, as necessary supply the applicable manufacturer's partial data report.
8. When material is received at the shop or on site, the QCI is to be notified. The material will be visually inspected for dimensions, markings, condition and compliance with the requirements of the PO.

SECTION - 6

MATERIAL CONTROL (Cont'd.)

9. For the purchase of materials in field applications all material, including welding electrodes, shall be ordered in the same manner as previously described with the additional requirement that a copy of the PO be sent to the QCI for inclusion in the Q.C. job file.
10. Upon completion of a job all material that is returned to storage must be identified and traceable to Code required marks.
11. Any material that does not comply with the requirements will be stored in a segregated area.
12. The QCI will be notified of material taken from stock for a particular job and will ensure that it complies with the applicable edition and addenda of the ASME code or other as specified.
13. Prior to cutting all material is to be positively identified by use of original Code required marks or by other marks acceptable to the IPE.

SECTION - 7

RECEIVING

1. The Receiver is responsible to accept materials, check it against the Purchase Order and Packing Slip.
2. He is to write up the Receiving Report to include the Job Number, PO Number, supplier's name and advise the QCI or his designate that the material is available for inspection.
3. The QCI or his designate will check visually that the condition of the material is acceptable and complete the Receiving Report, ensuring the markings are in compliance with the Code (if applicable).
4. If the material complies with the specifications as shown on the Purchase Order, it will be placed in its designated location. Electrodes are to be stored in a designated cabinet and in conditions as recommended by the Manufacturer.
5. The completed Receiving Report will be placed in the Q.C. Job File with copies of the Purchase Order, Mill Test Certificate or Certificate of Compliance and Bill of Material (or drawings as applicable).

SECTION - 8

EXAMINATION AND INSPECTION PROGRAM

1. The Quality Manager is responsible for implementation of the Examination and Inspection Program.
2. An Inspection and Test Plan (Exhibit 'QCG-005') developed by the QCI, is to be made out for all Code Jobs and (where required) will be reviewed and accepted by the IPE. The IPE, QCI and the Customer's Representative will indicate their hold or verification points.
3. A copy of the Inspection and Test Plan is to be retained at the site. The QCI is responsible to notify the IPE and the Customer Inspector of approaching hold and verification points. No project is to proceed beyond the specified hold points without the approval of the customer and the IPE.
4. Code required markings, (where applicable), are to be shown on all materials used and copies of the Receiving Report are to be retained in the Job File.
5. For boilers the final testing shall be under the direction of the Owner in the presence of the IPE (where practical), other testing is to be by arrangement with the Owner. Test gauges are to be calibrated by an independent testing agency and copies of the Calibration Report will be retained in the Calibration File. The dial range of test gauges shall be approximately double the intended test pressure, but not less than one and a half or more than four times the test pressure.
6. The QCI shall and the IPE may examine reports submitted after NDE and heat treating have been carried out, and if satisfactory, accept them.
7. The QM or his designate shall prepare, date and certify the Repair/Alteration Report (Exhibit 'QCM-003') or Construction Data Report (Exhibit 'QCG-020') and present it (them), with any other pertinent data to the IPE for his review and signature.

SECTION - 9

NON-CONFORMITIES

1. A non-conformity is any condition that does not meet the requirements of the applicable Code, Q.C. Manual or customer. This definition includes physical non-conformities found during receiving inspection and those found during fabrication and testing, it also includes errors and omissions in and from the documentation.
2. The QM is responsible for controlling all non-conformities.
3. Production and receiving non-conforming items shall be marked "Hold" and a hold tag attached (Exhibit 'QCG-009') until disposition has been determined.
4. Non-conformances with respect to material may be:
 - (a) rejected and returned to supplier,
 - (b) repaired and used subject to acceptance by the IPE,
 - (c) used "as is", subject to technical justification and the IPE acceptance.
5. The QM shall consult with the Design Engineer when necessary, in determining the disposition of non-conforming items. Where there is an impact on the Code, he shall ensure that such non-conformities are corrected to the satisfaction of the IPE.
6. For Code related work the QM shall refer to and obtain the acceptance of the IPE prior to carrying out repairs. All weld repairs shall be in accordance with approved repair procedures using qualified welders.
7. Non-conformities, their resolution and final acceptance, shall be documented on a Non-conformance Report (Exhibit 'QCG-006'); this shall be placed in the job file. The QCI shall release the item once the non-conformity is resolved.

SECTION - 10

WELDING

1. All welding shall conform to ASME Section IX, the requirements of the applicable Section of the Code and the requirements of the Boiler and Pressure Vessel Safety Act of British Columbia.
2. The welding procedure specifications (WPS) shall be prepared by the QCI under the direction of the QM and documented where practicable on the ASME suggested format form QW 482. Should this format not be suitable for the process the procedure shall be in written form ensuring that all variables required are fully detailed.
3. The welding of the test coupons will be supervised by the QCI. The actual values shall be recorded on the QW483 form. The QCI certifies the PQR and welder qualifications (WPQR).
4. Upon satisfactory completion of the weld, coupons shall be tested according to the subject paragraph of Section IX and these results along with completed QW 482, QW 483 and the Welder Qualification Form QW 484 will be submitted to the TSBC for registration and recording.
5. The qualifications of welders will be checked by the Welding Foreman prior to their being permitted to perform Code work. Any welder who has not previously qualified to the WSN or Common procedure(s) will be tested. When practical the QCI shall witness welder qualification tests and perform the visual inspection requirements of the coupons. The Welding Foreman is responsible for supervising, instructing and assigning welders.
6. Welder's continued performance will be monitored and documented on the Welder's Log Book by the Welding Foreman to ensure that they are currently qualified in accordance with the Provincial requirements.
7. A copy of the WPS shall be available to the welders and displayed in a prominent position.

SECTION - 10

WELDING (Cont'd.)

8. All electrodes are to be stored as directed by the manufacturer's specifications. After Low Hydrogen Electrodes have been removed from their sealed containers they shall be stored in a heated cabinet until issued to the welder by authority of the Welding Foreman. No more than four hours supply is to be issued at a time. Any Low Hydrogen Electrodes not used in this time shall be discarded.
9. Each welder will be assigned an identification number by the QCI and this number will be written indelibly alongside his weld, which will have been assigned a number, or will be recorded on a weld map and retained in the job file.
10. Only qualified welders using registered procedures will be permitted to perform tack welds which will be properly prepared by grinding and included in the weld joint. Tack welds will be visually examined prior to inclusion into the weld; if defective the tack welds will be removed.
11. The IPE has the right to request re-qualification of any welder, welding operator or WPS for cause.
12. W.S. Nicholls Western Construction Ltd. (the present company) adopts and accepts all prior WPS's, PQR's and WPQR's performed and registered by the previous company W.S. Nicholls Construction Inc.

SECTION - 11

NON-DESTRUCTIVE EXAMINATION

1. All non-destructive examination (NDE) will be performed in accordance with the Code of construction and ASME Section V as required.
2. The DE, QM and/or Customer shall be responsible for determining the NDE requirements and shall ensure that full details of all NDE requirements are stated on drawings or ITP.
3. NDE shall be subcontracted. This may also include visual examiners.
4. The QM shall ensure that the NDE subcontractor has a qualified Level III examiner to draw up NDE procedures and compile reports and shall approve them if these are found satisfactory. The QM shall appoint and certify by letter a qualified Level III examiner to act as the Level III examiner for W.S. Nicholls Western Construction Ltd.
5. The QM shall ensure that the documented personnel records of the NDE staff are available to the IPE for review.
6. It is the responsibility of the QM to ensure that all examiners are correctly certified as required by the Code and in accordance with the Employers Written Practice.
7. The QM will make available to the IPE the necessary equipment to enable him to view RT films.
8. The QCI shall supply to the IPE a Radiographic Review Form which relates to the RT film being reviewed and the RT technique documentation.

SECTION - 12

HEAT TREATMENT

1. All Post-weld Heat Treatment shall be subcontracted to a qualified company. The QM is responsible for review of subcontractor's facilities and procedures.
2. The Design Engineer or QM is responsible for preparation and issue of Heat Treatment Instruction to the Heat Treatment Sub-contractor (Exhibit 'QCM-007').
3. The QCI shall review time/temperature charts and calibration records for legibility and compliance with written instructions and procedures. He will also ensure that the charts are identified with order numbers, and date and sign if approved.
4. The heat treatment procedures shall include but is not limited to the following:
 - Joint identification
 - Material type and thickness
5. All time/temperature charts, written instructions, procedures and records shall be available to the Inspecting Power Engineer for his review.
6. The QCI will perform receiving inspection upon return of the material from the subcontractor for damage and proper identification.

SECTION - 13

CALIBRATION OF MEASUREMENT OF TEST EQUIPMENT

1. The QM is responsible for the condition and accuracy of all gauges and testing devices. He shall also issue all gauges and/or testing devices for shop or field use.
2. The QM shall ensure that each item is marked to be readily identifiable, and will maintain a written record of each calibration, showing date and names of authorized calibration agent.
3. All gauges and testing devices shall be calibrated once a year. Any gauge whose readings become suspect must be calibrated immediately or replaced. Ultrasonic thickness gauges shall be used for measurements. Calibration blocks or rods shall be calibrated every five years by a sub-contractor. These gauges shall be used for calibration of micrometers and verniers.
4. All calibrations shall be subcontracted to a qualified agency or the original manufacturer of equipment, who will calibrate to a nationally recognized standard.
5. The QM shall review and accept the calibration results upon receipt.

SECTION - 14

RECORDS RETENTION

1. The QM is responsible to ensure that all records relating to Engineering, Design and Material shall on completion of a job be filed in the Job File and retained along with the NDE reports (where the NDE company is a subcontractor to WSN) including Radiographic Film, Ultrasonic, Magnetic Particle and Dye Penetrant reports and shall be retained for a period of not less than five years. For field activities the QCI is responsible to return all documentation to the QM.
2. Copies of the Repair/Alteration Reports and/or Construction Data Reports shall also be retained in the file for a period of not less than five years.
3. All records shall be made available to the IPE at his request.

SECTION - 15

INSPECTING POWER ENGINEER (IPE)

1. The Inspecting Power Engineer shall be the qualified representative of the Technical Safety British Columbia.
2. The QM will ensure that the IPE and his supervisor has ready access to the plant, field sites and all other subcontracted activities and all information relating to Code fabrication that they may request.
3. The QM will also ensure that the IPE receives a controlled copy of this manual and that any proposed changes to these procedures receives the formal written approval of the IPE before implementation.
4. The QM and/or the QCI will accompany and assist the IPE and IPE supervisor during any required audit.

SECTION – 16

INSTALLATION, REPAIR and ALTERATION METHODS

1. Repairs and alterations performed by W.S Nicholls Western Construction Ltd, on pressure equipment will be in accordance with the current Safety Standards Act, CSA B51, ASME, NBIC and all other applicable codes.
2. W.S Nicholls Western Construction Ltd. registered welding procedures are to be used for the construction of pressure piping and/or the repair of pressure equipment.
3. Repairs are defined as work necessary to restore pressure equipment to a safe operating condition, provided there is no change from the original design. Alterations are any change in the item described on the original Manufactures Data Report which affects the pressure containing capability of the boiler or pressure vessel. W.S Nicholls Western Construction Ltd. shall review all procedures and drawings for code and quality assurance compliance prior to start of work. Methods of repairs and alteration must be accepted by a safety officer before starting work.
4. The repair procedure will contain the following as required:
 - Equipment or identification numbers
 - Description and location of repairs
 - Drawings and line designation table
 - Engineering calculations
 - Bill of materials
 - Registered welding procedure
 - Non-destructive examination
 - Hold points for inspection (ITP/Traveller)
 - Heat treatment
 - Pressure test (e.g. Hydrostatic test)
 - TSBC Repair/Alteration Form

SECTION - 17

METHOD OF PERFORMING WORK

1. The Quality Manger is responsible to ensure installations, repairs and alterations are conducted to the code requirements and are responsible for completion of the required documentation for the above work for the inspection and repair files.
2. The Quality Manger will prepare a repair/alteration procedure and ensure all procedures conform to W.S. Nicholls Western Construction Ltd., standard work procedures.
3. All work will be carried out in accordance with accordance with the repair/alteration procedure and ensure all procedures conform to W.S. Nicholls Western Construction Ltd., standard work procedures.
4. Upon completion of the repair/alteration, the Coordinator, Engineering and Maintenance will retain all documentation in the vessel file for a minimum of 7 years. All documentation is subject to audit by the TSBC.

SECTION - 18

MANUAL REVISION CONTROL

1. This manual is the sole property of W.S. Nicholls Western Construction Ltd.
2. Any revisions that are found to be necessary to upgrade the Quality Control System shall be as directed by the QM with the concurrence of the IPE who is in possession of a controlled copy of the manual.
3. Uncontrolled copies of this manual may be made available at the discretion of the QM to respective customers, their agents or consulting engineering organizations and must not be used or copied in any part by unauthorized personnel. Uncontrolled copies may not be brought up to date after revisions are made. These copies will be marked clearly that they are uncontrolled.
4. Controlled copies of this manual are numbered, and a register shall be kept listing those who are in possession. Revisions will be made by section showing revision level and date. A new Edition of the manual will be generated and issued subsequent to a major revision, (e.g. corporate name change). Revised information will be highlighted. A Drawing and Document of Transmittal form, in duplicate, will be sent advising the holder to remove the original page and return it, with the duplicate to the QM.
5. Controlled copies that are issued to W.S. Nicholls Western Construction Ltd. supervisory personnel are for their use in implementing the Quality Control System, the most recent revision shall be the one that governs.

SECTION - 19

INDEX OF EXHIBITS		
EXHIBIT No.	EXHIBIT	REVISION
General		
QCG-001	CAR/ PAR Report	0
QCG-002	CSR Log	0
QCG-003	Purchase Order	0
QCG-004	Construction Surveillance Report (CSR)	0
QCG-005	Inspection and Test Plan	0
QCG-006	Non-Conformance Report (NCR)	0
QCG-007	NCR Log	0
QCG-008	Contractor Quality Submittal Review	0
QCG-009	Hold Tags	0
QCG-010	Receiving Inspection Report	0
QCG-011	Quality Control Requirements	0
QCG-012	Request for Information (RFI) Form	0
QCG-013	Drawing & Document Transmittal	0
QCG-014	UAV (Drone) Pre-flight	0
QCG-015	UAV Operators Log	0
QCG-016	RFI Log	0
QCG-017	Signature Log	0
QCG-018	Welders Qualifications Log	0
QCG-019	Bill of Material	0
QCG-020	Construction Data Report (CDPS) Report	0
QCG-021	Vendor Data Sheet	0

Mechanical		
QCM-001	Coating Record	0
QCM-002	Final Closing	0
QCM-003	Repair Alteration	0
QCM-004	Tank Foundation Acceptance	0
QCM-005	Insulated Flanges Test Record	0
QCM-006	Holiday Test Report	0
QCM-007	Heat Treatment Instructions	0
QCM-008	Flange Torque / Tensioning Sheet	0
QCM-009	Calibration Log	0
QCM-010	Request for Non-Destructive Testing	0
QCM-011	Application for CRN	0
QCM-012	Request for Coating	0
QCM-013	Buildings AC Inspection	0
Piping		
QCP-001	Piping Data Report	0
QCP-002	Piping Test Record	0
QCP-003	Pneumatic Test Form	0
QCP-004	Piping Check-out Form	0
QCP-005	Weld Data Sheet	0
QCP-006	Welders Log	0
QCP-007	Radiography Log	0
QCP-008	Pipe Cleaning Record	0
QCP-009	Pipe Cleaning Log	0
QCP-010	Daily Weld Report	0

Date of Issue: Oct 15, 2019
Revision: 2

APPENDIX F

Fire Underwriters Survey Analysis

Table F1: Required Fire Flow per Construction Coeficient and Subdiving Buildings (Fire Walls)

Construction Coeficient	Total Effective Area (m ²)	
	Full Building with no Firewalls	Building with Fully Protected Firewalls
	580	238
1.5	8000	5000
1	5000	3000
0.8	4000	3000
0.6	3000	2000

Table F2: Exposure Adjustment Factors

Building Side	Distance to Exposure (m)	Length-height Factor for Exposure Building Face	Construction Type	Exposure Adjustment Charge with Protected Openings	Total Exposure Adjustment Charge
Side 1	2	19	V ¹	5%	
Side 2	2	17	V ¹	5%	
Side 1	2	19	III	5%	10%
Side 2	2	17	III	5%	
Side 1	2	19	II - I	0%	1%
Side 2	2	17	II - I	0%	

1. Considers exterior wall with cladding assembly with minimum 1 hour FRR, treat as Type III/IV without unprotected openings

Table F3: Adjusted Required Fire Flow Scenarios and Results

A. Construction Coefficient	B. Total Effective Area (m²)	C. Require Fire Flow (Litres/Minute)	D. Occupancy and Contents Adjustment Factor	E. Automatic Sprinkler System Adjustment Factor	F. Exposure Adjustment Factor	G. Adjusted Required Fire Flow (Litres/Minute)	G. Adjusted Required Fire Flow (Litres/Second)
1.5	580	8000	25%	0%	10%	11000	183
1.5	238	5000	25%	0%	10%	7000	117
1.0	580	5000	25%	0%	10%	7000	117
1.0	238	3000	25%	0%	10%	4000	67
0.8	580	4000	25%	0%	1%	5000	83
0.8	238	3000	25%	0%	1%	4000	67
0.6	580	3000	25%	0%	1%	4000	67
0.6	238	2000	25%	0%	1%	3000	50
1.5	580	8000	15%	0%	10%	10000	167
1.5	238	5000	15%	0%	10%	6000	100
1.0	580	5000	15%	0%	10%	6000	100
1.0	238	3000	15%	0%	10%	4000	67
0.8	580	4000	15%	0%	1%	5000	83
0.8	238	3000	15%	0%	1%	3000	50
0.6	580	3000	15%	0%	1%	3000	50
0.6	238	2000	15%	0%	1%	2000	33
1.5	580	8000	5%	0%	10%	9000	150
1.5	238	5000	5%	0%	10%	6000	100
1.0	580	5000	5%	0%	10%	6000	100
1.0	238	3000	5%	0%	10%	3000	50
0.8	580	4000	5%	0%	1%	4000	67
0.8	238	3000	5%	0%	1%	3000	50
0.6	580	3000	5%	0%	1%	3000	50
0.6	238	2000	5%	0%	1%	2000	33
1.5	580	8000	25%	30%	0%	8000	133
1.5	238	5000	25%	30%	0%	5000	83
1.0	580	5000	25%	30%	0%	5000	83
1.0	238	3000	25%	30%	0%	3000	50
0.8	580	4000	25%	30%	0%	4000	67
0.8	238	3000	25%	30%	0%	3000	50
0.6	580	3000	25%	30%	0%	3000	50
0.6	238	2000	25%	30%	0%	2000	33
1.5	580	8000	15%	30%	0%	7000	117
1.5	238	5000	15%	30%	0%	4000	67
1.0	580	5000	15%	30%	0%	4000	67
1.0	238	3000	15%	30%	0%	3000	50
0.8	580	4000	15%	30%	0%	3000	50
0.8	238	3000	15%	30%	0%	3000	50
0.6	580	3000	15%	30%	0%	3000	50
0.6	238	2000	15%	30%	0%	2000	33
1.5	580	8000	5%	30%	0%	6000	100
1.5	238	5000	5%	30%	0%	4000	67
1.0	580	5000	5%	30%	0%	4000	67
1.0	238	3000	5%	30%	0%	2000	33
0.8	580	4000	5%	30%	0%	3000	50
0.8	238	3000	5%	30%	0%	2000	33
0.6	580	3000	5%	30%	0%	2000	33
0.6	238	2000	5%	30%	0%	2000	33
1.5	580	8000	25%	40%	0%	7000	117
1.5	238	5000	25%	40%	0%	4000	67
1.0	580	5000	25%	40%	0%	4000	67
1.0	238	3000	25%	40%	0%	3000	50
0.8	580	4000	25%	40%	0%	3000	50
0.8	238	3000	25%	40%	0%	3000	50
0.6	580	3000	25%	40%	0%	3000	50
0.6	238	2000	25%	40%	0%	2000	33
1.5	580	8000	15%	40%	0%	6000	100
1.5	238	5000	15%	40%	0%	4000	67
1.0	580	5000	15%	40%	0%	4000	67
1.0	238	3000	15%	40%	0%	2000	33
0.8	580	4000	15%	40%	0%	3000	50
0.8	238	3000	15%	40%	0%	2000	33
0.6	580	3000	15%	40%	0%	2000	33
0.6	238	2000	15%	40%	0%	2000	33
1.5	580	8000	5%	40%	0%	5000	83
1.5	238	5000	5%	40%	0%	3000	50
1.0	580	5000	5%	40%	0%	3000	50
1.0	238	3000	5%	40%	0%	2000	33
0.8	580	4000	5%	40%	0%	3000	50
0.8	238	3000	5%	40%	0%	2000	33
0.6	580	3000	5%	40%	0%	2000	33
0.6	238	2000	5%	40%	0%	1000	17

APPENDIX G

Asset Management Plan Documents

Osoyoos Airport Development Society Master Plan - Forecast Reserve Account Balance (2024 Dollar Value)																		
	Water System		Sanitary System		Pavement and Roads		Fuel Station		Total Replacement Cost plus 30% E&C		O&M (Estimate)		Total Annual Cost		Annual Reserve Deposit		Reserve Balance	
2024	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
2025	\$	-	\$	-	\$	-	\$	-	\$	-	\$	19,636.00	\$	19,636.00	\$	48,014.11	\$	28,378.11
2026	\$	-	\$	-	\$	-	\$	-	\$	-	\$	19,636.00	\$	19,636.00	\$	48,014.11	\$	57,465.68
2027	\$	-	\$	-	\$	-	\$	-	\$	-	\$	19,976.00	\$	19,976.00	\$	49,204.79	\$	88,131.11
2028	\$	-	\$	-	\$	-	\$	-	\$	-	\$	20,976.00	\$	20,976.00	\$	73,534.57	\$	142,892.96
2029	\$	-	\$	-	\$	-	\$	-	\$	-	\$	22,276.00	\$	22,276.00	\$	80,131.82	\$	204,321.10
2030	\$	-	\$	-	\$	-	\$	-	\$	-	\$	22,276.00	\$	22,276.00	\$	80,131.82	\$	267,284.95
2031	\$	-	\$	-	\$	-	\$	-	\$	-	\$	22,926.00	\$	22,926.00	\$	83,462.08	\$	334,503.16
2032	\$	-	\$	-	\$	-	\$	-	\$	-	\$	22,926.00	\$	22,926.00	\$	83,462.08	\$	403,401.82
2033	\$	-	\$	-	\$	-	\$	-	\$	-	\$	23,401.00	\$	23,401.00	\$	87,348.53	\$	477,434.39
2034	\$	-	\$	-	\$	-	\$	-	\$	-	\$	23,401.00	\$	23,401.00	\$	87,348.53	\$	553,317.78
2035	\$	-	\$	-	\$	-	\$	-	\$	-	\$	23,401.00	\$	23,401.00	\$	92,340.60	\$	636,090.32
2036	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	725,199.44
2037	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	816,536.29
2038	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	910,156.57
2039	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,006,117.35
2040	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,104,477.15
2041	\$	-	\$	-	\$	4,950.00	\$	-	\$	6,435.00	\$	26,351.00	\$	32,786.00	\$	99,557.87	\$	1,198,860.95
2042	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,302,039.34
2043	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	1,381,797.19
2044	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,489,548.99
2045	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	1,573,994.58
2046	\$	-	\$	-	\$	650,550.00	\$	-	\$	845,715.00	\$	26,351.00	\$	872,066.00	\$	99,557.87	\$	840,836.31
2047	\$	-	\$	-	\$	33,000.00	\$	430,000.00	\$	601,900.00	\$	26,351.00	\$	628,251.00	\$	99,557.87	\$	331,698.80
2048	\$	20,000.00	\$	-	\$	-	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	387,176.42
2049	\$	-	\$	-	\$	67,800.00	\$	-	\$	88,140.00	\$	26,351.00	\$	114,491.00	\$	99,557.87	\$	381,922.69
2050	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	464,677.63
2051	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	549,501.44
2052	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	636,445.84
2053	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	725,563.85
2054	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	816,909.82
2055	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	910,539.43
2056	\$	-	\$	-	\$	4,950.00	\$	-	\$	6,435.00	\$	26,351.00	\$	32,786.00	\$	99,557.87	\$	1,000,074.78
2057	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,098,283.52
2058	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	1,172,947.48
2059	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,275,478.03
2060	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	1,354,571.85
2061	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,461,643.01
2062	\$	-	\$	-	\$	467,000.00	\$	-	\$	607,100.00	\$	26,351.00	\$	633,451.00	\$	99,557.87	\$	964,290.96
2063	\$	-	\$	-	\$	24,000.00	\$	-	\$	31,200.00	\$	26,351.00	\$	57,551.00	\$	99,557.87	\$	1,027,329.04
2064	\$	-	\$	-	\$	67,800.00	\$	-	\$	88,140.00	\$	26,351.00	\$	114,491.00	\$	99,557.87	\$	1,034,601.79
2065	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,131,478.96
2066	\$	-	\$	-	\$	25,500.00	\$	-	\$	33,150.00	\$	26,351.00	\$	59,501.00	\$	99,557.87	\$	1,199,013.28
2067	\$	-	\$	-	\$	-	\$	430,000.00	\$	656,500.00	\$	26,351.00	\$	682,851.00	\$	99,557.87	\$	645,695.48
2068	\$	48,750.00	\$	-	\$	97,500.00	\$	-	\$	190,125.00	\$	26,351.00	\$	216,476.00	\$	99,557.87	\$	544,919.74
2069	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	631,749.60
2070	\$	5,000.00	\$	-	\$	48,750.00	\$	-	\$	69,875.00	\$	26,351.00	\$	96,226.00	\$	99,557.87	\$	650,875.20
2071	\$	-	\$	-	\$	4,950.00	\$	-	\$	6,435.00	\$	26,351.00	\$	32,786.00	\$	99,557.87	\$	733,918.95
2072	\$	5,000.00	\$	-	\$	35,625.00	\$	-	\$	52,812.50	\$	26,351.00	\$	79,163.50	\$	99,557.87	\$	772,661.29
2073	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	839,184.69
2074	\$	5,000.00	\$	-	\$	-	\$	-	\$	6,500.00	\$	26,351.00	\$	32,851.00	\$	99,557.87	\$	926,871.18
2075	\$	-	\$	-	\$	241,250.00	\$	-	\$	313,625.00	\$	26,351.00	\$	339,976.00	\$	99,557.87	\$	709,624.82
2076	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	800,572.31
2077	\$	-	\$	-	\$	33,000.00	\$	-	\$	42,900.00	\$	26,351.00	\$	69,251.00	\$	99,557.87	\$	850,893.49
2078	\$	-	\$	12,000.00	\$	-	\$	-	\$	15,600.00	\$	26,351.00	\$	41,951.00	\$	99,557.87	\$	929,772.69
2079	\$	-	\$	-	\$	67,800.00	\$	-	\$	88,140.00	\$	26,351.00	\$	114,491.00	\$	99,557.87	\$	938,083.88
2080	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,034,682.75
2081	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,133,756.69
2082	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,235,307.47
2083	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,339,397.03
2084	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,446,088.82
2085	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,555,447.91
2086	\$	-	\$	-	\$	655,500.00	\$	-	\$	852,150.00	\$	26,351.00	\$	878,501.00	\$	99,557.87	\$	815,390.97
2087	\$	-	\$	-	\$	-	\$	430,000.00	\$	559,000.00	\$	26,351.00	\$	585,351.00	\$	99,557.87	\$	344,463.22
2088	\$	20,000.00	\$	-	\$	20,000.00	\$	-	\$	52,000.00	\$	26,351.00	\$	78,351.00	\$	99,557.87	\$	369,881.53
2089	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	449,144.08
2090	\$	-	\$	-	\$	20,000.00	\$	-	\$	26,000.00	\$	26,351.00	\$	52,351.00	\$	99,557.87	\$	505,693.67
2091	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	591,066.94
2092	\$	-	\$	-	\$	33,000.00	\$	-	\$	42,900.00	\$	26,351.00	\$	69,251.00	\$	99,557.87	\$	636,150.48
2093	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	725,261.11
2094	\$	-	\$	-	\$	67,800.00	\$	-	\$	88,140.00	\$	26,351.00	\$	114,491.00	\$	99,557.87	\$	728,459.50
2095	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	819,861.92
2096	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	913,565.33
2097	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,009,611.33
2098	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,108,058.49
2099	\$	-	\$	-	\$	-	\$	-	\$	-	\$	26,351.00	\$	26,351.00	\$	99,557.87	\$	1,208,966.82

Interest on positive balance	2.5%
Interest on negative balance	8.0%

Table: Reserve Balance Annual Reserve Deposit Summary

Phase	Year	Annual Contribution	Annual O&M	Total Cost	Cumulative AC	Cumulative OM	Cumulative Total
Existing		\$ 28,378.11	\$ 19,636.00	\$ 48,014.11	\$ 28,378.11	\$ 19,636.00	\$ 48,014.11
Phase 1	2026	\$ 850.68	\$ 340.00	\$ 1,190.68	\$ 29,228.79	\$ 19,976.00	\$ 49,204.79
Phase 2	2027	\$ 23,329.78	\$ 1,000.00	\$ 24,329.78	\$ 52,558.57	\$ 20,976.00	\$ 73,534.57
Phase 3	2028	\$ 5,297.25	\$ 1,300.00	\$ 6,597.25	\$ 57,855.82	\$ 22,276.00	\$ 80,131.82
Phase 4	2030	\$ 2,680.26	\$ 650.00	\$ 3,330.26	\$ 60,536.08	\$ 22,926.00	\$ 83,462.08
Phase 5	2032	\$ 3,411.44	\$ 475.00	\$ 3,886.44	\$ 63,947.53	\$ 23,401.00	\$ 87,348.53
Phase 6	2034	\$ 4,992.07	\$ -	\$ 4,992.07	\$ 68,939.60	\$ 23,401.00	\$ 92,340.60
Phase 7	2035	\$ 4,267.27	\$ 2,950.00	\$ 7,217.27	\$ 73,206.87	\$ 26,351.00	\$ 99,557.87

Table: Phased Plane Count Summary

Existing	Exsting	1	2	3	4	5	6	7
Gravel Tie-down	9	20	20	20	18	20	26	22
Asphalt Tie-down	0	0	0	0	0	0	0	4
Cessna Hangar Bays	0	2	2	4	7	9	11	11
King Air Hangar Bays	0	1	1	1	1	2	3	3
Total Planes	9	23	23	25	26	31	40	40

Osoyoos Airport Development Society Master Plan- Water Unit Prices and Historical Cost Estimates

<i>Description</i>	<i>Unit</i>	<i>Estimated Unit Cost</i>	<i>Comments</i>
<i>2024</i>			

Section D - Transmission and Distribution Plant

331.1

100 Ø PVC Watermain	lm	<u>\$250</u>
150 Ø PVC Watermain	lm	<u>\$300</u>
200 Ø PVC Watermain	lm	<u>\$375</u>

333.0 Services ea. \$5,000

<i>Description</i>	<i>Estimated Replacement Cost</i>	<i>Comments</i>
<i>2024</i>		

335.0 Hydrants ea. \$17,000

339.1 Valves

100 Ø Valve	ea.	<u>\$2,250</u>
200 Ø Valve	ea.	<u>\$4,500</u>

1.0 Asphalt	m²	<u>\$300</u>	Cost for 3 m ² per m road
1.1 300mm SGSB (recycle existing gravel)	m ²	<u>\$30</u>	
1.2 150mm Crush (recycle existing gravel)	m ²	<u>\$20</u>	
1.3 50mm Asphalt	m ²	<u>\$50</u>	
2.0 Gravel	m²	<u>\$150</u>	Cost for 3 m ² per m road
2.1 300mm SGSB (recycle existing gravel)	m ²	<u>\$30</u>	
2.2 150mm Crush (recycle existing gravel)	m ²	<u>\$20</u>	
3.0 Existing			
3.1 Surface Restoration	m ²	<u>\$40</u>	Cost for 4 m ² per m of excavation

Osoyoos Airport Development Society Master Plan - Water Distribution Network - Table W1: Pipe Inventory

Label	Phase	Surface Material	Diameter (mm)	Material	Length (m)	Installation Year	Useful Life	Estimated Replacement Date	Pipe Replacement Unit Cost	Surface Restoration Unit Cost (3m²/lm)	Unit Replacement Cost (\$/m)	Total Replacement Cost	Depreciation Rate	Annual Depreciation
P-1	3	Asphalt	200	PVC	24	2028	80	2108	\$ 375.00	\$ 300.00	\$ 675.00	\$ 16,200.00	1.3%	\$ 216.00
P-2	3	Gravel	100	PVC	24	2028	80	2108	\$ 250.00	\$ 150.00	\$ 400.00	\$ 9,600.00	1.3%	\$ 128.00
P-3	4	Gravel	100	PVC	40	2030	80	2110	\$ 250.00	\$ 150.00	\$ 400.00	\$ 16,000.00	1.3%	\$ 213.33
P-5	5	Gravel	100	PVC	50	2032	80	2112	\$ 250.00	\$ 150.00	\$ 400.00	\$ 20,000.00	1.3%	\$ 266.67
P-4	6	Gravel	100	PVC	5	2034	80	2114	\$ 250.00	\$ 150.00	\$ 400.00	\$ 2,000.00	1.3%	\$ 26.67
143												\$ 63,800.00		\$ 850.67

Osoyoos Airport Development Society Master Plan - Water Distribution Network - Table W2: Valve Inventory

Label	Phase	Diameter (mm)	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
V-1	3	200	2028	40	2068	\$ 4,500.00	2.5%	\$ 112.50
V-2	3	100	2028	40	2068	\$ 2,250.00	2.5%	\$ 56.25
						\$ 6,750.00		\$ 168.75

Osoyoos Airport Development Society Master Plan- Water Distribution Network - Table W3: Hydrant Inventory

Label	Phase	Diameter (Hydrant Lateral) (mm)	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
H-1	3	200	2028	40	2068	\$ 17,000.00	2.5%	\$ 425.00

Osoyoos Airport Development Society Master Plan - Water Distribution Network - Table W4: Water Service Inventory

Label	Phase	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
SERV-1	3	2028	40	2068	\$ 5,000.00	2.5%	\$ 125.00
SERV-2	4	2030	40	2070	\$ 5,000.00	2.5%	\$ 125.00
SERV-3	5	2032	40	2072	\$ 5,000.00	2.5%	\$ 125.00
SERV-4	6	2034	40	2074	\$ 5,000.00	2.5%	\$ 125.00
					\$ 20,000.00		\$ 500.00

Osoyoos Airport Development Society Master Plan - Water Distribution Network - Table W5: Water Meter Inventory

Label	Phase	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
CU-1	3	2028	20	2048	\$ 20,000.00	5.0%	\$ 1,000.00

Osoyoos Airport Development Society Master Plan- Sanitary Unit Prices and Historical Cost Estimates

<i>Description</i>	<i>Unit</i>	<i>Estimated Unit Cost</i>	<i>Comments</i>
<i>2024</i>			

Section D - Transmission and Distribution Plant

331.1

150 Ø PVC Sanitary Main lm \$250

333.0 Services	ea.	\$5,000	Includes asphalt restoration allowance
<i>Description</i>		<i>Estimated Replacement Cost</i>	<i>Comments</i>
<i>2024</i>			

1.0 Asphalt	m²	<u>\$300</u>	Cost for 3 m ² per m road
1.1 300mm SGSB (recycle existing gravel)	m ²	<u>\$30</u>	
1.2 150mm Crush (recycle existing gravel)	m ²	<u>\$20</u>	
1.3 50mm Asphalt	m ²	<u>\$50</u>	
2.0 Gravel	m²	<u>\$150</u>	Cost for 3 m ² per m road
2.1 300mm SGSB (recycle existing gravel)	m ²	<u>\$30</u>	
2.2 150mm Crush (recycle existing gravel)	m ²	<u>\$20</u>	
3.0 Existing			
3.1 Surface Restoration	m ²	<u>\$40</u>	Cost for 4 m ² per m of excavation

Osoyoos Airport Development Society Master Plan - Sanitary Sewer System - Table S1: Pipe Inventory

Label	Phase	Surface Material	Diameter (mm)	Material	Length (m)	Installation Year	Useful Life	Estimated Replacement Date	Pipe Replacement Unit Cost	Surface Restoration Unit Cost (3m ² /lm)	Unit Replacement Cost (\$/m)	Total Replacement Cost	Depreciation Rate	Annual Depreciation
P-1	3	Gravel	150	PVC	35	2028	80	2108	\$ 250.00	\$ 150.00	\$ 400.00	\$ 14,000.00	1.3%	\$ 175.00
P-2	4	Gravel	150	PVC	40	2030	80	2110	\$ 250.00	\$ 150.00	\$ 400.00	\$ 16,000.00	1.3%	\$ 200.00
P-3	5	Gravel	150	PVC	50	2032	80	2112	\$ 250.00	\$ 150.00	\$ 400.00	\$ 20,000.00	1.3%	\$ 250.00
P-4	6	Gravel	150	PVC	10	2034	80	2114	\$ 250.00	\$ 150.00	\$ 400.00	\$ 4,000.00	1.3%	\$ 50.00
135												\$ 54,000.00		\$ 675.00

Osoyoos Airport Development Society Master Plan - Sanitary Sewer System - Table S2: Manholes

Label	Phase	Diameter (mm)	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
MH-1	3	900	2028	50	2078	\$ 12,000.00	2.0%	\$ 240.00
						\$ 12,000.00		\$ 240.00

Osoyoos Airport Development Society Master Plan - Sanitary Sewer System - Table S3: Sanitary Service Inventory

Label	Phase	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
SERV-1	3	2028	80	2108	\$ 5,000.00	1.3%	\$ 62.50
SERV-2	4	2030	80	2110	\$ 5,000.00	1.3%	\$ 62.50
SERV-3	5	2032	80	2112	\$ 5,000.00	1.3%	\$ 62.50
SERV-4	6	2034	80	2114	\$ 5,000.00	1.3%	\$ 62.50
					\$ 20,000.00		\$ 250.00

Osoyoos Airport Development Society Master Plan- Pavement and Roads Unit Prices and Historical Cost Estimates

<i>Description</i>		<i>Estimated Replacement Cost 2024</i>	<i>Comments</i>
1.0 Asphalt	m²	\$100	
1.1 300mm SGSB (recycle existing gravel)	m ²	\$30	
1.2 150mm Crush (recycle existing gravel)	m ²	\$20	
1.3 50mm Asphalt	m ²	\$50	
1.4 100mm Asphalt	m ²	\$100	
2.0 Gravel	m²	\$50	
2.1 300mm SGSB (recycle existing gravel)	m ²	\$30	
2.2 150mm Crush (recycle existing gravel)	m ²	\$20	
3.0 Existing			
3.1 Surface Restoration	m ²	\$40	

Osoyoos Airport Development Society Master Plan - Pavement and Roads Assets - Table PR1: Pavement and Roads Inventory

Label	Phase	Description	Status	Surfacing Material	Surfacing Material Thickness (mm)	Area (m ²)	Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$/m ²)	Total Replacement Cost	Depreciation Rate	Annual Depreciation
PR-1	EX06	Runway	Existing	Hot Mix Asphalt	50	13011	2006	40	2046	\$ 50.00	\$ 650,550.00	2.5%	\$ 16,263.75
PR-2	EX22	Runway Extension	Existing	Hot Mix Asphalt	50	840	2022	40	2062	\$ 50.00	\$ 42,000.00	2.5%	\$ 1,050.00
PR-3	EX22	Runway Extension	Existing	Hot Mix Asphalt	50	715	2022	40	2062	\$ 50.00	\$ 35,750.00	2.5%	\$ 893.75
PR-4	EX22	Taxi-way	Existing	Hot Mix Asphalt Mill & Fill	50	4750	2022	40	2062	\$ 75.00	\$ 356,250.00	2.5%	\$ 8,906.25
PR-5	EX23	Taxi-way	Existing	Hot Mix Asphalt Mill & Fill	50	320	2023	40	2063	\$ 75.00	\$ 24,000.00	2.5%	\$ 600.00
PR-10	1	Phase 1 Entrance Road and Parking Lot	Future	Hot Mix Asphalt Mill & Fill	50	340	2026	40	2066	\$ 75.00	\$ 25,500.00	2.5%	\$ 637.50
PR-11	2	Phase 2 Taxi-way Extension and Fuel Station Apron	Future	Hot Mix Asphalt Mill & Fill	50	1000	2027	40	2067	\$ 75.00	\$ 75,000.00	2.5%	\$ 1,875.00
PR-12	3	Phase 3 Taxi-way Extension	Future	19 mm Minus Crushed Gravel	150	375	2028	15	2043	\$ 20.00		6.7%	\$ -
PR-13	3	Phase 3 Gravel Tie-down Area	Future	19 mm Minus Crushed Gravel	150	1000	2028	15	2043	\$ 20.00	\$ 20,000.00	6.7%	\$ 1,333.33
PR-14	3	Phase 3 Parking Lot	Future	Hot Mix Asphalt Mill & Fill	50	1300	2028	40	2068	\$ 75.00	\$ 97,500.00	2.5%	\$ 2,437.50
PR-15	4	Phase 4 Taxi-way Extension	Future	19 mm Minus Crushed Gravel	150	350	2030	15	2045	\$ 20.00		6.7%	\$ -
PR-16	4	Phase 4 Gravel Tie-down Area	Future	19 mm Minus Crushed Gravel	150	1000	2030	15	2045	\$ 20.00	\$ 20,000.00	6.7%	\$ 1,333.33
PR-17	4	Phase 4 Parking Lot	Future	Hot Mix Asphalt Mill & Fill	50	650	2030	40	2070	\$ 75.00	\$ 48,750.00	2.5%	121875.0%
PR-18	5	Phase 5 Parking Lot	Future	Hot Mix Asphalt Mill & Fill	50	475	2032	40	2072	\$ 75.00	\$ 35,625.00	2.5%	\$ 890.63
PR-19	5	Phase 5 Taxi-way Extension	Future	19 mm Minus Crushed Gravel	150	1100	2032	15	2047	\$ 20.00		6.7%	0.0%
PR-20	5	Phase 5 Gravel Tie-down Area	Future	19 mm Minus Crushed Gravel	150	1650	2032	15	2047	\$ 20.00	\$ 33,000.00	6.7%	220000.0%
PR-21	6	Phase 6 Taxi-way Extension	Future	19 mm Minus Crushed Gravel	150	1550	2034	15	2049	\$ 20.00	\$ 31,000.00	6.7%	206666.7%
PR-22	6	Phase 6 Gravel Tie-down Area	Future	19 mm Minus Crushed Gravel	150	1750	2034	15	2049	\$ 20.00	\$ 35,000.00	6.7%	233333.3%
PR-23	7	Phase 7 Taxi-way Extension	Future	Hot Mix Asphalt Mill & Fill	50	1550	2035	40	2075	\$ 75.00	\$ 116,250.00	2.5%	\$ 2,906.25
PR-24	7	Phase 7 Asphalt Tie-down Area	Future	Hot Mix Asphalt Mill & Fill	50	1400	2035	40	2075	\$ 75.00	\$ 105,000.00	2.5%	\$ 2,625.00
						35126		600			\$ 1,751,175.00		\$ 49,571.04

Osoyoos Airport Development Society Master Plan - Pavement and Roads Assets - Table PR2: Tie-downs Concrete Block Eye Repairs

Label	Phase	Description	Quantity	Original Installation Year	Useful Life	Estimated Replacement Date	Unit Repair Cost (\$)	Total Replacement Cost	Depreciation Rate	Annual Depreciation
T-1	0	Existing lock block Tie-downs	9	2022	15	2037	\$ 450.00	\$ 4,050.00	6.7%	\$ 270.00
T-2	1	Phase 1 lock block Tie-downs	11	2026	15	2041	\$ 450.00	\$ 4,950.00	6.7%	\$ 330.00
T-3	3	Phase 3 lock block Tie-downs		2028	15	2043	\$ 450.00	\$ -	6.7%	\$ -
T-4	6	Phase 6 lock block Tie-downs	4	2034	15	2049	\$ 450.00	\$ 1,800.00	6.7%	\$ 120.00
			24					\$ 10,800.00		\$ 720.00

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Osoyoos Airport Development Society Master Plan - Fuel Station Assets - Table FS1: Fuel Station Assets

Label	Phase	Description	Original Installation Year	Useful Life	Estimated Replacement Date	Unit Replacement Cost (\$)	Depreciation Rate	Annual Depreciation
T-1	2	14,000 Litre Aviation Fuel Station	2027	20	2047	\$ 430,000.00	5.0%	\$ 21,500.00
								\$ 21,500.00