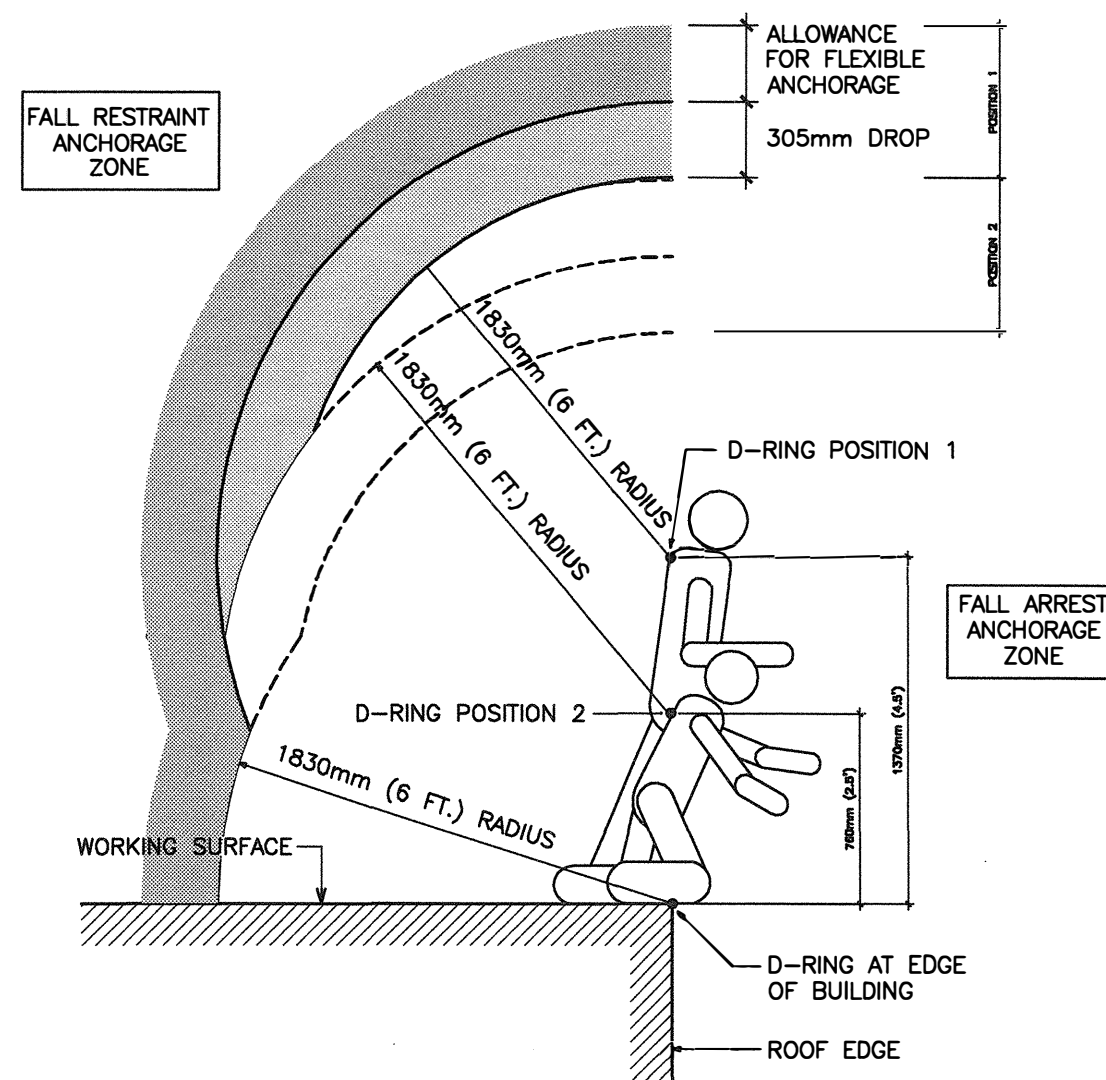
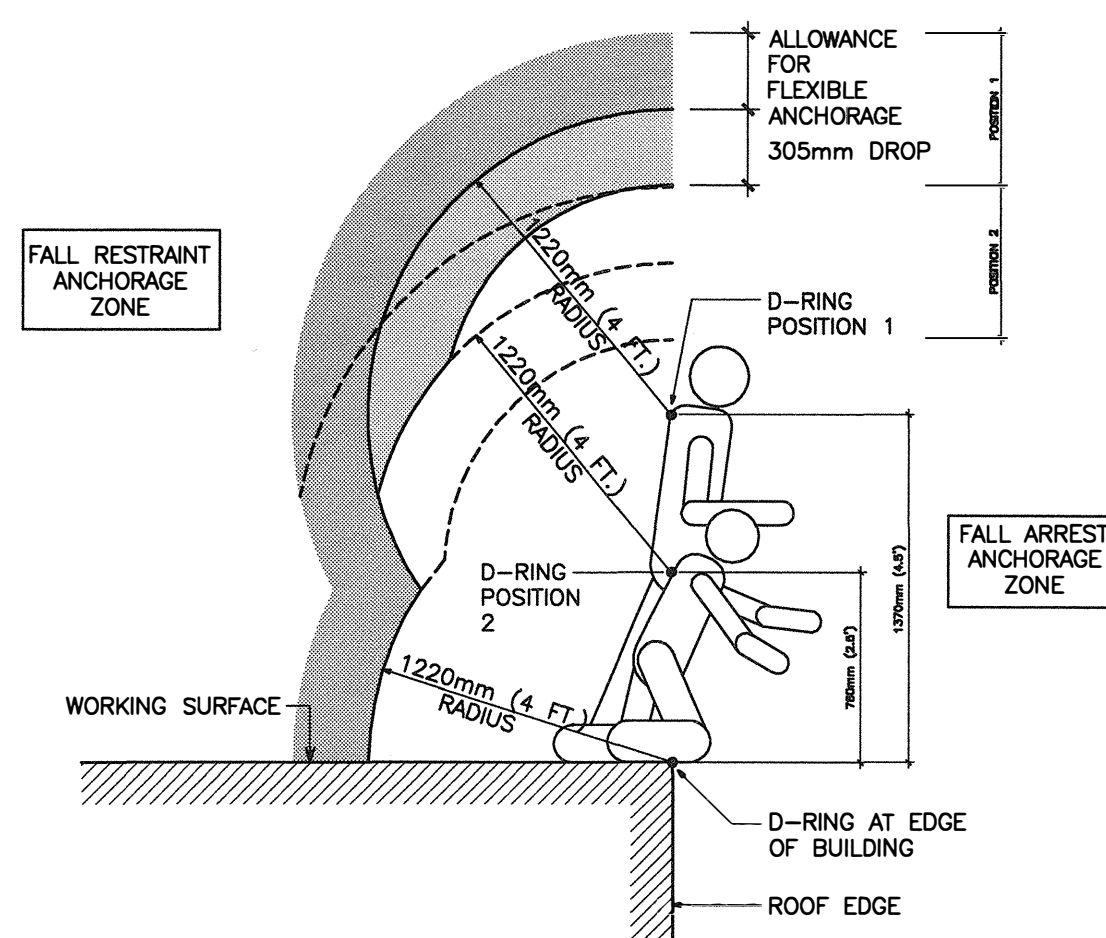


TRAVEL RESTRAINT ENVELOPE

- THE FOLLOWING GENERALLY DESCRIBES THE INTENT OF A TRAVEL RESTRAINT SYSTEM:
TRAVEL RESTRAINT – TRAVEL RESTRAINT NORMALLY MEANS A FALL PROTECTION SYSTEM ARRANGED SUCH THAT A WORKER CANNOT FALL LOWER THEN THE SURFACE ON WHICH THE WORKER WAS SUPPORTED BEFORE THE FALL STARTED. FOR EXAMPLE, A PERSONAL TRAVEL RESTRAINT SYSTEM FOR A WORKER ON AN ELEVATED FLAT SURFACE WOULD BE ARRANGED SO THE WORKER COULD GO UP TO THE EDGE OF THE WORK SURFACE, BUT NOT BEYOND THE EDGE IN THE EVENT OF A SLIP OR FALL. THE SYSTEM, IN THE EVENT OF A SLIP OR FALL, WOULD RESULT IN THE WORKER LANDING ON THE WORK SURFACE, AND PERHAPS VERY CLOSE TO GOING OVER THE EDGE. EQUIPMENT SHOULD BE ARRANGED TO LIMIT THE VERTICAL DROP AS MUCH AS POSSIBLE, AND IN NO CASE, SHOULD THE TOTAL FALL DISTANCE BE MORE THAN 30 CENTIMETERS (1 FOOT). A TRAVEL RESTRAINT SYSTEM SHOULD ONLY BE USED WHERE A WORKER LIKELY CAN REGAIN FOOTING OR OTHERWISE SELF-RESCUE IMMEDIATELY AFTER A SLIP OR FALL.
FALL ARREST – IF THE EQUIPMENT CANNOT BE ARRANGED TO LIMIT THE VERTICAL DROP TO 30 CENTIMETERS (1 FOOT), THEN THE PERSONAL FALL PROTECTION SYSTEM SHOULD BE A FALL ARREST TYPE, AND THE SYSTEM WILL NEED TO ADDRESS THE ADDITIONAL REQUIREMENTS FOR FALL ARREST. FOR EXAMPLE, WORKERS MUST WEAR A FULL BODY HARNESS WHEN USING A PERSONAL FALL PROTECTION SYSTEM FOR FALL ARREST.
- THE WORKER MUST SELECT THE APPROPRIATE LANYARD AND MAKE ADJUSTMENTS AS NECESSARY WHERE A LANYARD, ROPE-GRAB AND TEMPORARY LIFE LINE ARE USED TO REMAIN WITHIN THE FALL RESTRAINT ENVELOPE.
- IN SOME INSTANCES, THE TRAVEL RESTRAINT SYSTEM MAY RESULT IN A SWING FALL. THE WORKER MUST EVALUATE WHERE SUCH SWING FALLS MAY RESULT IN A SWING FALL HAZARD.
- THE DIAGRAMS BELOW ILLUSTRATE THE FALL RESTRAINT ENVELOPE FOR 6FT. AND 4FT. LANYARDS ANCHORAGES TO THE LEFT OF THE ENVELOPE ARE FOR TRAVEL RESTRAINT.



TRAVEL RESTRAINT DIAGRAM WITH 1830mm (6 FT) LANYARD

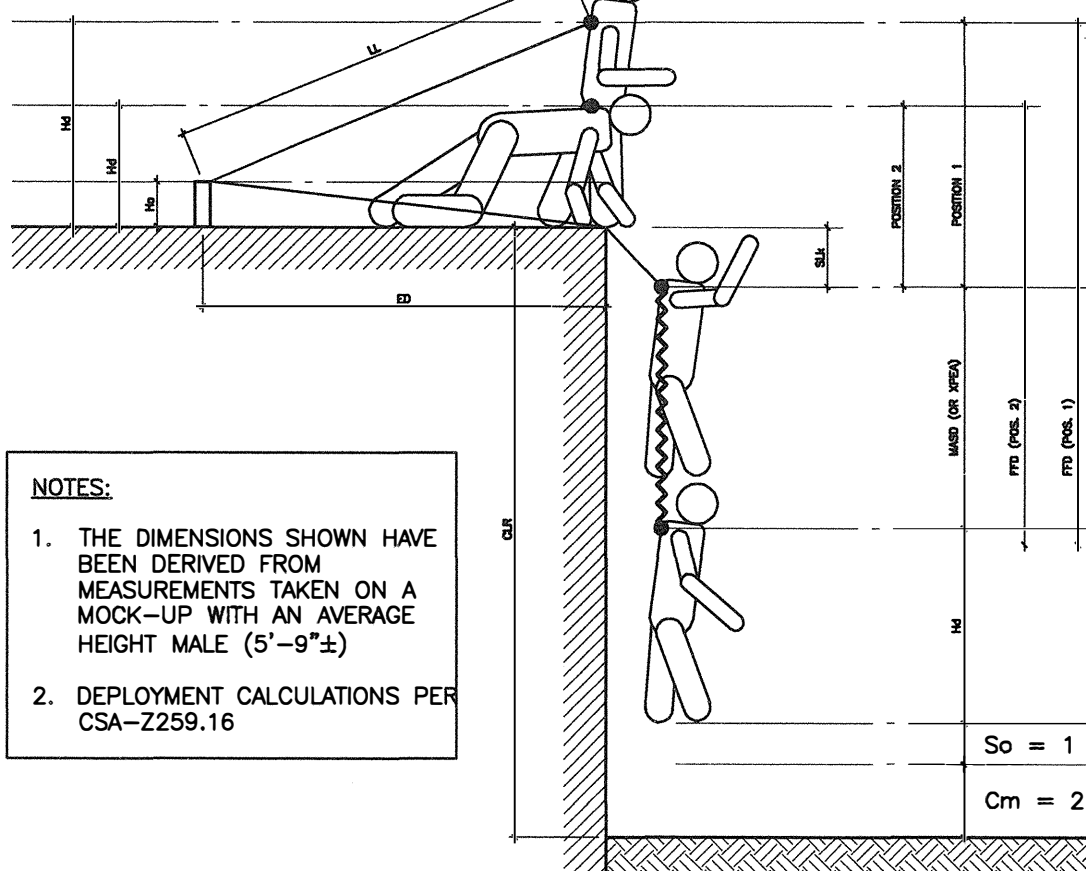


TRAVEL RESTRAINT DIAGRAM WITH 1220mm (4 FT) LANYARD

FALL ARREST CLEARANCE CHART AT RIGID ANCHORAGE

	ED (ft)	WW (lb)	LL (ft)	Hd (ft)	Slk (ft)	FFD (ft)	E.A. TYPE	Fmax (lb)	Fav (lb)	XPEA (ft)	CLR (ft)
STANDING WORKER (POSITION 1)	4	250	4	4.5	0	4.5	E4	900	720	2.39	9.89
	3	250	4	4.5	0.58	5.08	E4	900	720	2.70	10.79
	2	250	4	4.5	1.42	5.92	E4	900	720	3.15	12.06
	1	250	4	4.5	2.08	6.58	E4	900	720	3.50	13.09
	4	310	4	4.5	0	4.5	E6	1300	1040	1.91	9.41
	3	310	4	4.5	0.58	5.08	E6	1300	1040	2.16	10.24
	2	310	4	4.5	1.42	5.92	E6	1300	1040	2.51	11.43
	1	310	4	4.5	2.08	6.58	E6	1300	1040	2.80	12.38
	6	250	6	4.5	0	4.5	E4	900	720	2.39	9.89
	5	250	6	4.5	0.83	5.33	E4	900	720	2.84	11.17
	4	250	6	4.5	1.50	6.0	E4	900	720	3.19	12.19
	3	250	6	4.5	2.42	6.92	E4	900	720	3.68	
KNEELING WORKER (POSITION 2)	2	250	6	4.5	3.67	8.17	E4	900	720	4.34	
	6	310	6	4.5	0	4.5	E6	1300	1040	1.91	9.41
	5	310	6	4.5	0.83	5.33	E6	1300	1040	2.26	
	4	310	6	4.5	1.50	6.0	E6	1300	1040	2.55	
	3	310	6	4.5	2.42	6.92	E6	1300	1040	2.94	
	2	310	6	4.5	3.67	8.17	E6	1300	1040	3.47	
	4	250	4	2.33	0	2.33	E4	900	720	1.24	6.57
	3	250	4	2.33	0.58	2.91	E4	900	720	1.55	7.46
	2	250	4	2.33	1.42	3.75	E4	900	720	1.99	8.74
	1	250	4	2.33	2.08	4.41	E4	900	720	2.35	9.76
	6	310	4	2.33	0	2.33	E6	1300	1040	0.99	6.32
	5	310	4	2.33	0	2.33	E6	1300	1040	0.99	6.32

* MAXIMUM PERMITTED FREE FALL EXCEEDED.



NOTES:

- THE DIMENSIONS SHOWN HAVE BEEN DERIVED FROM MEASUREMENTS TAKEN ON A MOCK-UP WITH AN AVERAGE HEIGHT MALE (5'-9"±).
- DEPLOYMENT CALCULATIONS PER CSA-Z259.16

VARIABLE	UNITS	DESCRIPTION
ED	ft	HEIGHT OF ANCHOR (IFT BASED ON MOCK-UP)
WW	lb	WORKER WEIGHT
Hd	ft	D-RING HEIGHT (BASED ON MOCK-UP)
LL	ft	LANYARD LENGTH
Slk	ft	SLACK IN LANYARD AFTER A FALL
FFD	ft	FREE FALL DISTANCE
E.A. TYPE	N/A	TYPE OF PEA (CLASS E4 OR CLASS E6)
Fav	lb	AVERAGE ACTIVATION ENERGY (= 0.8 Fmax)
Fmax	lb	MAX DEPLOYMENT FORCE
XPEA	ft	DEPLOYMENT LENGTH OF PERSONAL ENERGY ABSORBER
CM	ft	CLEARANCE MARGIN
SO	ft	STRETCH OUT
CLR	ft	MINIMUM CLEARANCE

TRAVEL RESTRAINT RIGGING NOTES

- EACH ANCHORAGE AND/OR HORIZONTAL LIFE LINE SYSTEM HAS BEEN DESIGNED TO SUPPORT A SINGLE WORKER ANCHORAGE CONNECTION.
- PERFORM A THOROUGH WALK THROUGH OF THE BUILDING PERIMETER TO ENSURE ALL LANDING AREAS ARE CLEARLY SAFE AND FREE OF OBSTRUCTION.
- CONTRACTOR IS RESPONSIBLE FOR DEVELOPING A RESCUE PROCEDURE SHOULD A WORKER FALL AND IS SUSPENDED BY A PERSONAL FALL PROTECTION SYSTEM. CONTRACTOR TO SUBMIT RESCUE PLAN TO OWNER PRIOR TO COMMENCING WORK.
- REFER TO WORKSAFE BC OCCUPATIONAL HEALTH AND SAFETY REGULATION, AND CAN/CSA Z259.16 – DESIGN OF ACTIVE FALL PROTECTION SYSTEMS, MANUFACTURER'S PROPRIETARY INFORMATION FOR USE AND SYSTEM MAINTENANCE, AND THE SYSTEM FALL PROTECTION MANUAL FOR USE.
- WORKERS MUST REMAIN CONNECTED TO THE FALL RESTRAINT SYSTEM AT ALL TIMES WHEN ACCESSING AREAS WITHIN 2000MM (6FT) FROM AN UNGUARDED EDGE OR FALL HAZARD.
- WORKERS ARE TO ENSURE PERSONAL FALL PROTECTION EQUIPMENT IS ADJUSTED APPROPRIATELY TO ALLOW ACCESS TO ROOF EDGE (OR AREA OF WORK) BUT NOT ALLOW WORKER TO TRAVEL PAST EDGE. WORKERS MUST USE APPROPRIATE FIXED LANYARD LENGTH OR TEMPORARY LIFE LINE WITH ADJUSTABLE ROPE GRAB CONNECTED TO FALL RESTRAINT SYSTEM. SEE TRAVEL RESTRAINT ENVELOPE NOTES.
- WORKERS MUST ENSURE PROPER LANYARD TRANSFER METHODS ARE USED FOR TRAVEL BETWEEN THE LIFE LINES. MAINTAIN ONE POINT OF CONTACT WITH THE FALL RESTRAINT SYSTEM AT ALL TIMES.

FALL PROTECTION ANCHORAGE NOTES

- ALL PERMANENT ANCHORAGES FOR SUSPENDED OPERATIONS HAVE BEEN DESIGNED IN SUBSTANTIAL ACCORDANCE WITH WORKSAFE BC OCCUPATIONAL HEALTH AND SAFETY REGULATION, 2012 BC BUILDING CODE, CAN/CSA Z271-10, AND CSA Z91-02.
- ALL ANCHORAGE POINTS INDICATED IN THESE DRAWINGS HAVE BEEN DESIGNED FOR THE FOLLOWING LOAD CASES IN ACCORDANCE WITH CAN/CSA Z271-10:
 - 11.1 KN (2500 LBS) – NO PERMANENT DEFORMATIONS
 - 15.4 KN (3500 LBS) – FACTORED LOAD
 - 22.2 KN (5000 LBS) – ULTIMATE LOAD
- EACH DOUBLE ANCHORAGE HAS BEEN DESIGNED TO 44.4KN (10,000LBS) ULTIMATE LOAD AND HAS TWO SEPARATE CONNECTION POINTS. SINGLE ANCHORAGES HAVE BEEN DESIGNED TO 22KN (5,000LBS) ULTIMATE LOAD.
- EACH CONNECTION POINT ON THE ANCHORAGE HAS BEEN DESIGNED TO 22KN (5,000LBS) ULTIMATE LOAD.
- STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA-S16.1 AND REFERENCED DOCUMENTS.
- ALL STEEL TO BE HOT DIPPED GALVANIZED.
- MATERIAL SHALL CONFORM TO THE FOLLOWING:
 - ANGLES, PLATES AND RODS – GRADE 40.21 – M300W
 - SQUARE HSS – GRADE 40.21 – M350W CLASS C
 - THROUGH BOLTS – TYPE 304 STAINLESS STEEL
 - HOT DIPPED GALVANIZING TO CSA G164
- TORQUE BOLTS TO 90 FT LBS. MAX. UNLESS NOTED OTHERWISE BY HILTI INSTALLATION REQUIREMENTS.
- WELDING TO BE 100% VISUAL AND NON-DESTRUCTIVE (MAGNETIC PARTICLE) TESTED PRIOR TO GALVANIZING OR FIELD PAINTED BY A QUALIFIED TESTING AGENCY. SUBMIT REPORTS TO RJC. COST BORNE BY CONTRACTOR.
- STEEL FABRICATOR SHALL BE CERTIFIED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA W47.1 CLASSIFICATION: DIVISION 2.1.
- WELDING SHALL CONFORM TO CSA W59 AND SHALL BE PERFORMED BY CERTIFIED WELDERS.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT FOR FALL PROTECTION

- ALL EQUIPMENT TO BE COMPATIBLE WITH ALL COMPONENTS OF PERSONAL FALL PROTECTION SYSTEM AND ACTIVE FALL PROTECTION SYSTEM, INCLUDING ANCHORAGES.
- RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR FALL PROTECTION NOTED AS MINIMUM REQUIREMENTS. WORKERS ARE TO ENSURE PPE MEETS ALL REQUIREMENTS FOR WORK ACTIVITIES BEING PERFORMED, SITE SPECIFIC WORK PLANNING AND FALL PROTECTION REQUIREMENTS, AND ALL OTHER REGULATION HAVING JURISDICTION.
- FULL BODY HARNESS: PER CSA Z259.10-06
 - FALL ARREST/RESTRAINT: CLASS A – FALL ARREST
 - FALL RESTRICT FOR PERMANENT VERTICAL LIFE LINES OR RAIL: CLASS L – LADDER CLIMBING
 - WORK POSITIONING: CLASS P – WORK POSITIONING
- LANYARD AND PERSONAL ENERGY ABSORBER: PER CSA Z259.11-05 – CLASS B: SHOCK ABSORBING WEB LANYARD OR CLASS F: ADJUSTABLE POSITION LANYARD WITH SHOCK ABSORBER.
 - CLASS E4: WORKER WEIGHT BETWEEN 100 LBS AND 254 LBS. MAXIMUM ARREST FORCE OF 4.0 KN (900 LBS)
 - CLASS E6: WORKER WEIGHT BETWEEN 200 LBS AND 386 LBS. MAXIMUM ARREST FORCE OF 6.0 KN (1300 LBS)
- TEMPORARY LIFE LINE AND ADJUSTABLE ROPE GRABS: PER CSA Z259.2.1-98, CLASS ADP: FOR FALL ARREST (AUTOMATIC-DORSAL-PANIC HARDWARE)
 - ADJUSTABLE ROPE GRAB MUST BE COMPATIBLE WITH CONNECTING COMPONENTS AND LIFE LINE TYPE (MATERIAL TYPE AND DIAMETER).
- CONNECTING COMPONENTS: ALL CONNECTING COMPONENTS TO CSA Z259.12-01, CLASS I FOR FALL ARREST
- HARDHAT WITH CHIN STRAP: WORKSAFE BC PART 8: PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT, (8.1.1.4) FOR WORK AT HEIGHTS EXCEEDING 3M (10FT) AND CSA-Z94.1-92, INDUSTRIAL PROTECTIVE HEADWEAR. CLASS OF HARDHAT TO SUIT TYPE OF WORK BEING PERFORMED AND ENVIRONMENT.
- STEEL TOE BOOTS: WORKSAFE BC PART 8: PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT, (8.2.2) AND REQUIREMENTS OF CSA Z195-M92: PROTECTIVE FOOTWEAR. CLASS OF STEEL TOE BOOTS TO SUIT TYPE OF WORK BEING PERFORMED AND ENVIRONMENT.

FALL PROTECTION GENERAL NOTES

- ONLY ONE WORKER PERMITTED TO USE INDIVIDUAL SYSTEM COMPONENTS AT ANY ONE TIME.
- ENSURE ANCHORAGES HAVE BEEN INSPECTED AND TESTED IN ACCORDANCE WITH FALL PROTECTION SYSTEM INSTRUCTIONS AS INDICATED BY THE ENGINEER OF RECORD. AT MINIMUM, FALL PROTECTION SYSTEM TO BE INSPECTED PRIOR TO INITIAL USE AND ANNUALLY IN ACCORDANCE WITH WORKSAFE BC OCCUPATIONAL HEALTH AND SAFETY REGULATION PART 11.
- WORKERS AND FALL PROTECTION SYSTEM USERS ARE TO BE APPROPRIATELY TRAINED IN:
 - APPLICABLE OHS REGULATION,
 - PERSONAL MANUFACTURER'S SPECIFICATIONS FOR USE,
 - PERSONAL PROTECTIVE EQUIPMENT USE AND INSPECTION,
 - RIGGING PROCEDURES
 - TEMPORARY AND PERMANENT ANCHORAGE SYSTEMS
 - USE AND UNDERSTANDING OF FALL PROTECTION PLAN AND ROOF PLANS
 - GENERAL EMERGENCY PROCEDURES
 - PRINCIPLES OF SPECIFIC SYSTEM IN USE AND SAFE OPERATIONAL CONTROLS
- WORKERS MUST PREPARE WRITTEN FALL PROTECTION PLAN FOR ALL WORK WHERE A FALL HAZARD OCCURS. THE FALL PROTECTION PLAN MUST BE IN PLACE PRIOR TO RISK OF FALL BEGINS.
- WORKERS MUST BE PROPERLY ATTACHED TO AN ANCHORAGE WHEN APPROACHING OR WORKING WITHIN 2000 MM (6FT) OF ANY UNPROTECTED EDGE (PARAPETS LESS THAN 1060MM (3'-6") IN HEIGHT) WHERE HEIGHT IS 3000 MM (10 FEET) OR MORE ABOVE AN ACCEPTABLE LANDING OR WHERE A FALL WOULD BE INTO HAZARDOUS SUBSTANCE OR OBJECT.
- WORKERS MUST ENSURE PERSONAL FALL PROTECTION EQUIPMENT AND RIGGING IS COMPATIBLE WITH FALL PROTECTION SYSTEM BEING USED AND IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
- EQUIPMENT SHALL NOT BE USED IN CONDITIONS OF HIGH WINDS, INCLEMENT WEATHER OR EXTREME TEMPERATURES WHERE SUCH CONDITIONS IMPAIR SAFE USE.
- THE FALL PROTECTION SYSTEM IS DESIGNED TO ACCOMMODATE WORKERS WEIGHING BETWEEN 45KG AND 115 KG ONLY (INCLUDING ALL TOOLS AND EQUIPMENT)
- FOR ROOF SLOPES GREATER THAN 12 HORIZONTAL TO 8 VERTICAL (33.7 DEGREES) WORK PROCEDURES MUST MEET REQUIREMENTS FOR SUSPENDED OPERATIONS.
- USE OF FULL BODY HARNESS AND PERSONAL ENERGY ABSORBING LANYARD IS REQUIRED FOR ALL WORKERS, UNLESS NOTED OTHERWISE.
- ANY MODIFICATIONS TO THE FALL PROTECTION SYSTEM SUBSEQUENT TO THE INITIAL INSTALLATION MUST BE APPROVED BY THE ENGINEER OF RECORD. THIS IS NOT A RELOCATABLE SYSTEM.
- WHERE SKYLIGHTS EXIST, WORK PLANS ARE TO BE IN ACCORDANCE WITH CSA Z91-02, SECTION 6.1:SKYLIGHTS
- IN THE EVENT OF A FALL, THE FALL PROTECTION SYSTEM MUST BE REMOVED FROM SERVICE UNTIL IT HAS BEEN INSPECTED AND REVIEWED BY A PROFESSIONAL ENGINEER.

FALL PROTECTION LIFE LINE SYSTEM NOTES

- ALL LIFE LINE END ANCHORAGES HAVE BEEN DESIGNED TO RESIST A FORCE OF 5000 LBS (22.2 KN) WITHOUT FRACTURE IN THE DIRECTIONS PERMITTED BY THE HORIZONTAL LIFE LINE. LOADING IS BASED ON MANUFACTURER'S TEST DATA.
- ONLY ONE PERSON PERMITTED TO BE CONNECTED TO A LIFE LINE SYSTEM AT ONE TIME. UNLESS NOTED OTHERWISE.
- HORIZONTAL LIFE LINES ARE NOT TO BE USED FOR PRIMARY SUSPENSION.
- WORKER TO ENSURE PERSONAL FALL PROTECTION EQUIPMENT, RIGGING, AND WORK PROCEDURE IS CONFIGURED TO REDUCE FREE FALL AT ALL TIMES.
- SYSTEM DESIGNED IN ACCORDANCE WITH CSA Z259.16
- WORKERS MUST REVIEW LIFE LINE INFORMATION PROVIDED ON THE ENGINEERED DRAWINGS AND REVIEW LINES FOR COMPLIANCE WITH LINE SAGS AND CLEARANCE REQUIREMENTS. WORKERS ARE TO REVIEW ALLOWABLE CLEARANCES BELOW THE WORKING PLATFORM AND CONFIRM ACTUAL CLEARANCE IS AVAILABLE BELOW WORK AREA FOR ALL LIFELINES IN FALL ARREST CONDITIONS.
- FOR ALL LIFELINES DEFINED FOR TRAVEL RESTRAINT, WORKERS ARE TO ENSURE APPROPRIATE RIGGING AND ANCHORAGE CONNECTORS ARE USED TO ENSURE RESTRAINT CONDITIONS AT ALL TIMES.

WORKSAFE REQUIREMENTS

THESE DRAWINGS INDICATE THE FALL PROTECTION SYSTEM TO BE USED FOR TRAVEL RESTRAINT AND FALL ARREST WHILE TRAVERSING THE ROOF EDGE. IN ACCORDANCE WITH PART 11: FALL PROTECTION OF THE WORKER'S COMPENSATION BOARD OCCUPATIONAL HEALTH AND SAFETY REGULATION AND CSA Z259.16-04 DESIGN OF ACTIVE FALL PROTECTION SYSTEM.



Read Jones Christoffersen Ltd.
Engineers
rjc.ca

1285 West Broadway, Suite 300
Vancouver, BC V6H 3X8 Canada
tel 604-738-0048
fax 604-738-1107

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ISSUED FOR 100% REVIEW	MAR 24/16	SNM
ISSUED FOR 99% REVIEW	FEB 23/16	SNM
ISSUED FOR PRICING	DEC 11/15	SNM

Client/client

CANADA BORDER SERVICES AGENCY

Project title/Titre du projet

OSOYOOS BORDER CROSSING

202 - 97TH STREET, OSOYOOS, B.C.

ROOF REPLACEMENT

PWGSC PROJECT NO. : R75896.0001

Consultant Signature Only

Designed by/Concept par
SNM

Drawn by/Dessiné par
KJB

Date
APRIL 06, 2016

PWGSC Project Manager/Administrateur de Projets TPSGC

Regional Manager, Architectural and Engineering Services
Gestionnaire régionale, Services d'architecture et de génie, TPSGC

Drawing title/ Titre du dessin

FALL PROTECTION GENERAL NOTES

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