

2022-03-14

**REQUEST FOR TENDER
SPLASH ISLAND – WASHROOM UPGRADES
TZC T 11-2022-02
ADDENDUM #2**

This addendum shall be incorporated into, and form part of TZC T 11-2022-02 and take precedence over all requirements of the previously issued bid documents including plans. This addendum must be signed by the bidder (signing officer) in the appropriate space and must be attached to the Form for submission by the bidder. This Addendum consists of two (2) pages plus the attached documents.

1. Attached Addendum AD-01 from Consultant:

See attached addendum AD-01 from Julius Horvath Architect.

2. Revised Pricing Forms Attached:

Are there any sub trades for this job requires affiliated union labour?

3. Question:

For the requested alternative door pricing, are there door specification in terms of type of doors required to be used for the interior & exterior? Will the existing hardware also be re-used? Does this pricing request also include the utility door on the interior side as well, or just the double washroom dividing doors?

Answer:

Replacement of doors has been removed from Appendix III – Additional Prices form

4. Question:

Please confirm the alternate pricing request for toilets. The request asks us to price wall mounted toilets in lieu of what has been specified, however the specifications provided are already wall mounted by Sloan.

Answer:

Alternate toilet option has been removed from Appendix IV – Alternative Prices form

5. Question:

Is the 2x4 & plywood painted barricade required around the site, or will construction fencing suffice for this work?

Answer:

Construction fencing is acceptable if it is 6' high and covered with privacy screening. There must not be gaps in the fence or at the end of the fence where public can access the site. The site must remain secured at all times. The fencing must be secured in a way that it does not get knocked or blown over.

6. Question:

Please confirm if the non-unionized trades are acceptable for this project

Answer:

Non-union trades are permitted.

7. Question:

Referencing the specified validity period of 90 days, we hereby request this validity period be revised to 30 days to accommodate the volatile pricing from varying material sectors such as washroom accessories and partitions, ceramic tiles, electrical cabling & conduit; and piping material

Answer:

Bid validity period is to be 45 days.

8. Question:

Please confirm E-Bonding is acceptable for bid submission

Answer:

Contractors may provide Bid Bonds, Performance Bonds as well as Labour and Material Payment Bonds in either paper or electronic format (e-Bonds).

In accordance with the recommendations of the Surety Association of Canada, the e-Bonds shall be digitally verifiable through a third party digital certification service provider that can maintain integrity of e-Bond content and provide secure access to the e-Bond such as Mobile Bonds, Xenex Enterprises or Trisura Guarantee Insurance.

9. Question:

Please provide the building fire alarm sub-contractor if available

Answer:

The Zoo's fire alarm contractor is Vipond.

Receipt of the Addendum shall be acknowledged as part of your submission.

The Board of Management of the Toronto Zoo reserves the right to reject any or all Tenders or to accept any quotation, should it deem such action to be in its interests.

If you have any queries regarding this matter, please contact Mr. Peter Vasilopoulos, Supervisor, Purchasing & Supply, at 416-392-5916 or by email pvasilopoulos@torontozoo.ca.

Yours truly,

Peter Vasilopoulos
Supervisor, Purchasing & Supply

I/we hereby acknowledge receipt of this addendum and make allowance in my bid.

Signed (Must be Signing Officer of Firm)

Name of Firm

Date:



2022-02-14

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS REV. 1 – FOR ADDENDUM #2**

Tender Pricing Form Submission

Complete and return this section Part 4–*Form of Tender* including Appendices I to XII

Project/Contract: SPLASH ISLAND – WASHROOM UPGRADES – TORONTO ZOO

Project/Contract No.: TZC T 11-2022-02

OWNER: TORONTO ZOO

I/We, the undersigned have received, allowed for and included as part of our submission all issued Addendum numbered _____.

This form must be completed, properly signed and received on or before the date and time specified or your submission will not be considered. Quoted prices shall remain in effect for a period of ninety (90) days from the stipulated closing date.

The Board of Management of the Toronto Zoo reserves the right to reject any or all Quotations or to accept any Quotation, should it deem such action to be in its interests.

By signing and submitting this FORM, you are agreeing to the release of your quotation information, as deemed necessary by the Board, in order to conduct business associated with this quotation or project.

I/We, the undersigned, **having the authority to bind the Company**, certify, that I/we have examined the Instruction to Bidders, Construction Agreement and General Conditions, Specifications, Scope of Work, Drawings and Form of Tender, do hereby offer and agree to enter into an agreement with The Toronto Zoo, WASHROOM UPGRADES at the AFRICA PAVILION – at the Toronto Zoo as described herein for a Total Tender Price, including HST in Canadian funds, equal to the total of the amounts in the following clauses (A) to (B).

THIS TENDER is submitted by

PLEASE
USE INK

Name of Firm

Address Postal Code

Telephone Number Fax Number



2022-02-14

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS REV. 1 – FOR ADDENDUM #2**

Name of Authorized Signing Officer for Firm

Title of Authorized Signing Officer for Firm

Name and Title of Project Contact Person

Email and fax # of Project Contact person

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

FORM OF TOTAL TENDER PRICE

(A) PRICE of *TENDER, which excludes HST is:*

_____ In lawful money of Canada. (State in writing)

\$ _____
(State in numbers)

**(B) PRICE of HST of (13 %) payable by the Owner to the Contractor
DOLLARS**

_____ In lawful money of Canada. (State in writing)

\$ _____
(State in numbers)

**TOTAL TENDER PRICE, which includes the Tender (A) and HST (B) price is:
DOLLARS**

_____ In lawful money of Canada. (State in writing)

\$ _____
(State in numbers)

DISCOUNT	Discount and/or Other	Days
Discount allowed for prompt payment and period within which invoice must be paid to qualify.	%	
Charity Status: The Toronto Zoo is a registered charitable organization (registration #BN 119216398RR0001) and accordingly may be eligible for preferred pricing which should be reflected in the Quotation as submitted.		

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

The following appendix(s) must be completed and returned with the tender submission. **("Not applicable" indicated where completion of a section is not required.)**

Appendix I	Schedule of Values
Appendix II	Unit Prices
Appendix III	Additional Prices
Appendix IV	Alternative Prices
Appendix V	Unsolicited Prices

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

APPENDIX I- SCHEDULE OF VALUES (Due 24 hours after stipulated closing date)

(**included** in Total Tender Price)

All prices are to include the supply and installation of all labour, material, taxes (excluding Harmonized Sales Tax), charges, payroll, burden, and profit, and would be deducted from the Tender Tender Price should the specified work be excluded from the contract work.

ITEM	DESCRIPTION	PRICE
1.	General Items	\$
2.	Provide all General Conditions, including Contractor's insurance coverage, labour and project coordination to complete work as specified.	\$
3.	Mobilization	\$
4.	Site Protection and Hoarding	\$
5.	Demobilization	\$
6.	Clean-up	\$
7.	Bonds	\$
8.	All Demolition, unless called out below	\$
9.	Stall Partitions	\$
10.	Urinal Dividers	\$
11.	Water Closet/Toilets	\$
12.	WC Items (I.e.: toilet paper dispenser, grab bars, change table, reinstallation of step stools, napkin dispenser, coat hooks)	\$
13.	Urinals	\$
14.	Wall Tile	\$
15.	Floor Tile	\$

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

16.	Suspended Ceiling Animal Cutouts (not including lighting system)	\$
17.	Aroma 360 Air Scent System	\$
18.	Walls, Framing, Bulkheads	\$
19.	Painting	\$
20.	Millwork	
21.	Plumbing (excluding sink fixtures, urinals, water closets/toilets)	\$
22.	AER-DEC Sinks and Fixtures (Sinks, Faucets, Soap Dispensers, Hand Dryers) – Supply Only	
23.	AER-DEC Sinks and Fixtures (Sinks, Faucets, Soap Dispensers, Hand Dryers) – Install Only	\$
24.	HVAC	\$
25.	Power and Wiring	\$
26.	Fire Alarm and Protection	\$
27.	Miscellaneous Mechanical Work (cutting, coring, patching, etc.)	\$
28.	Disposal (not including Hazardous Building Materials)	\$
29.	Removal and Disposal of Hazardous Building Materials (as identified in DSS)	\$
30.	Other Architectural Items not broken out above	\$
31.	Other Mechanical Items not broken out above	\$
32.	Other Electrical Items not broken out above	\$
33.	Any other Items required to meet the scope	<hr/>

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

of drawings and specifications (that may not have been accounted for above) – please specify below if any

Total Bulk Tender Price*

\$

*The sum of the amounts shown in the table above **should** equal the Total Tender Price stipulated in the space provided in the Form of Total Tender Price

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

APPENDIX II - UNIT PRICES (Due 24 hours after stipulated closing date)

All prices are to include the supply and installation of all labour, material, charges, taxes (excluding Harmonized Sales Tax), payroll, burden and profit.

ITEM	UNIT	ADD	DEDUCT
Foreman	/hr		
Tradesman			
Labourer			
Floor Tiling	/square foot		
Wall Tiling	/square foot		
Plumbing Services	/hour		
HVAC/Mechanical Services	/hour		
Electrical Services	/hour		
Painting Services	/hour		

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

APPENDIX III - ADDITIONAL PRICES (Due 24 hours after stipulated closing date)

(**not included** in Total Tender Price)

All prices are to include the supply and installation of all labour, material, taxes (excluding Harmonized Sales Tax), charges, payroll, burden and profit.

ITEM	DESCRIPTION	PRICE
	Dibond metal panels in lieu of acrylic panels for the animal cut-outs	\$ _____ Increase / Reduction

* For each item, insert amount in the appropriate column to indicate whether the price change will result in an increase in, or a reduction of, the Total Tender Price.

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

APPENDIX IV- ALTERNATIVE PRICES (Due 24 hours after stipulated closing date)

(**not included** in Total Tender Price)

All prices are to include the supply and installation of all labour, material, taxes (excluding Harmonized Sales Tax), charges, payroll, burden and profit.

Item	Description	Increase or Reduction From Total Tender Price
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* For each item, insert amount in the appropriate column to indicate whether the price change will result in an increase in, or a reduction of, the Total Tender Price.

**TZC T 02-2021-01 SPLASH ISLAND – WASHROOM UPGRADES
PART 5– PRICING FORMS – FOR ADDENDUM #2**

APPENDIX V - *UNSOLICITED ALTERNATIVES (Due 24 hours after stipulated closing date IF APPLICABLE)
(prices not used for Total Tender Price)

All alternatives must conform to the requirements of Section 01 25 00 – Product Substitution Procedures.

All prices are to include the supply and installation of all labour, material, taxes (including Harmonized Sales Tax), charges, payroll, burden and profit.

Number of Item	Description of Item	Change in Total Tender Price Substituted in Work	
		Increase	Reduction

ADDENDUM

Project Name:	Splash Washroom Renovation	Addendum #:	AD-01
Project Number:	1193059	Date:	March 9, 2022
Project Address:	200 Meadowvale Road Toronto, Ontario	Client:	Toronto Zoo

The following information supplements and/or supersedes the bid documents issued for Tender on November 12, 2021.

This Addendum forms part of the contract documents and is to be read, interpreted, and coordinated with all other parts. The cost of all contained herein is to be included in the contract sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above-named project to the extent referenced and shall become part thereof. Acknowledge receipt of this Addendum by inserting its number and date on the Tender Form. Failure to do so may subject bidder to disqualification.

Subject: Clarifications

Description of Addendum

1. No phasing is required.
2. The washroom partition stall specifications are found on A002.
3. The turtle stencils on the four (4) exterior doors are to be installed on both sides of the door. The placement of the turtle stencil will not interfere with the automatic door operator or washroom signage. The exterior doors are to receive a new painted finish (PT:02) as noted in the door elevation drawing on A002.
4. The urinal dividers are the same material and same finish as the washroom stall partitions.
5. Only the sink walls are to receive the P01 partitions as indicated on the drawings. All other walls, unless otherwise noted, shall have the tile or gypsum mounted directly to the existing block wall.
6. The new washroom stall partitions are to be ceiling hung and mounted to the wood planking ceiling.
7. There is to be a smooth transition, tile to tile, where one tile meets another tile. No transition strip or trim is to be provided.
8. The final placement of the animal cut-outs and light fixtures in the ceiling will be determined on-site with the awarded contractor when the installation process occurs. The cut-outs and light fixtures are not fixed to an absolute position.
9. The contractor shall provide an alternative price for the material used for the animal cut-outs. The

ADDENDUM

alternative price is to construct the cut-outs out of Dibond metal panels. Finish is to be mat and the contractor shall price the panel on being a custom solid colour. It is imperative that the metal panel has no reflectivity.

10. The new floor tiles shall terminate under the existing threshold of the exterior doors. The threshold shall be temporarily removed, the tile installed, and the threshold be reinstalled and caulked all around.
11. The contractor shall include in their base bid price the grinding of the existing floor slabs, once the existing floor tiles are removed, to ensure a smooth and proper base surface is provided for the installation of the new floor tile.
12. Refer to attached revised architectural drawings for various updates and revisions to the design.
13. Refer to attached electrical specifications.
14. The new RP-A panel is to be located in the maintenance corridor between the washrooms as per Detail 1 on Drawings E2.1.
15. The automatic door operators for all exterior doors are to remain.
16. The contractor shall include everything noted in the electrical drawings and specifications in their base bid price.
17. The following revisions are to occur to the electrical fixture types
 - Type D1 – Battery Unit to be Lumacell: RGS1802LD2
 - Type D2 – Remote heat to be Lumacell: MQM2LD2
 - Type D3 – Single remote heads to be Lumacell MQM1LD2
 - Type D4 – All double remote heads to be type D2
 - Type E1 – Exit signs to be Lumacell: CM-PC-L
18. The removal and replacement of the disconnect switch as noted as N-2 on drawing 2/E-1.3 shall be completed by the Zoo staff

Issued By

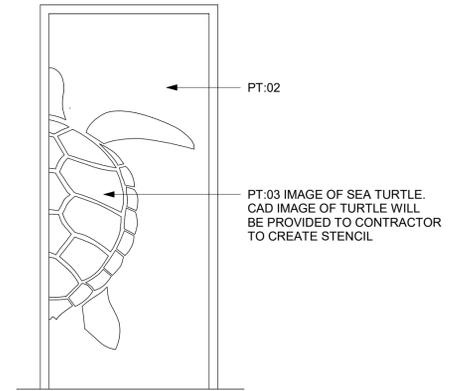


Mark Faulds
Lead Designer



SUB-CONSULTANTS:
telstorm
entrust:IE
 ENGINEERING INC
HCC ENGINEERING
 DESIGN AND TECHNOLOGY SERVICES GROUP
 HCC ENGINEERING LIMITED

- NOTES:
 1. ALL EXTERIOR AND INTERIOR HOLLOW METAL DOORS ARE TO BE REPAIRED AND REFINISHED



DOOR IMAGERY

DOOR ELEVATIONS
 1 : 20

WASHROOM PARTITION SPECIFICATION	
MANUFACTURER:	BOBRICK
PRODUCT:	DURA LINE
MATERIAL:	SOLID PHENOLIC
COLOUR/FINISH:	FINAL COLOUR TO BE DECIDED BY THE ZOO
HARDWARE:	INSTITUTIONAL
MOUNTING:	CEILING HUNG
DOORS:	GAP-FREE CONCEALED HINGES
THICKNESS:	19mm
OPTIONS:	OCCUPIED/UNOCCUPIED DOOR LOCK WITH UNLOCK FROM EXTERIOR (OCCUPANCY INDICATOR)



DO NOT SCALE OFF DRAWINGS. CONTRACTOR TO SITE VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO ARCHITECT. DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND ARE NOT TO BE REPRODUCED AND DISTRIBUTED WITHOUT WRITTEN PERMISSION FROM ARCHITECT. DRAWINGS ARE NOT BE USED FOR ANY PURPOSE OTHER THAN THE LATEST ISSUE SHOWN BELOW.

NO.	DESCRIPTION	DATE
01	75% REVIEW	21/08/23
02	99% REVIEW	21/10/15
03	TENDER	21/11/12
04	ADDENDUM 01	22/03/08

- NOTE:
 1. UPON CONTRACT AWARD, THE CONTRACTOR SHALL IMMEDIATELY CONFIRM QUANTITY OF REQUIRED TILE AND ORDER THEM. CONSTRUCTION CANNOT COMMENCE UNTIL CONFIRMED DELIVERY DATE OF TILES ARE PROVIDED AND TILES ARE ON ROUTE IN ORDER TO LIMIT THE AMOUNT OF DOWN TIME TO THE WASHROOMS
 2. THE CONTRACTOR SHALL PROVIDE AN ADDITIONAL 10% OF TILE FINISH OVER AND ABOVE WHAT IS REQUIRED TO COMPLETE THE PROJECT. TILES TO BE STORED IN A LOCATION SELECTED BY THE ZOO

FINISH SCHEDULE									
TAG	DESCRIPTION	MANUFACTURER	PRODUCT NUMBER	FINISH/COLOUR	SIZE	SUPPLIER	PURCHASED BY	INSTALLED BY	NOTES
TL-01	FLOOR TILE - RIVER AND OCEAN	CENTURA	SPAZZOLATA #LY071224	LEMMY - INDIO	12" x 24"	CENTURA	GC	GC	INSTALL IN PATTERN AS ILLUSTRATED IN DRAWINGS
TL-02	FLOOR TILE - SHORE	SOHO TILES	N/A	PEBBLES IVORY FLAT - NATURAL	N/A	SOHO TILES	GC	GC	INSTALL IN PATTERN AS ILLUSTRATED IN DRAWINGS
TL-03	FLOOR TILE - ACCENT ANIMALS	CENTURA	SPAZZOLATA #LY081224	LEMMY - PUMPKIN	12" x 24"	CENTURA	GC	GC	INSTALL IN PATTERN AS ILLUSTRATED IN DRAWINGS
TL-04	WALL TILE - BLUE SCALE	PORCELANOSA	100213723	MOSAIC AQUA BLUE	10" x 11"	PORCELANOSA	GC	GC	ARRANGE MOSAIC VERTICALLY ALONG INDICATED WALL
TL-05	WALL TILE - AQUA FAN	SALTILLO TILE	NT FAN	OLIVE	12cm	SALTILLO TILE	GC	GC	INSTALL IN SCALE PATTERN AS ILLUSTRATED IN DRAWINGS
TL-06	WALL TILE - LIGHT BLUE FAN	SALTILLO TILE	NT FAN	BLUE MAYA	12cm	SALTILLO TILE	GC	GC	INSTALL IN SCALE PATTERN AS ILLUSTRATED IN DRAWINGS
PT-01	UPPER WALL FINISH PAINT	SHERWIN WILLIAMS	SW 9054	LITTLE BOY BLU	N/A	SHERWIN WILLIAMS	GC	GC	PROVIDE 1 COAT PRIMER, 2 COATS FINISH
PT-02	DOOR PAINT - TYPE 1	SHERWIN WILLIAMS	SW 9054	LITTLE BOY BLU	N/A	SHERWIN WILLIAMS	GC	GC	PROVIDE 1 COAT PRIMER, 2 COATS FINISH
PT-03	DOOR PAINT - TYPE 2	SHERWIN WILLIAMS	SW 6842	FORWARD FUCHSIA	N/A	SHERWIN WILLIAMS	GC	GC	PROVIDE 1 COAT GREY PRIMER, 2 COATS FINISH
PT-04	WINDOW TRIM - BROWN	SHERWIN WILLIAMS	SW 8153	BRONZE PROTEGE	N/A	SHERWIN WILLIAMS	GC	GC	PROVIDE 1 COAT PRIMER, 2 COATS FINISH

EQUIPMENT SCHEDULE										
TAG	QUANTITY	DESCRIPTION	MANUFACTURER	PRODUCT NUMBER	PRODUCT	DIMENSIONS	FINISH	PURCHASED BY	INSTALLED BY	NOTES
EQ-01	13	WATER CLOSET & BF WATER CLOSET	N/A	N/A	REFER TO MECHANICAL			GC	GC	PROVIDE BACK REST FOR ACCESSIBLE WATER CLOSETS. REFER TO MECHANICAL FOR ADDITIONAL INFORMATION.
EQ-02	5	URINAL	N/A	N/A	REFER TO MECHANICAL					
EQ-03	4	LAVATORY	SLOAN	AD-84000	AER-DEC WALL MOUNT SINK	CUSTOM AS PER DRAWINGS	CORIAN - EVENING PRIMA	GC	GC	INSTALL SUPPORTS, BRACKETS, UNDERCOUNTER SKIRT, ETC. SUPPLIED BY THE ZOO.
EQ-04	16	FAUCET	SLOAN	EFX200	BASYS SENSOR ACTIVATED FAUCET	N/A	CHROME FINISH	GC	GC	
EQ-04	16	DRYER	SLOAN	EHD-511	SINK MOUNTED TOUCH FREE HAND DRYER	N/A	CHROME FINISH	GC	GC	
EQ-04	16	SOAP DISPENSER	SLOAN	ESD400	TOUCH FREE SOAP DISPENSER	N/A	CHROME FINISH	GC	GC	
EQ-06	2	SIDE GRAB BAR	BOBRICK	B-5898	90 DEGREE GRAB BAR	762x762mm, 32mm DIA.	SATIN FINISH PEENED	GC	GC	
EQ-07	6	REAR GRAB BAR	BOBRICK	B-5806x24	STRAIGHT GRAB BAR	610mm LONG, 32mm DIA.	SATIN FINISH PEENED	GC	GC	
EQ-09	13	SURFACE MOUNTED COAT HOOK	BOBRICK	B-635	KLUTCH DEVICE HOLDER	190x228x64mm	STAINLESS STEEL	GC	GC	
EQ-10	2	BF TOILET PAPER DISPENSER	BOBRICK	B-2890	SINGLE JUMBO ROLL TOILET TISSUE DISPENSER	N/A	STAINLESS STEEL	GC	GC	
EQ-11	10	TOILET PAPER DISPENSER	BOBRICK	B-2892	TWIN JUMBO ROLL TOILET TISSUE DISPENSER	N/A	STAINLESS STEEL	GC	GC	
EQ-12	4	CHANGE TABLE	KOALA CARE	KB110-SSWM	BBBY CHANGE TABLE	882x508x102mm	STAINLESS STEEL	GC	GC	
EQ-13	4	KIDS PULL DOWN STEP	STEP N WASH	N/A	STEP N WASH	N/A	STAINLESS STEEL	OWNER	GC	RE-USE AND RE-INSTALL EXISTING
EQ-14	9	SHELVING	CORIAN	N/A	CORIAN SOLID SLAB	511mmX305mm	CORIAN - EVENING PRIMA	GC	GC	PROVIDE MOUNTING BRACKET AND FASTENERS
EQ-15	16	MIRROR	N/A	N/A	SOLID ROUND PIECE MIRROR	REFER TO DRAWINGS	MIRROR	GC	GC	

NOTE:
 1. SURFACE MOUNTED COAT HOOK FOR PARTITIONS STALLS SHALL BE INSTALLED ON THE STALL DOORS.

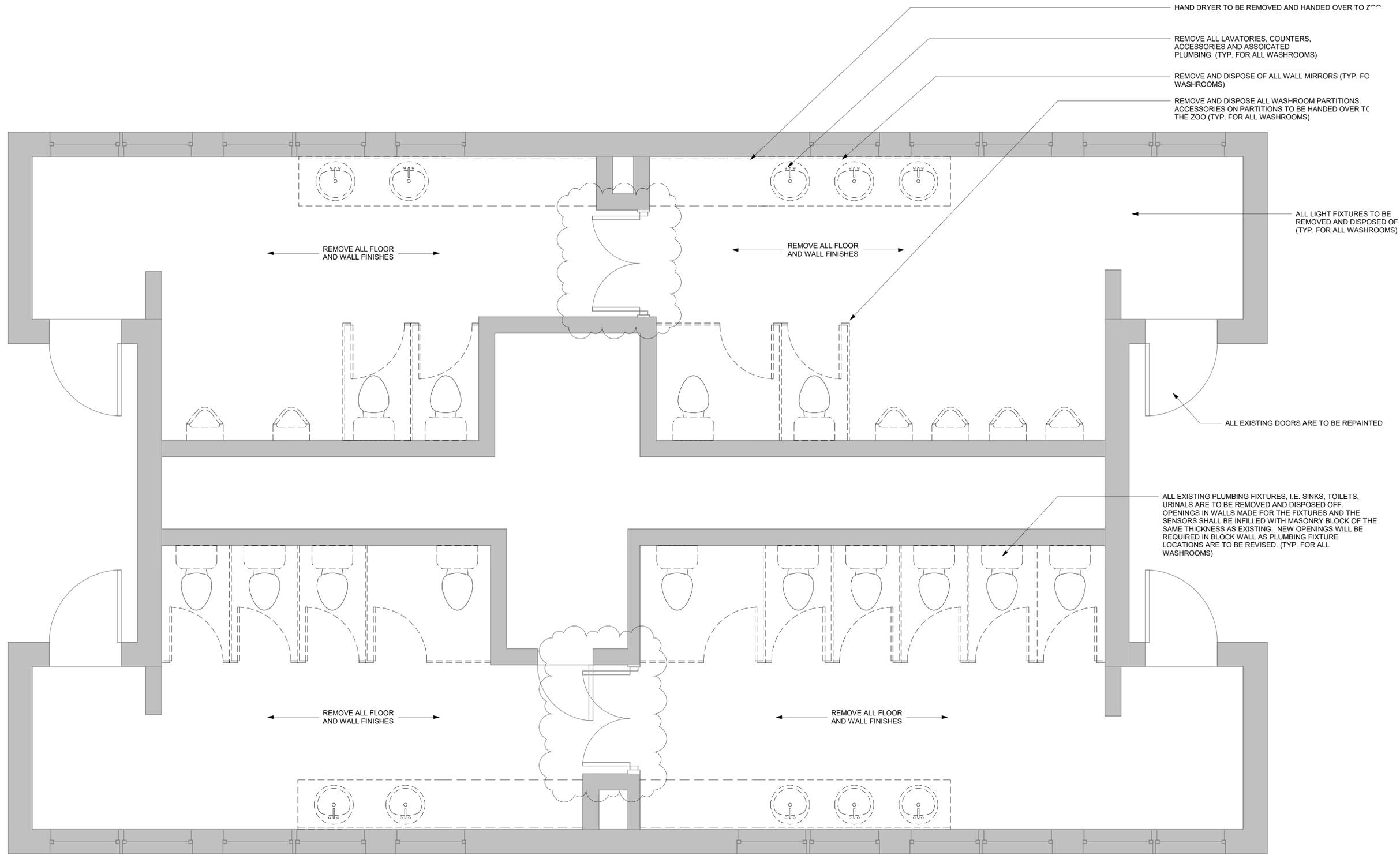
TORONTO ZOO
 361A OLD FINCH AVE
 TORONTO, ONTARIO, M1B 5K7
 WASHROOM UPGRADES - SPLASH ISL

SCHEDULES

Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A002

Scale 1 : 20



DO NOT SCALE OFF DRAWINGS. CONTRACTOR TO SITE VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO ARCHITECT. DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND ARE NOT TO BE REPRODUCED AND DISTRIBUTED WITHOUT WRITTEN PERMISSION FROM ARCHITECT. DRAWINGS ARE NOT TO BE USED FOR ANY PURPOSE OTHER THAN THE LATEST ISSUE SHOWN BELOW.

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- NOTE:**
- REMOVE ALL WALL MOUNTED ELEMENTS SUCH AS BUT NOT LIMITED TO HAND DRYERS, SIGNAGE, DISPENSER, SINKS, FAUCETS, TOILETS, STALL PARTITIONS, LIGHTING ETC. AND HAND OVER TO OWNER UNLESS DIRECTED TO DISPOSE OF PER SPECIFICATIONS.
 - REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR FURTHER DEMOLITION SCOPE AND INFORMATION.
 - REMOVE BUT RETAIN ALL LOOSE ITEMS FOR RE-USE AND COORD STORAGE OF THESE WITH OWNER.
 - WHERE ELECTRICAL ITEMS ARE TO REMAIN, TEMPORARILY RE-POSITION CONDUITS AND REMOUNT AFTER FINISHES ARE APPLIED.
 - ALL NOTES RELATE TO BOTH MEN AND WOMEN WASHROOMS.

TORONTO ZOO
 361A OLD FINCH AVE
 TORONTO, ONTARIO, M1B 5K7
 WASHROOM UPGRADES - SPLASH ISL

DEMOLITION PLAN

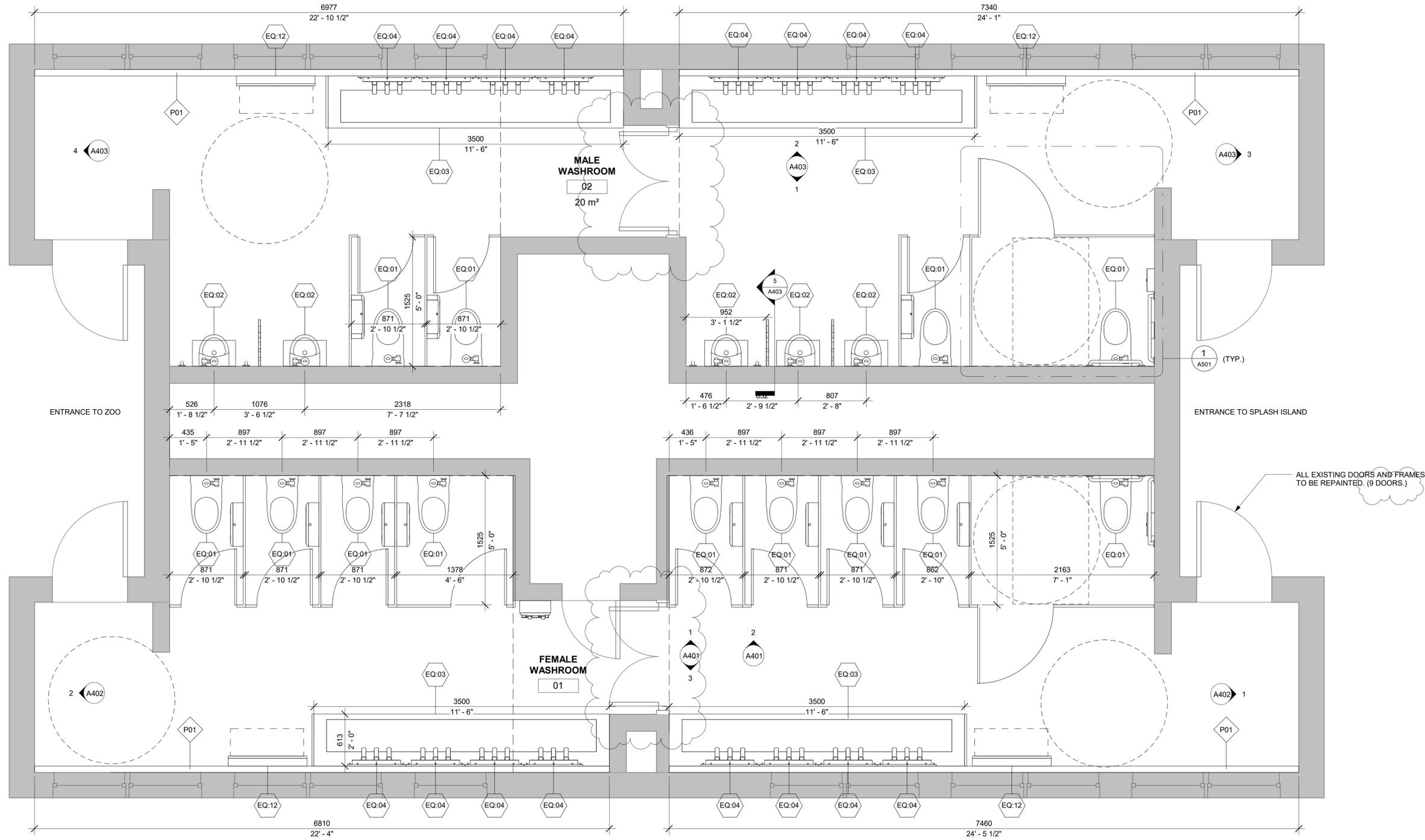
Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A101
 Scale 1 : 25

PARTITION TYPES

PARTITION P01 - SLAB TO U/S OF ROOF

- 64mm STEEL STUDS @ 400mm o/c
 - 12.7mm CEMENT BOARD FOR TILE/12.7mm GWB FOR PAINT
- NOTE: FRAME AROUND EXISTING WINDOWS AND PROVIDE NEW WIDER TIMBER SILL TO MATCH EXISTING



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TORONTO ZOO
 361A OLD FINCH AVE
 TORONTO, ONTARIO, M1B 5K7
 WASHROOM UPGRADES - SPLASH ISL
PROPOSED PLAN

Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A201
 Scale 1 : 25

CLIENT:



SUB-CONSULTANTS:



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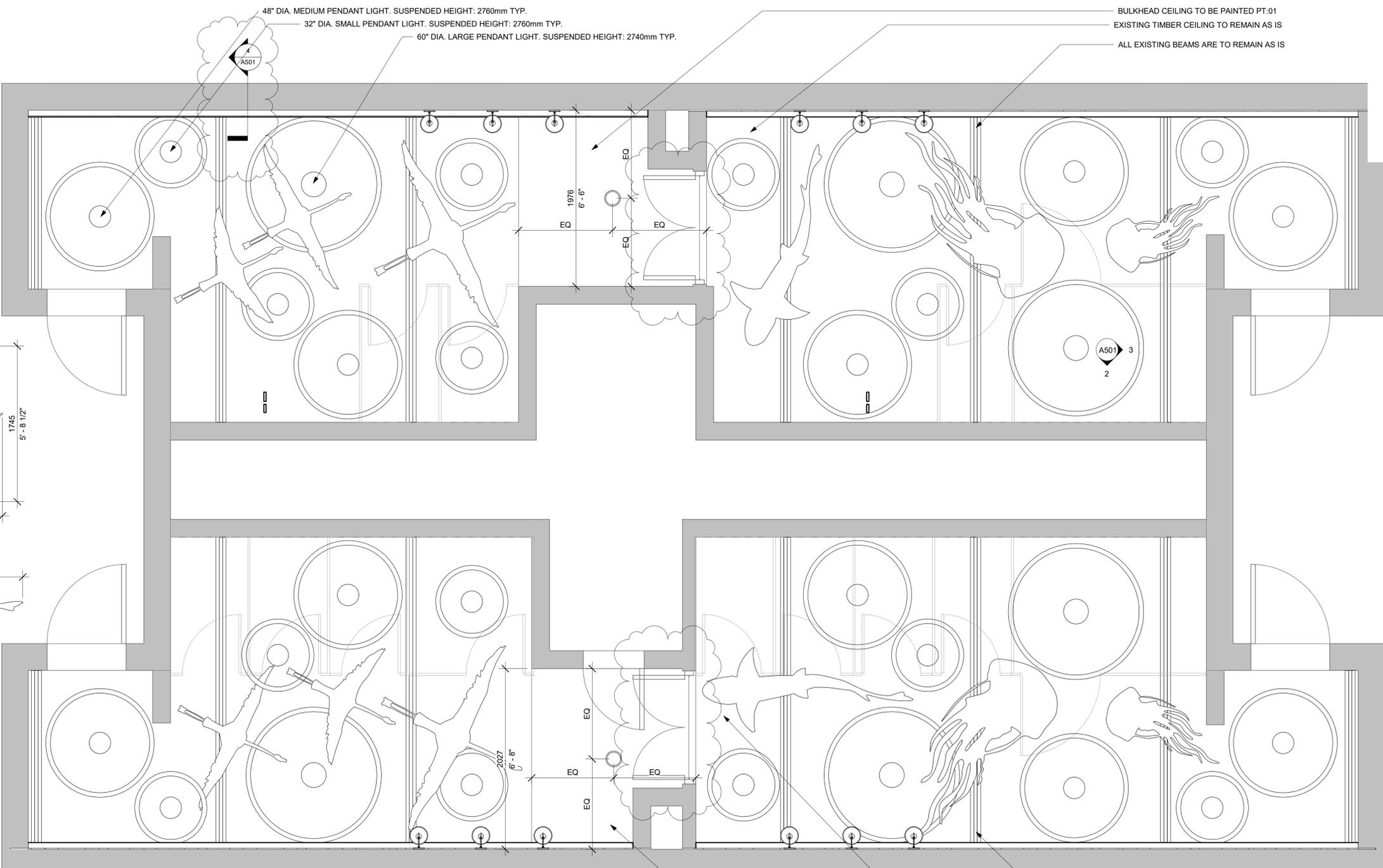
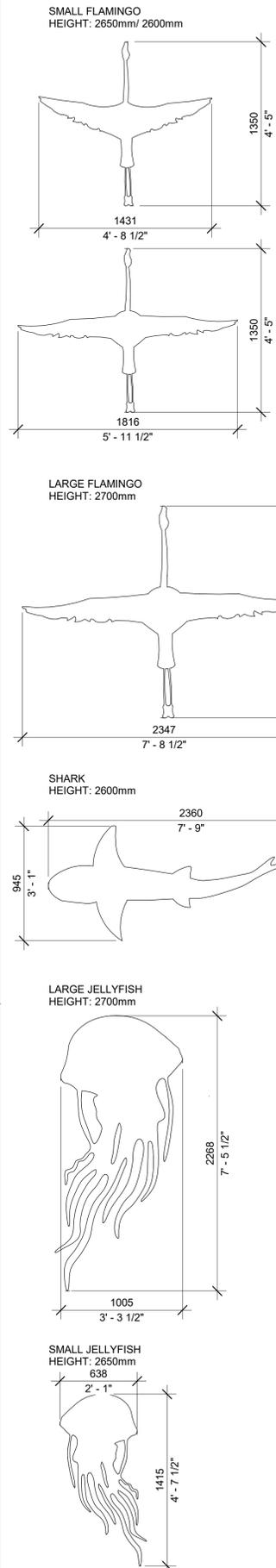
TORONTO ZOO
 361A OLD FINCH AVE
 TORONTO, ONTARIO, M1B 5K7
 WASHROOM UPGRADES - SPLASH ISL

REFLECTED CEILING PLAN

Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A203

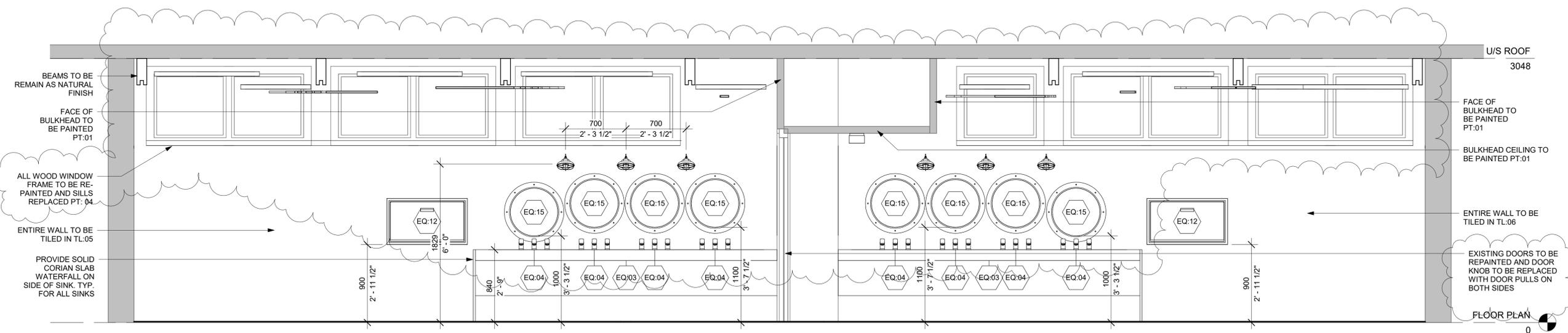
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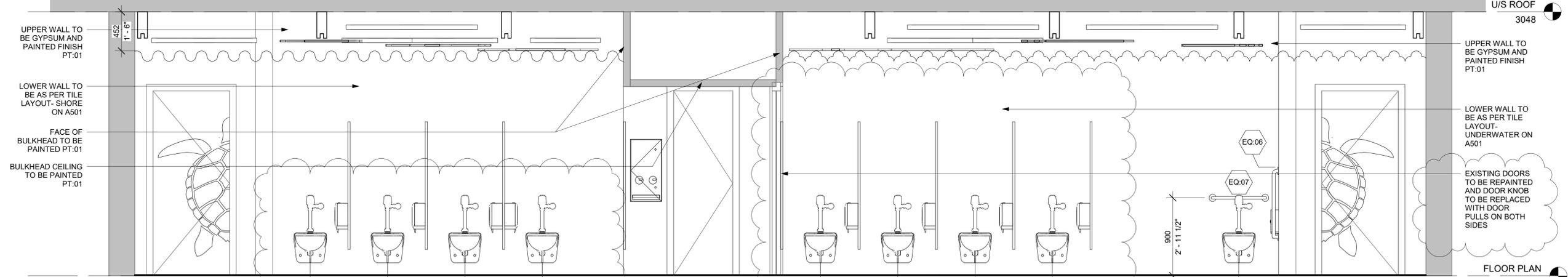
- NOTE:
1. ANIMAL CUTOUTS ARE TO BE MADE OF OPAQUE PLEXIGLASS COLOURED ACRYLIC SHEETS THAT ARE CUT TO THE ANIMAL PROFILES AS ILLUSTRATED. CUTOUT TEMPLATE CAN BE PROVIDED AT CONTRACTOR'S REQUEST OR A SIMILAR PROFILE CAN BE SUBMITTED FOR CONSULTANTS REVIEW. ACRYLIC SHEETS MUST HAVE NO REFLECTIVITY PROPERTIES.
 2. OPAQUE PLEXIGLASS SHEETS TO BE A MINIMUM OF 1/2" THICK.
 3. COLOUR OF ANIMALS TO BE EITHER A PEACH PINK, OR PURPLE OR BURGUNDY (2 TONES TO BE SELECTED). COLOURS TO BE SUBMITTED FOR CONSULTANT REVIEW.
 4. CUTOUTS TO BE SUSPENDED FROM WOOD CEILING UTILIZING CABLE SYSTEM SUCH AS THE CRL CABLE DISPLAY SYSTEM OR APPROVED EQUIVALENT
 5. HEIGHT OF ANIMALS TO RANGE. AS THERE ARE THREE CUTOUTS ON EITHER SECTION OF THE WASHROOM, EACH SHALL BE INSTALLED AT A DIFFERENT HEIGHT RANGING IN 50mm +/- INTERVALS STARTING FROM 9000mm HIGHEST .
 6. EXACT PLACEMENT OF CUTOUTS TO BE REVIEWED AND APPROVED WITH THE CONSULTANT PRIOR TO FINAL INSTALL. ALLOW FOR ADJUSTMENTS DUE TO ELECTRICAL AND MECHANICAL PLACEMENTS. COORDINATE INSTALL OF ALL CUTOUTS WITH CONSULTANT.
 7. ENSURE SMOKE DETECTORS ARE NOT COVERED BY CUTOUTS.
 8. EXACT PENDANT LIGHT PLACEMENT AND LUMEN TO BE APPROVED BY CONSULTANT

BULKHEAD CEILING TO BE PAINTED PT:01
 EXISTING TIMBER CEILING TO REMAIN AS IS
 ALL EXISTING BEAMS ARE TO REMAIN AS IS

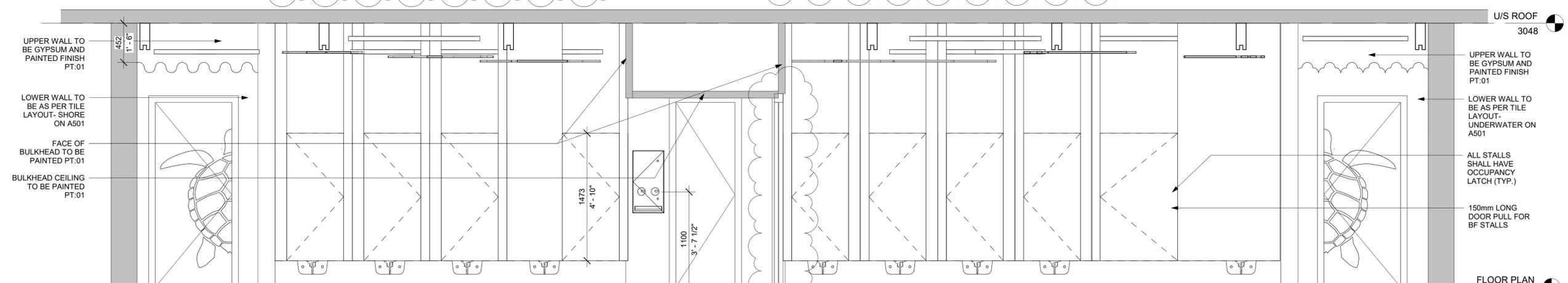
ALL EXISTING BEAMS ARE TO REMAIN AS IS
 EXISTING TIMBER CEILING TO REMAIN AS IS
 BULKHEAD CEILING TO BE PAINTED PT:01



3 ELEV. FEMALE SINK
 1 : 25



2 ELEV. FEMALE W/C
 1 : 25



1 ELEV. FEMALE STALL
 1 : 25

DO NOT SCALE OFF DRAWINGS. CONTRACTOR TO SITE VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO ARCHITECT. DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND ARE NOT TO BE REPRODUCED AND DISTRIBUTED WITHOUT WRITTEN PERMISSION FROM ARCHITECT. DRAWINGS ARE NOT TO BE USED FOR ANY PURPOSE OTHER THAN THE LATEST ISSUE SHOWN BELOW.

NO.	DESCRIPTION	DATE
01	75% REVIEW	21/08/23
02	99% REVIEW	21/10/15
03	TENDER	21/11/12
04	ADDENDUM 01	22/03/08

TORONTO ZOO
 361A OLD FINCH AVE
 TORONTO, ONTARIO, M1B 5K7
 WASHROOM UPGRADES - SPLASH ISL

ELEVATIONS WOMEN

Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A401

Scale 1 : 25

CLIENT:



SUB-CONSULTANTS:



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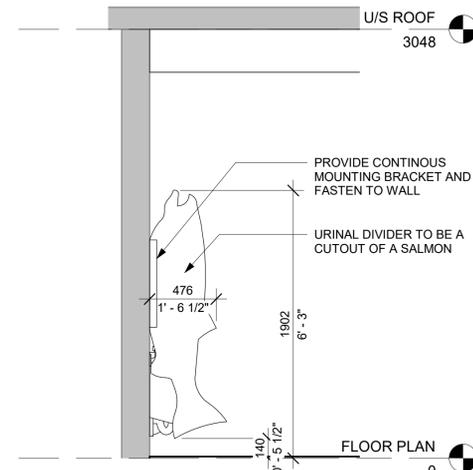
NO.	DESCRIPTION	DATE
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02	99% REVIEW	21/10/15
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TORONTO ZOO	
361A OLD FINCH AVE TORONTO, ONTARIO, M1B 5K7	
WASHROOM UPGRADES - SPLASH ISL	
ELEVATIONS MEN	
Project number	2019-06
Date	2021-11-12
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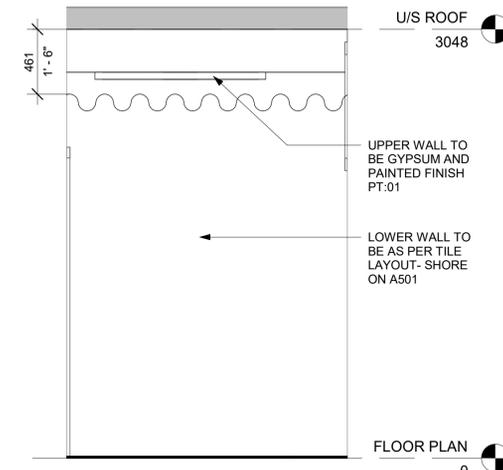
ELEVATIONS MEN

Project number: 2019-06
 Date: 2021-11-12
 Drawn by: M FAULDS
 Checked by: J HORVATH

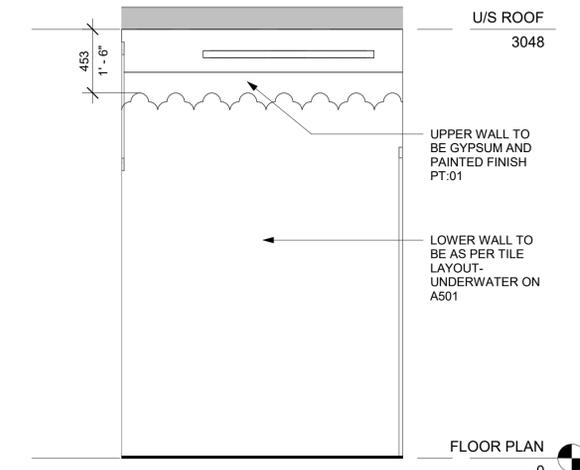
A403
 Scale: 1 : 25



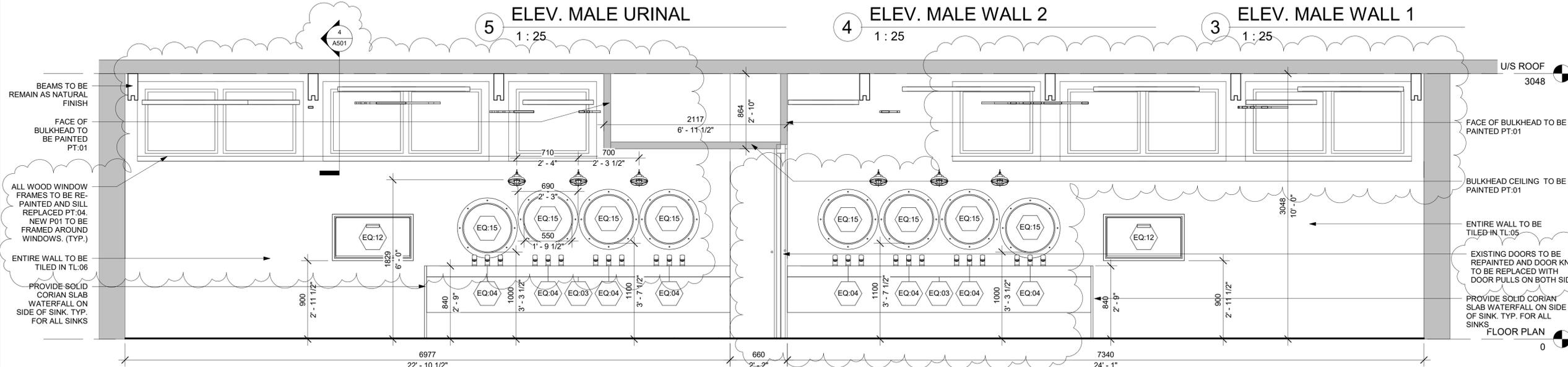
5 ELEV. MALE URINAL
1 : 25



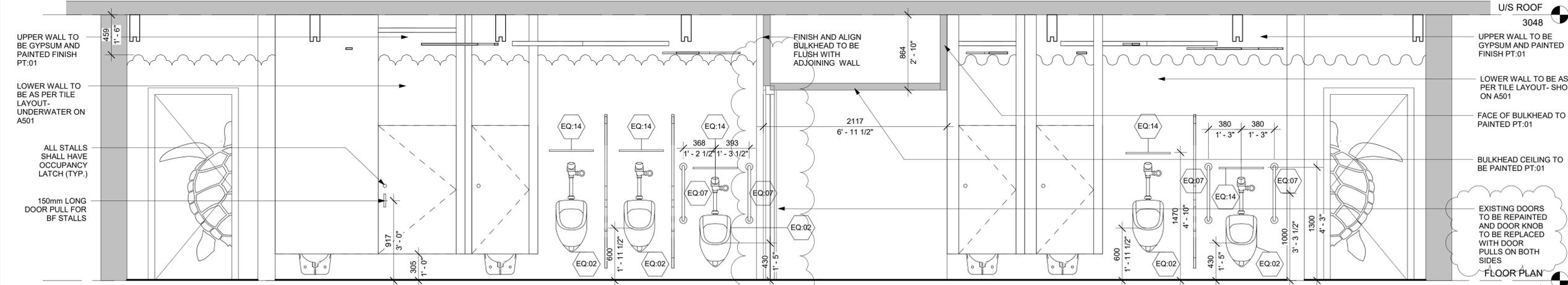
4 ELEV. MALE WALL 2
1 : 25



3 ELEV. MALE WALL 1
1 : 25



2 ELEV. MALE SINK
1 : 25



1 ELEV. MEN W/C
1 : 25

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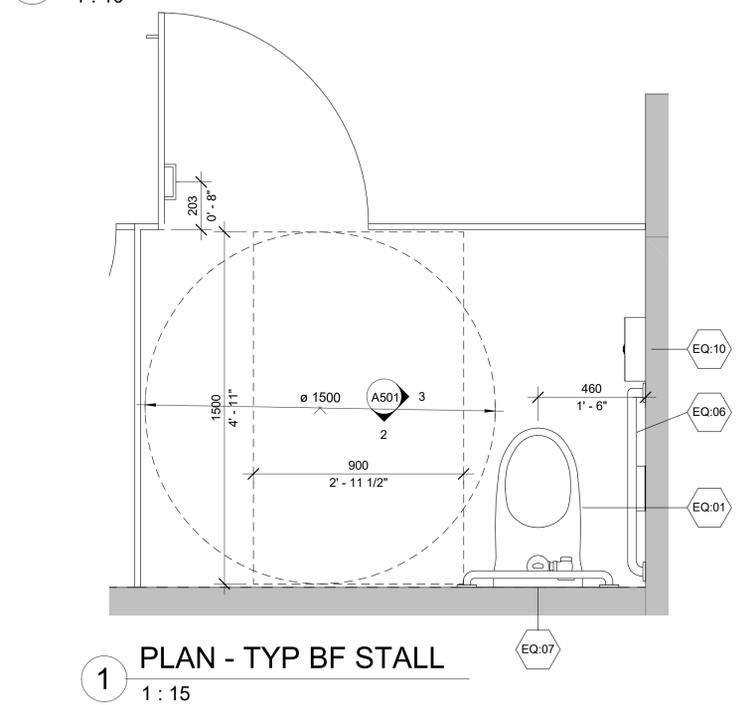
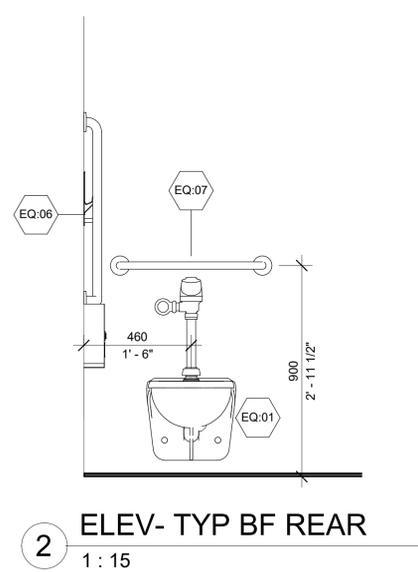
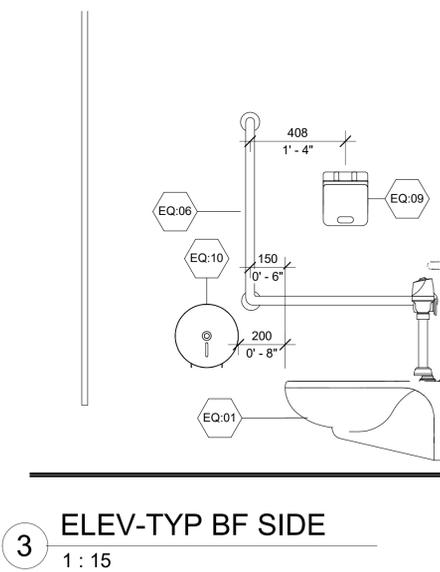
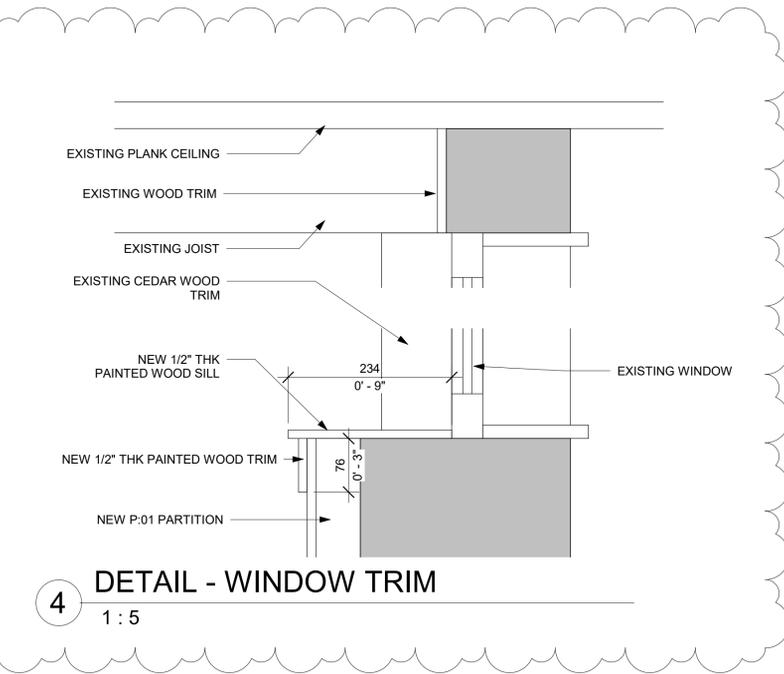
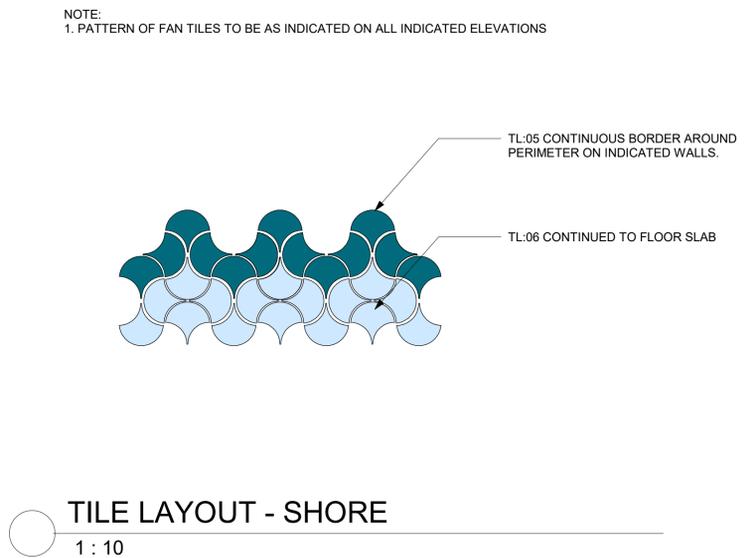
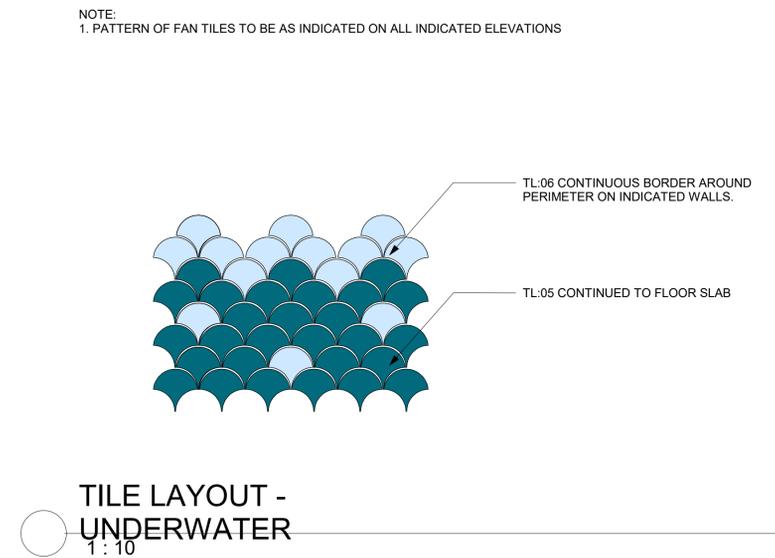
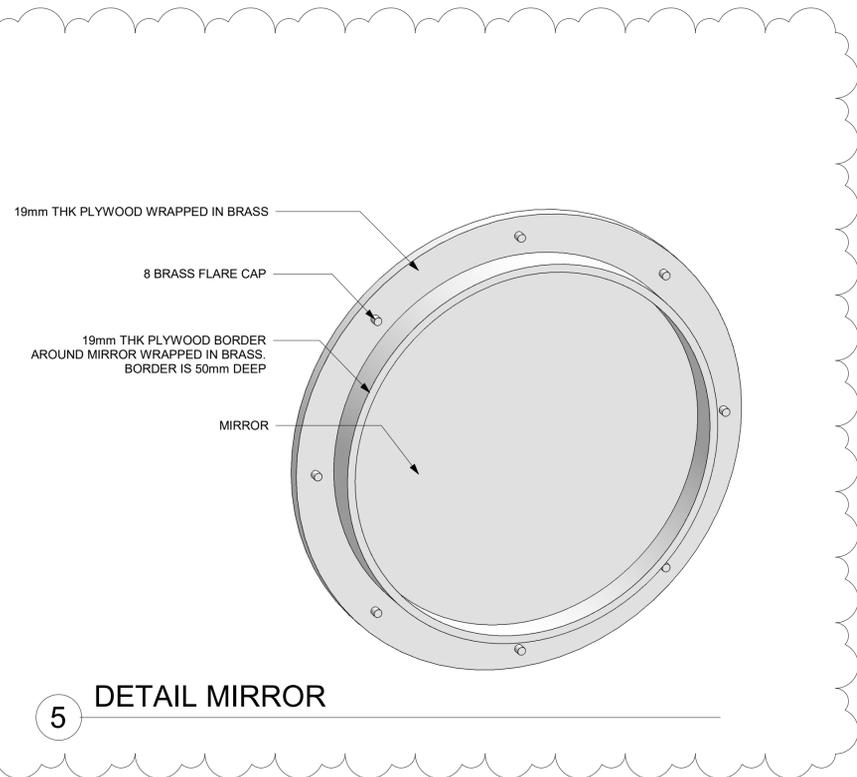
TORONTO ZOO
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 WASHROOM UPGRADES - SPLASH ISL

DETAILS

Project number	2019-06
Date	2021-11-12
Drawn by	M FAULDS
Checked by	J HORVATH

A501

Scale As indicated



**Electrical
Specifications**

for

**Toronto Zoo
Splash Island
Washroom Renovations
361A Old Finch Avenue
Toronto, Ontario**

HCC PROJECT #21251

HCC ENGINEERING LIMITED

**40 Eglinton Avenue East
Suite 600**

**Toronto, Ontario
M4P 3A2**

Tel: (416) 932-2423

**Issued for Tender
December 1, 2021**

SECTION 00 00 00: TABLE OF CONTENTS.

SECTION TITLE	SECTION NUMBER
Price Schedule and Valuation of Changes	
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Grounding	26 05 27
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Conduits, Conduit Fastenings and Conduit Fittings	26 05 34
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PANEL SCHEDULES

PRICE SCHEDULE AND VALUATION OF CHANGES

- .1 We will submit, for approval, a complete breakdown of labour and material costs for all changes.
- .2 The man hour labour units for changes are to be based on labour units from column 1 of the NECA Manual of Labour Units.
- .3 Total mark up including overhead and profit on the **material** shall be limited to 10%.
- .4 Unit hourly composite cost to be used on all changes for labour, as required. The unit hourly composite cost shall contain all provincial taxes, overhead (i.e.: supervision, financing, estimating, project management, CADD, administration, parking, mileage, clean up, safety, truck fees, ESA fees, etc.), **profit** and associated costs for the work involved, excluding H.S.T. Unit hourly composite cost to remain in effect throughout the duration of this project.

SECTION 26 05 00: GENERAL CONDITIONS.

1.1 Project Description:

1. The project encompasses the 361A Old Finch Avenue, Toronto facility. In general, the work shall include, without being limited to the following:
 1. Provide new 120/208 Volt utility power service.
 2. Provide grounding systems, lighting, etc., requirements as shown on the drawings.
2. The existing electrical system and operations must be maintained throughout this project.
3. The facility consists of office areas and computer rooms. Therefore, the successful contractor will be working in active and occupied office and technology environments and must make all allowances required to work within such environments.
4. The electrical contractor shall provide a comprehensive Methods of Procedures (MOP's) two weeks prior to each and every power shutdown. MOP's must include a detailed sequence of operations to be completed during the respective shutdown as well as a back out plan. MOP's must be approved by client and the electrical engineer prior to any work taking place.

1.2 Sub-Contractors:

1. The Contractor may not assign or sub-contract any work without the prior written consent of the Construction Manager or his designated representative. A list of sub-contractors must be submitted with the tender response.

1.3 Substantial Completion Of Contract

1. All the equipment and wire must be cleaned and tested before acceptance by the consultant.
2. This Contractor shall guarantee all equipment and work furnished under this Division for a period of **two (2) years** or such longer periods as may be provided in the warranty of the manufacturer of individual components, whichever is longer from the date of final acceptance by the Engineer. This contractor shall correct all defects developing as a whole or in part, due to defective workmanship, materials or defective arrangement of the various parts or materials damaged as a result of these defects or repairs. All defects shall be made good to the satisfaction of the Engineer at this Contractor's expense.
3. Replace, at no cost, all incandescent lamps burned out during a (thirty (30) day period, all burned-out fluorescent and HID lamps for a period of ninety (90) days and all burned out LEDs based on a 70% lumen maintenance within a 5 year warranty period after date of issuance of certificate of Substantial Performance for the contract of this building.
4. Additional requirements as detailed in Section 26 05 00, paragraph 1.7, sentence 9.

- 1.4 Paragraph not used.
- 1.5 Site Meeting
 1. The site meeting will be scheduled during the tender period by the construction manager.
- 1.6 Examination of Premises and Work
 1. Visit and examine the site where the work is to be done. Become familiar with all features and characteristics of the site and/or any existing structure before submitting a bid. No allowances will be made by the Owner for any difficulties encountered by this Contractor due to any peculiarities of the site, surrounding public or private property that existed when the Tender was submitted.
 2. This Contractor shall examine the structural, mechanical, architectural, electrical and any other drawings issued to satisfy himself that the work can be satisfactorily carried out. Before commencing work or prefabrication, examine the work of other trades and report at once any defect or interference affecting the work of the electrical trade.
 3. Where variances occur between the drawings and the specifications, or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the contract sum. The Engineer will decide on the item and manner in which the work shall be installed.
 4. All bidders shall familiarize themselves with and adhere to the design builder's / owner's building standards and guidelines.
- 1.7 Terms And Conditions
 1. DEFINITIONS
 1. The term Owner shall be understood to refer to Toronto Zoo.
 2. The term consultant shall be understood to refer to Howard Cohen, P. Eng., RCDD/LAN, MBA.
 3. The term project manager shall be understood to refer to Toronto Zoo.
 4. The term electrical contractor shall be understood to refer to the successful bidder to this specification for the electrical systems.
 5. The term Contract shall be understood to refer to all items and conditions of this specification, Drawings, the complete tender package, the Contractor's tender submission and any other future contractual arrangements. All such items and conditions shall be binding unless agreed otherwise by the Contractor, Consultant and Owner.
 6. The term Project shall be understood to refer to the complete supply and installation of the Electrical System and components, as defined in this specification and Drawings.
 7. Wherever the words "equal", "equivalent", "approved", or "approved equal" are used, it shall be understood to mean, "equal", "equivalent", "approved", or "approved equal" in the opinion of the Consultant only.
 8. Wherever the words "install", "provide", or "supply and install", are used it shall be understood to mean "provide and install, inclusive of all labour, materials, installation, testing, and connections" for the item to which referred.
 9. "Concealed" is defined as "out of sight" in "normal" viewing conditions, and includes buried in concrete, above acoustic tile or gypsum board ceilings, within masonry or gypsum board constructed walls, within cable trays of below raised access floors.

2. These specifications or the drawings shall not be used alone. Any item or subject omitted from one, but mentioned or reasonably implied in the other, shall be provided. Misinterpretation of any requirements of either the specification or drawings shall not result in any additional charge after submission of Tender. This Contractor shall, by careful study of the total requirements, include all necessary components to make each system workable. The consultant shall be contacted for written clarification on any point before the submission of Tenders.
3. All terms and conditions of the specifications, tender documents and accompanying Drawings shall be strictly adhered to by the Contractor, unless otherwise noted. Any inability to comply with these requirements must be stated in writing, in detail, with the response submission. Otherwise, it shall be understood that the Contractor is bound to compliance with the stated terms and conditions.
4. The Contractor shall co-operate fully with the Owner, Consultant, owner and owner's agent and all contractors, sub-contractors and other persons working on the site.
5. The Contractor shall do the complete installation in accordance with the latest editions of the Building Code, Electrical Safety Code, CSA, or other Codes or governing authorities of competent jurisdiction. In case of discrepancies with this or the manufacturer's specifications, the Contractor shall notify the Consultant immediately.
6. Obtain and pay for permits (note: Building Permit obtained by owner) and inspections required for work performed including all required ESA submissions and applications. Provide Certificate (s) of Acceptance from the Authorities Inspection Department, upon completion of work.
7. Submit required Documents and shop drawings to authorities having jurisdiction in order to obtain approval for the Work. Copies of Contract Drawings and Specifications may be used for this purpose. Prepare any additional information, details and drawings which these authorities may require.
8. The Contractor must comply with all requirements of the Occupational Health & Safety Act.
9. In order to meet the requirements of substantial completion the electrical contractor must complete the following:
 1. Installation and successful testing of all electrical system devices as per mutually agreed to tests and commissioning plan.
 2. Submission of all coordination and permit documentation for the Consultant's review.
 3. Submission of all record and As-built documentation.
 4. Correction of any deficiencies in the electrical system.

1.8 Schedule

1. All work must be completed as per the schedule provided by the project manager. Refer to schedule provided by the project manager for additional details. Include for all necessary overtime required to carry out the project. The successful contractor will not be permitted claims as a consequence of this requirement. The successful contractor to submit a full construction schedule before starting any work.
2. Sufficient manpower, materials, equipment, appliances and services are to be kept on site at all times to maintain the scheduled completion of work.
3. All work required to be done after office hours and weekends (including x-raying, core drilling and power shutdowns), shall be included in the tender price. Note: All x-raying and core drilling shall be provided by the electrical contractor.

4. Work associated with power shutdowns (including switching services from permanent, portable or temporary generator distribution back to utility power) and with testing and commissioning of electrical systems (including load bank testing of UPS and EPS) **must be carried out between Saturday @6:00pm and Sunday @5:00am**. All shutdowns must be approved by Owner.
5. **Contractor must provide a dedicated onsite electrician for 8 hours on the Monday following each cutover.**

1.9 Contract Drawings

1. The Drawings for the electrical system work are diagrammatic performance Drawings, intended to convey the scope of work and indicate the approximate sizes and locations of equipment and outlets. The Drawings do not intend to show Designer's Architectural, Mechanical or Structural details.
2. Do not scale or measure Drawings, but obtain information regarding accurate dimensions, from the dimensions shown or by site measurements. Follow the Drawings for laying out the work.
3. Make, at no additional cost, any changes or additions to materials and equipment necessary to accommodate Structural conditions (offsets around beams, columns, etc..).
4. Alter at no additional cost, the location of materials and/or equipment as directed, provided that the changes are made before installation, and do not necessitate additional materials.
5. Change location of termination panels and devices at no extra cost providing cable length increase resulting from relocation does not exceed 3m (10 ft.) and information is given before installation.
6. Confirm at the site, the exact location of equipment.
7. Any miscellaneous materials, hardware, devices, wiring, etc., not specifically described, but required for the installation and operation of the electrical system, shall be provided and included as part of the Bid.

1.10 Materials And Equipment

1. All materials and equipment shall be completely new and unused products of only the most recent manufacturer model or version number, CSA certified, and manufactured to the Standards specified.
2. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the local Inspection Department.
3. No damaged, chipped or marked equipment or materials will be accepted and must not be installed.

1.11 Substitutes

1. All tenders must be based on specified items. Substitutes will not be permitted.

1.12 Operation And Maintenance Manuals

1. Provide three (3) sets of operation and maintenance manuals for equipment and products supplied
 1. Provide three (3) soft copy scanned sets of operation and maintenance manuals for equipment and products supplied. Media shall be USB sticks.
 2. Include the following information in the Operation and Maintenance manuals:
 - Names and address of local suppliers for the items included.
 - Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items and parts lists. Advertising or sales literature is not acceptable.
 - Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of the installation.

3. Review information provided in the maintenance instructions and manuals with the Owners' operating personnel to ensure a complete understanding of the electrical equipment and systems and their operation.
- 1.13 Progress Payments
1. Submit a complete breakdown of the Contract with each progress billing, indicating percentage of work complete, in a form acceptable to the Owner/Consultant.
 2. The amount of monies to be allocated for close out documents must be 3% of contract value. This does not include monies allocated for studies, testing, measurement and verification, commissioning, etc.
- 1.14 Shop Drawings
1. Submitted Shop Drawings must indicate details of construction, dimensions, capacities, weights and electrical performance and flame spread characteristics of equipment or materials, as well as specification reference Section number and project name.
 2. Shop Drawings shall be provided with sufficient space on the front for all Consultant's and Contractor's "review" stamps.
 3. Work affected by submittal shall not proceed until review is complete.
 4. Review submittal prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of the work and Contract Documents and bears the Stamp of Communications Contractor.
 5. Changes made to the Shop Drawings by the Consultant will not affect the Contract Price.
 6. Submit Shop Drawings for all material and equipment referred to in contract document.
- 1.15 Field Supervision
1. Throughout the duration of the Project, a properly qualified Electrical Field Supervisor must be available at all times. The Supervisor who starts the work must not be changed unless requested by the project manager, or written permission from the project manager is obtained.
 2. In addition, provide proper office supervision of the work. The person responsible for office supervision must visit the site as often as necessary, to ensure work is properly performed, and attend weekly site meetings when so requested.
- 1.16 Site Responsibilities
1. Maintain work areas to be free of construction debris and waste. The disposal of all materials shall be the responsibility of the Contractor.
 2. Make all necessary arrangements to transport materials and equipment to and within the site. The Contractor shall be responsible for arranging for the use of any hoists, lifts, pulleys, winches, cranes or service elevators.
 3. The Contractor is responsible for complete storage, handling, delivery, and installation of all materials used in the performance of the work.
 4. Obtain a copy of the Owner's leasehold design manual and ensure that all requirements are complied with.

1.17 Deliveries / Access

1. Coordinate all deliveries to site with the Building Manager. Book loading dock and service elevators 72 hours in advance. Contractor must pre-arrange all site access and authorization for all site personnel and subcontractor personnel with the Building Project Manager or his representative

1.18 Testing and Commissioning

1. Provide testing and commissioning as per Testing and Commissioning Plan to be reviewed and approved by the Consultant and Project Manager for all items and their related components.
2. Supply all required equipment maintenance and operations manuals, for owner's staff use.
3. Provide all required software for monitoring, annunciation and control/dispatch applications

1.19 Other

1. The tender documents shall remain the property of the Project Manager. Bidders are required to return the tender documents to the Project Manager with their bids.
2. It is the responsibility of the Contractor to perform all cutting, patching and repair related to the electrical system work.
3. Work by the electrical contractor shall be protected during erection against disfigurement, contamination or damage by mechanical abuse or harmful materials. Protective covers shall be installed where exposure to potential damage is likely. The contractor shall ensure that no eating, drinking or smoking is carried out in the finished areas. Damages resulting from a breach of these requirements shall be repaired at the cost of the electrical contractor.
4. Existing and adjacent finishes, work and structures shall be protected from damage resulting from work of this project.

1.20 Record and As-Built Drawings

1. The Contractor shall maintain two sets of drawings on site. Clearly mark on these drawings all changes and deviations from the contract drawings and in particular mark the actual location of all feeder conduit locations.
2. All deviations from the contract drawings shall be recorded on the "as-built" drawings, including those changes due to Addenda, Site Instructions or Change Orders.
3. After the date of Substantial Performance, obtain from the Consultant, a set of AutoCAD Version 2019 CD of the most recent Electrical System Drawings. These Drawings shall be marked up to record clearly, neatly, accurately and promptly all locations of Electrical System deviations as a result of Change Orders, Consultant's or Owner's Instruction, site conditions, etc. Utilize normal recognized CAD procedures that match the original drafting methodology. Submit the revised As-Built AutoCAD CD and Drawings (three sets) with changes clearly indicated to the Consultant for review and final presentation to the Owner.

1.21 Drawings

1. For exact details and quantities, refer to the later sections of this document and to drawing E-1.1, E-1.2, E-1.3, E-2.1 and E-5.1 denoted as 'Issued for Permit/Tender December 1, 2021.'

1.22 Contract

1. Conform to the conditions stated in the Contract Form, Document Toronto Zoo RFT 45 (2019-08) bid document.
2. A confidentiality agreement will form an integral part of the contract and will be provided to the successful contractor.

1.23 Cleaning

1. It is the responsibility of the Contractor to dispose of all waste related to this project.
2. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
3. On a daily basis, remove waste materials, rubbish, tools, equipment, machinery, surplus materials and clean all sight exposed surfaces.
4. All materials must be stacked neatly and safely.
5. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
6. Cleaning operations shall include those areas used for temporary site access or used on a temporary basis to facilitate work.
7. The contractor will remove all garbage from site on a daily basis at his own expense.
8. Failure to provide housekeeping and/or maintain a clean work area to the satisfaction of the project manager will result in the project manager providing the necessary housekeeping and/or maintenance service with all related costs, including mark-up's, being charged to the electrical contractor.

1.24 Demolition

1. Disconnect and remove existing conduit and wiring in partitions to be demolished and existing 'BX' cables, conduit and wire in ceiling where existing outlets, lighting fixtures, devices and mechanical equipment are to be removed.
2. Remove all branch circuit wiring and raceways originating from the existing receptacle panels. Wiring and raceways shall be removed back to the source panel. Circuits utilized to feed existing to remain mechanical equipment and other 120/208 volt sources to remain must be maintained.
3. Remove all existing electrical outlets and light switches as well as the associated wiring and raceways not being reused and/or not required for new layout (note: existing outlets and switches to be removed are not shown on the drawings). Provide blank coverplates at all locations where electrical and/or communications devices were removed in which partitions are not being demolished.

1.25 Digital Photos

1. Provide digital photos of all progress to date on a weekly basis. Each photo submission must be reviewed and approved by the consultant prior to continuing with the installation.

End of Section

SECTION 26 05 01: COMMON WORK RESULTS - ELECTRICAL.

PART I - GENERAL

1.1 Reference:

1. This section forms part of every section of Division 16.

1.2 Access Doors:

1. Not Required.

1.3 Cleaning:

1. Clean devices and other surfaces that have been exposed to construction dust and dirt. Clean the insides and outsides of panels and other electrical equipment and completely remove all debris and tools from the project.

1.4 Codes and Standards:

1. Complete the installation of the work in accordance with latest editions of the Building Code, Electrical Safety Code, CSA, ULC, NFPA, OSHA or other codes, as required.
2. Comply with Electrical Bulletins in force at time of Bid submission. While not identified and specified by number in this Division, they are to be considered as forming part of related Standards.
3. Abbreviations for electrical terms are as per CSA Z85.

1.5 Finishes:

1. All shop finished metal equipment and enclosure surfaces, must be prepared by removal of rust and scale from the raw metal, degreasing, cleaning, application of rust resistance primer inside and outside, and at least two coats of finish enamel paint. Use factory standard colours unless otherwise specified. Colour reference numbers are Sico.
2. Paint exterior surfaces of indoor electrical equipment to manufacturer's standard.
3. Clean and touch-up (to Consultant's acceptance) surfaces of shop-finished equipment that is scratched or marred during shipment or installation, so as to match original paint.
4. Leave with the Owner, 0.22 gal. of paint of each colour used, in the form of liquid or spray, to allow for future touch-up of damaged areas.

1.6 Inserts, Hangers and Sleeves:

1. Provide hangers, inserts, sleeves and supports as required.
2. Inserts are to be of lead shield type.
3. Hangers must not be welded to structural steel members and burning of holes in structural steel is prohibited.
4. Sleeves are to be of a type suitable for the application and be sealed and made watertight. Sleeves through concrete shall be sized for free passage of conduit, and installed flush with underside of concrete slab and extend 100mm (4") above finished floor unless otherwise shown.

1.7 Intent:

1. It is the intent of these drawings and specifications that the Contractor provide complete and operational systems as required.
2. Where differences occur, the maximum condition shall govern.
3. Any miscellaneous items, hardware, devices, wiring, etc., not specifically described, but required for the operation of the system, must be provided and included as part of the Bid.

1.8 Mounting Heights:

1. Mounting height of equipment is from finished floor to center line of equipment unless specified or indicated otherwise.
2. If mounting height of equipment is not indicated, verify with Consultant before proceeding with installation.

1.9 Owners Instruction and Trial Usage:

1. Instruct the Owner's operating personnel in the startup, operation, care and maintenance of all the equipment. All equipment to be tested, operational and commissioned before instruction. Provide sheets for signatures of Owner's representative and operating personnel present at each instruction period.
2. Arrange and pay for the service of the manufacturer's factory service Engineer/Technician to supervise the start-up of his equipment installation, and to check, adjust, balance and calibrate components.
3. Provide these services for such period, and for as many visits as necessary to ensure that the Owner's operating personnel are conversant with all aspects of its care and operation.
4. When commissioning is included in the contract:
 1. Prior to any instruction sessions, commissioning coordinator shall submit check lists of each system or equipment indicating their operation status for acceptance by the Owner.
 2. Coordinate all instruction sessions to suit Owner's operation personnel schedule. Submit proposed instruction session schedule c/w training agenda three weeks prior to session start date to Owner for review.
5. The Owner's operating personnel must be permitted to operate the systems under the contractor's supervision for a reasonable period of time prior to Substantial Completion of Contract. This use shall not be misconstrued as acceptance of the equipment.

1.10 Plywood Backboard:

1. Supply and install all plywood backboards required for the work of this Division. Plywood to be highest quality fire retardant fir. 1200 mm wide x 2400 mm high (4'-0" wide x 8'-0" high), 19mm (3/4") thick unless otherwise specified. Prime and paint backboards on both sides with fire retardant paint, equal to CGSB spec. #1-GP-151M, of a colour to match the equipment and services mounted thereon as defined in "Finishes" above. **Do not paint over fire rated stamps.**

2. Plywood backboards are to be provided for mounting the following surface wall mounted equipment:
 - Cabinets.
 - Contactors.
 - Control Panels
 - Disconnect Switches.
 - Junction Boxes 600mm (2 ft.) square and larger.
 - Pull Boxes.
 - Panel Boards.
 - Splitters
 - Transient Voltage Surge Suppression Units.
 - External Breakers
3. Where practical, group devices on a common backboard.

1.11 Protection:

1. Protect exposed live equipment during construction for personnel safety.
2. Shield and mark live parts “LIVE 600 VOLTS”, or with appropriate voltage in English.

1.12 Sealing:

1. Where cables or conduits pass through non fire-rated floors, walls or roof, provide internal and external sealing thereto.
2. Retain the service of a specialty sealant contractor for the work required.
3. Comply with manufacturer’s installation instructions for all sealant applications.
4. For non-fire rated locations, Sealant shall be silicone, that meets requirements of CGSB 19-GP-23, for the size of the joint required, and the types of materials being bonded.
5. For fire rated locations, the fire stop shall meet the requirements of ULC with regards to the type of assembly and the fire separation.
6. Provide architecturally approved air barrier seals and vapor barrier seals to electrical items passing through or terminating within walls, roofs and decks, humidity controlled areas and pressurized areas.

1.13 Sprinkler Proofing:

1. All areas of this building are protected by a wet sprinkler system. **All electrical equipment** to be configured for installation in such an environment.

1.14 Warning Signs:

1. Provide warning signs, as specified to meet requirements of Ministry of Labour Safety Inspection, Inspection Department, Authorities having jurisdiction and Consultant.
2. Use decal signs, in English minimum as required by Authorities.

1.15 Wire Pulling Lubricant:

1. Lubricant to be non-corrosive and CSA approved for the type of cable used.
2. Lubricants to be soap or wax based, depending upon application. Use soap based for short runs and for semi-conducting insulated wires, and wax based for long runs.

End of Section

SECTION 26 05 20: WIRE AND BOX CONNECTORS (0-1000V).

PART I - GENERAL

1.1 Work Included:

1. Provide all wire and box connectors required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Materials:

1. Pressure type wire connectors are to be manufactured to CSA C22.2 No.65. Clamps and connectors are to be manufactured to CSA C22.2 No. 18.
2. Building Wire Connectors shall be:
 1. For wire sizes up to #6 AWG - Ideal "Wing Nut" or Gardner - Bender "Wing Gard".
 2. For Wire Sizes #4 AWG and larger:
 - End to end splices - Burndy YS.
 - Parallel splices - Burndy YH.
 - At studs and bus bars - Burndy YA-A (CU / AL).
 - Two or three conductors in parallel - Burndy KA-U (CU / AL).
3. Cable connectors shall be:
 1. For armored TECK cables, watertight type, with open compounded head - T&B series "Spin-on 2" with corrosion resistant boot.
 2. For armored cables steel type with nylon insulated throat - T&B "TITE-Bite".
 3. Clamps or connectors for armored cable, flexible conduit, non-metallic sheathed cable shall be as required.

PART III - EXECUTION

3.1 Installation:

1. Remove insulation carefully from ends of conductors and:
 1. Install connectors and tighten as recommended by manufacturer.
Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

Install bushing stud connectors in accordance with EEMAC 1Y-2.

End of Section

SECTION 26 05 21: WIRE AND CABLES.

PART 1 - GENERAL

1.1 Work Included:

1. Provide building wire as detailed below and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 Materials

1. Wire in Conduit:

1. Conductor material to be annealed commercial grade, copper, 98 percent conductivity, up to #10 AWG solid, with RW90 insulation, #8 and larger, stranded, with RW90 insulation, unless noted otherwise, 300V rating for fire alarm, security and other low voltage circuits, 600V rating for 120 / 208V circuits, 1000V rating for 230 / 400V circuits, 1000V rating for 277 / 480V circuits, 1000V rating for 347 / 600V circuits.

2. Colour Coding (must be approved by ESA Field Inspector):

1. Two conductor, 1 phase: 1 black, 1 white
Three conductor, 1 phase: 1 red, 1 black, 1 white
Three conductor, 3 phase: 1 red, 1 black, 1 blue
Four conductor, 3 phase: 1 red, 1 black, 1 blue, 1 white

3. Ground wires: green.

3. Low voltage Armored Cables Type AC-90:

1. Type to be AC-90, Multi-conductor, with solid, annealed commercial grade 98 percent conductivity tinned copper conductors and cross-linked polyethylene with R90 insulation, 600 volt rating, on #10 and #12 size only.

2. Colour Coding:

- Two conductor, 1 phase: 1 black, 1 white
Three conductor, 1 phase: 1 black, 1 red, 1 white

3. Grounding to be uninsulated, solid copper, with impregnated paper separator.

4. Low voltage Armored Cables - TECK:

1. Type to be TECK, single conductor with annealed. Class B, stranded copper conductors and cross linked polyethylene, RW90 insulation, 1000 volt rating for #8 AWG and larger.
2. Grounding to be uninsulated tinned stranded copper, with non-hygroscopic filter material to maintain circular cross-section.

3. The inner and outer jackets to be PVC "Flamenol" suitable for -40°C , with mylar tape separator and aluminum strip, armour helically wound and interlocked.
5. Two Hour Fire Rated Cable - Mineral Insulated
 1. Mineral Insulated Cables:
 1. Mineral insulated cables shall be manufactured to CSA C22.2 No. 124.
 2. Conductors are to be solid, bare, soft annealed copper, sized as required.
 3. Insulation to be compressed powdered magnesium oxide, to form compact homogeneous mass throughout entire length of cable.
 4. Overall covering to be annealed seamless copper sheath, type LW MI, rated 600 volt, 250°C .

PART III - EXECUTION

3.1 Installation:

1. General:

1. Wire shall be installed in conduit, and sized for the connected load (s) and protection as required, unless otherwise specified.
2. All single neutrals run with Phase 'A', 'B', 'C' conductors to be minimum #10 AWG. #12 AWG neutrals may be used when run from final junction box to wiring devices.
3. Minimum power conductor wire size shall be #12 AWG, unless otherwise stated. Home runs in excess of 25 m (75 ft.) for circuits protected by a 15A over current device, shall be #10 AWG.
4. The current carrying capacity of the feeders, subfeeders and branch circuit conductors shall be sized to equal or better than shown on the drawings. If wire or cable sizes with equivalent current carrying capacity other than that specified is used, ensure that the voltage drop shall not be more than 2%.
5. The number of wires indicated for various systems is intended to show the general scheme only. The required number and type of wires shall be installed in accordance with the manufacturer's diagrams and with the requirements of the installation.

2. Wire in Conduit:

1. Provide pigtails at all outlets for wiring devices. All neutrals and branch circuits shall be connected in each outlet box to avoid a break in the neutral or the circuit wire when fixture or wiring device is disconnected.
2. At each junction, pull and outlet box make a 360 degree loop of the stripped uncut ground conductor under the ground screws.

3. Low Voltage Armored Cables - (Feeders):
 1. Do not directly bury in or below concrete slabs or walls.
 2. Do not encircle single conductor cable with ferrous metal.
 3. No splices will be permitted.
 4. Single conductors of the three or four wire circuit shall be run with uniform spacing of not less than one cable diameter throughout the feeder length.
 5. Use wood throated cable clamps to ensure proper and uniform cable spacing.
 6. Where cables are installed on walls, provide mechanical protection over them up to 2.4m (8 ft.) above finished floor, using a 12 gauge U section aluminum cover.
 7. Cable connections to all enclosures, boxes and panels shall be by means of a watertight malleable aluminum connector.

4. Mineral Insulated Cable:
 1. Run cable exposed as required, securely supported by straps.
 2. Make cable terminations by using factory made kits.
 3. Use thermoplastic sleeving over bare conductors at cable terminations.
 4. Do not splice cable.
 5. MI cables must be rigidly supported at maximum spacing of 1m (3 ft). Do not use aluminum products for support.
 6. MI cables shall be used for emergency system feeders and branch circuits requiring a one (1) hour fire rating.

End of Section

SECTION 26 05 27: GROUNDING

PART I - GENERAL

1.1 Work Included:

1. Provide all grounding to conform with the Canadian Electrical Code and the latest instructions of the Inspection Authority, with any further requirements as noted herein.

PART II - PRODUCTS

2.1 Materials:

1. All grounding conductors stranded copper, bare or insulated as indicated on Drawings or in Specifications.
2. All ground wires are to be FT-4 rated factory green. Green tape, spray paint or any other means to alter the colour of the conductor is not permitted.
3. Use Cadweld or Burndy Thermoweld process for all weld connections. AMP of Canada Ltd. Wrench-Lok grounding connectors are an acceptable equivalent to welded connections.
4. All ground connectors to be designed and approved for grounding purposes.

PART III - EXECUTION

3.1 Installation:

1. Ground all conduit, and all non-current carrying metal parts, equipment cases, frames, bases, brackets, etc.
2. Grounding of all trays, AFRCR's, racks, cabinets, etc. provided by the electrical contractor.
3. Ground each piece of fixed equipment back to the panel feeding that equipment, by one of the following methods:
 1. Conduit shall **not** be utilized for the ground return conductor.
 2. Where the conduit is flexible, install a separate bare soft drawn copper ground inside the conduit. At the switchboard or distribution panel, provide a grounding bushing, loop the ground conductor through the bushing, and connect to the switchboard ground bus. At the fixed equipment, connect to an internal ground bus, or connect to the inside of the metal enclosure utilizing approved screws and connectors (remove all paint).
 3. Run a separate (dedicated) insulated ground wire in all conduits to all devices and fixtures.
 4. Where equipment is fed by a multi-conductor power cable, provide a ground conductor in the cable. At the switchboard or panel, connect to the ground bus. Use a grounding connector on the cable for positive grounding of the metallic sheath. Loop the ground wire to the grounding connector.
 5. Run a separate ground wire in all flexible conduits. Connect each end to ground bus or lug or connector.
 6. Where mechanical protection is required for insulated grounding conductors install in rigid conduit.

7. Provide weld connection or wrench type grounding connectors for:
All connections between grounding conductors.
All connections to building steel.
All connections between grounding conductors and cable lugs.
8. Arrange grounding to provide the minimum impedance paths for ground fault currents. Provide any additional grounding required for approval by the inspecting authorities.

3.2 Equipment Grounding

1. Install grounding connections to typical equipment including non-current carrying metal parts of transformers, generators, motors, circuit breakers, cable sheaths, raceways, pipe work, screen guards, switchboards, meter and relay cases, any exposed building metal and building structural steel.

End of Section

SECTION 26 05 31: SPLITTERS, JUNCTION BOXES, PULL BOXES AND CABINETS.

PART I - GENERAL

1.1 Work Included:

1. Provide splitters, junction boxes, pull boxes and cabinets as shown on the drawings and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 Splitter Troughs:

1. Splitter trough construction is to be based on CSA C22.2 No. 76.
2. They shall have sheet steel enclosure, with welded corners and formed hinged cover suitable for locking in closed position.
3. Connection bars are to match required size and number of incoming and outgoing conductors as indicated.
4. Provide at least three spare terminals on each set of lugs in splitter troughs less than 400A and feed through lugs where required.
5. Provide double lugs for neutrals where required.
6. Enclosures shall be CSA/EEMAC Type 1 modified to sprinkler proof enclosure.

2.2 Junction and Pull boxes.

1. Junction and pull boxes construction is to be based on CSA C22.2 No. 40.
2. They shall be suitable for surface mounting and be of welded steel construction with screw-on flat covers.
3. For flush-mounted pull and junction boxes, provide covers with 25 mm (1") minimum extension all around.

2.3 General Cabinets:

1. Type D or E to be sheet steel, for surface mounting, complete with screw on cover (D) or hinged door (E), and return flange overlapping sides, handle and catch.

PART III - EXECUTION

3.1 Splitter Installation:

1. Install splitter troughs where required. Mount plumb, true and square to the building lines.
2. Extend splitters for full length of equipment arrangement except where indicated otherwise.
3. Provide **water-tight connections** for all services entering the top of the splitter trough.

3.2 Junction, Pull Boxes and Cabinet installation:

1. Install junction, pull boxes and cabinets in inconspicuous but accessible locations.
2. Only certain junction and pull boxes are indicated. Provide pull boxes so as not to exceed 30 m (100 ft) of conduit run between boxes, and after every two (2) 90° bends.

3.3 Identification:

1. Install nameplates.

End of Section

SECTION 26 05 32: OUTLET AND CONDUIT BOXES AND FITTINGS.

PART I - GENERAL

1.1 Work Included:

1. Provide outlet and conduit boxes and fittings as required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Outlet and Conduit boxes - General

1. The construction of outlet boxes, conduit boxes and fittings is to be based on CSA C22.2 No.18.
2. Boxes shall be suitable for the utilization voltage.
3. Combination boxes shall have barriers where outlets for more than one system are grouped.
4. Recessed 100 mm (4") square or larger outlet boxes shall be complete with single or ganged plaster rings to suit application.

2.2 Sheet Steel Outlet boxes:

1. Electro-galvanized steel single and multi-gang device boxes for flush installation, shall be minimum size 75 mm x 50 mm x 37 mm (3" x 2" x 1-1/2") unless otherwise specified or required. 100 mm (4") square outlet boxes shall be used when more than one conduit enters one side, with extension and plaster rings as required.
2. Boxes for door switches and push buttons shall be sized as required.
3. Utility boxes for connection to surface mounted EMT conduit, shall be minimum 100 x 54 x 48 mm (4" x 2-1/8" x 1-7/8") size.
4. Square or octagonal outlet boxes for lighting fixture outlets, shall be minimum 100 mm (4") size.
5. Square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls, shall be minimum 100 mm (4") size.

2.3 Masonry Boxes:

1. Electro-galvanized steel masonry single and multi-gang MBD boxes shall be used for flush mounted devices in exposed block walls.

2.4 Concrete boxes:

1. Electro-galvanized sheet steel concrete boxes shall be used for flush mounting in concrete, with matching extension and plaster rings as required.

2.5 Conduit Boxes:

1. Cast FS or FD ferrous boxes with factory-threaded hubs and mounting feet shall be used for outlets connected to surface mounted rigid conduit.

2.6 PVC Boxes:

1. F series and octagon boxes shall be moulded type, with fastening ears and screwed secured covers as required.

2.7 Fittings - General:

2. Bushing and connectors shall be with nylon insulated throats.
3. Provide knock-out fillers to prevent entry of foreign materials.
4. Use conduit outlet bodies for conduit up to and including 32 mm (1-1/4") and pull boxes for larger conduits.
5. Provide double locknuts and insulated bushings on sheet metal boxes.

PART III - EXECUTION

3.1 Installation:

1. Support boxes independently of connecting conduits.
2. Fill boxes with paper, foam sponges or similar approved material to prevent entry of construction material.
3. Size box wiring chambers in accordance with Electrical Safety Code.
4. Gang boxes together where wiring devices are grouped.
5. Provide matching blank cover plates for boxes without wiring devices.
6. Use combination boxes where outlets for more than one system or voltage are grouped.
7. For flush installations, mount outlets flush with finished wall using plaster rings to permit wall finish to come within 5mm (1/4") of opening.
8. Provide correct size of openings in boxes for conduit and armored cable connections. Reducing washers are not allowed.

End of Section

SECTION 26 05 34: CONDUITS, CONDUIT FASTENINGS AND CONDUIT FITTINGS.

PART I - GENERAL

1.1 Work Included:

1. Provide conduits, conduit fastenings and conduit fittings as detailed below and as required for a complete electrical installation.

PART II - PRODUCTS

2.1 CONDUITS

1. Rigid and epoxy coated conduit shall be threaded, galvanized steel and shall be manufactured to CSA C22.2 No. 45.
2. Electrical metallic tube (EMT) conduit and couplings shall be manufactured to CSA C22.2 No. 83.
3. Flexible metal conduit and liquid tight - flexible metal conduit shall be manufactured to CSA C22.2 No. 56.

2.2 CONDUIT FASTENINGS

1. Conduit straps shall be steel, double hole for rigid or EMT conduit. **Single hole straps are not acceptable.**

2.3 CONDUIT FITTINGS

1. Fittings for conduits shall be manufactured to CSA C22.2 No.18. Provide coatings as per conduit.
2. Fittings for rigid conduit shall be steel threaded type and for EMT conduit, to be steel set screw type.
3. Fittings for flexible conduit and exposed conduit outdoors to be liquid-tight type, straight or angled threaded for rigid and compression for EMT conduit.
4. Expansion fittings for rigid or EMT conduits shall be of the watertight type, with an integral bonding assembly, suitable for deflection in all directions.

2.4 PULLING CABLES

1. Pulling cables shall be 1/4" diameter polypropylene and of a strength suitable for tension to be pulled.

2.5 WATERPROOF MEMBRANE

1. Conduits penetrating waterproof membranes shall be PEM #6372.

PART III - EXECUTION

3.1 INSTALLATION (GENERAL)

1. The conduits for the following circuits and systems shall be run separately:
 - 120/208 volt utility power distribution.
 - Normal power to luminaries.
 - Emergency power to luminaries and exit signs.
 - Fire alarm system multiplex loop devices.
 - Fire alarm system signalling devices.
 - Security and CCTV system devices.
 - Telephone and data systems.
 - Control wiring.
2. All conduits to be surface mounted (exposed, EMT) in mechanical and electrical service spaces and rooms and concealed elsewhere unless otherwise shown.
3. Wiring in ceiling spaces and in all partitions shall be EMT.
4. Exposed conduits shall be installed to conserve headroom and cause minimum interference in spaces through which they pass.
5. Use rigid conduit up to 2.4 m (8' -0") above finished floor where exposed indoors
6. **Use RGS conduit PVC coated galvanized rigid steel Robroy Permacote in all outdoor locations and in areas that are not environmentally controlled.**
7. Use electrical metallic tubing (EMT) above grade, and above 2.4 m (8'-0") above finished floor where exposed indoors.
8. Use flexible liquid tight metal conduit for connection to motors, and transformers.
9. Bend conduit without heating. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
10. Mechanically bend conduit over 20mm (3/4") diameter.
11. Field threads on rigid conduit must be of sufficient length to draw conduits tight.
12. Install pulling cables in all conduits that are to remain "empty".
13. A maximum of two (2), 90 degree bends, or equivalent up to 180 degrees, will be permitted without installation of a pull box. Radius of bends must be no less than ten (10) times the conduit diameter.
14. Conduits must be dry, before installing wires.
15. Support all branch conduits from building structure. Do not clip conduits to ceiling hangers, sprinkler pipes, plumbing or BAS wiring hangers.

3.2 SURFACE CONDUITS

1. Surface conduits shall be run parallel or perpendicular to building lines.
2. Conduits located near any heat producing equipment shall have 1500 mm (5 ft.) clearance.
3. Conduits adjacent to structural steel, beams or columns shall be run within the flanged portion, unless otherwise shown.
4. Group exposed conduits on surface or suspended channels.
5. Do not pass conduits through structural members except where indicated and approved by owner.
6. Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines. Provide a minimum clearance of 25 mm (1") at crossovers.

3.3 CONDUIT SIZE

1. The minimum conduit size shall be 19 mm (3/4").
2. All undimensioned conduits in the drawings are 19 mm (3/4").

3.4 EXPANSION FITTINGS

1. Conduit expansion fittings shall be provided on all conduits crossing expansion joints, and at maximum of 60 m (200 ft.) spacing.
2. Install expansion fittings perpendicular to expansion joint.
3. Refer to structural drawings for location of expansion joints.

End of Section

SECTION 26 05 34.01: FASTENINGS AND SUPPORTS:

PART I - GENERAL

1.1 Work Included:

1. Provide fastenings and supports as required for a complete electrical system installation.

PART II - PRODUCTS

2.1 Support Channels:

1. U shape pre-galvanized steel, size 41 mm x 41 mm x 22 mm (1-5/8" x 1-5/8" x 7/8"), for surface mounting, suspending, or inserting into poured concrete walls and ceilings as required.
2. All channel fittings to suit channel type.
3. All other fittings to suit equipment weight, location and surface as required.

PART III - EXECUTION

3.1 Installation:

1. Secure plywood backboards, channels, luminaires, equipment and fittings to wood with wood screws, to solid masonry, tile and plaster surfaces with lead anchors, to poured concrete with self-drilling expandable inserts, and to hollow masonry walls with toggle bolts.
2. All ceiling mounted equipment shall be independently supported from the structure. Do not support equipment from ceiling support system.
3. Support equipment, conduit or cable using clips, spring loaded bolts, or cable clamps designed as accessories to basic channel members.
4. Fasten exposed conduit or cables to building using:
 1. One-hole steel straps to secure surface conduits and cables 50 mm (2") and smaller.
 2. Two-hole steel straps for conduits and cables larger than 50 mm (2").
 3. Beam clamps to secure conduit to exposed steel work.

5. For suspended support system:
 1. Support individual cable or conduit runs with 6 mm (1/4") diameter threaded rods and spring clips.
 2. Support two or more cables or conduits on channels support by 6 mm (1/4") diameter threaded rod hangers where direct fastening to building construction is impractical.
 3. Support suspended luminaire using two or more lengths of Weldless "Single Jack", bright zinc plated steel chain, Canadian Standard #10 gauge, 13 links per foot.
6. Provide metal brackets, frames, hangers, clamps and related type of support structure where indicated or as required to support conduit and cable runs.
7. Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
8. Do not use wire lashing or perforated strap to support or secure raceways or cables.
9. Do not use supports or equipment installed for other trades for conduit or cable support except with permission and approval of Consultant.
10. Install fastenings and supports as required for each type of equipment, cable and conduits, and in accordance with manufacturer's installation recommendations.

End of Section

SECTION 26 27 26: WIRING DEVICES.

PART I - GENERAL

1. Provide all wiring devices indicated on drawings and described below.

PART II - PRODUCTS

2.1 Standards:

1. Construction of manually operated general purpose AC switches is to be based on CSA C22.2 No. 111, snap switches on CSA C22.2 No.55, and receptacles, plugs and similar wiring devices on CSA C22.2 No. 42.
2. Devices shall be Specification Grade and of one manufacturer throughout

2.2 Switches:

1. Switches shall be suitable for the voltage and load controlled and shall be single pole or three way as indicated.
2. They shall have terminal holes approved for No. 10 AWG wire, silver alloy contacts, and urea or melamine moldings for parts subject to carbon tracking.
3. They shall be suitable for back and side wiring, and rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
4. White decorator style switches shall be used for 120V circuits, in all finished areas.
5. White decorator style switches shall be used for 347V circuits in all areas.

2.3 Receptacles:

1. Duplex receptacles shall be CSA Type 5-15R, 125 volt, 15 Amp, U ground and CSA Type 5-20R (T Slot), 125 volt, 15/20 Amp, U Ground.
2. They shall be decorator style.
3. They shall be suitable for No. 10 AWG, back and side wiring, have break-off links for use as split receptacles and shall have eight (8) back wired entrances, four (4) side wiring screws and double wipe contacts with riveted grounding contacts.

2.4 Coverplates:

1. Coverplates shall be white in finished areas and stainless steel in unfinished areas.
2. Use die cast aluminum coverplates for wiring devices mounted for surface mounted FS or FD boxes, and pressed steel coverplates for utility surface boxes.
3. Use weatherproof spring-loaded, cast aluminum coverplates complete with gaskets for exterior mounted single receptacles and switches, or where indicated.

PART III - EXECUTION

3.1 Installation:

- Switches:
 1. Install single throw switches with lever in "UP" position when switch closed.
 2. Install switches in gang type outlet box when more than one switch is required in one location.

- Receptacles:
 1. Install receptacles in gang type outlet box when more than one device is required in one location.

- Coverplates:
 1. Protect coverplate finish until painting and other work is finished or install after painting is complete.
 2. Do not use flush type coverplates on surface mounted boxes.

End of Section

SECTION 26 28 13.01: FUSES - LOW VOLTAGE

PART I - GENERAL

1.1 Work Included:

1. Supply and install fuses in disconnect switches, etc. as required to complete this contract.

PART II - PRODUCTS

2.1 Fuses - General:

1. Plug and cartridge fuses shall be manufactured to CSA C22.2 No. 59.
2. HRC fuses shall be manufactured to CSA C22.2 No. 106 and to have interrupting capability of 200,000A symmetrical.
3. Fuses shall be the product of one manufacturer.
4. Fuse type reference L1, L2, J1, R1, etc. have been adopted for use in this specification.

2.2 Fuse Types:

1. HRCI - J fuses.
 1. Type J1, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 2. Type J2, fast acting.
2. HRC - L.
 1. Type L1, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 2. Type L2, fast acting.
3. HRC - R fuses (For UL Class RK1 fuses, peak let-through current and I^2t values not to exceed limits of UL 198E table 10.2.)
 1. Type R1, (UL Class RK1), time delay capable of carrying 500% of its rate current for 10 seconds minimum, to meet UL Class RK1 maximum let-through limits.
 2. Type R2, time delay, capable of carrying 500% of its rated current for 10 seconds minimum.
 3. Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.
 4. HRCII - C fuses.

PART III - EXECUTION

3.1 Installation:

1. Install fuses in mounting devices immediately before energizing circuit.
2. Ensure circuit fuses fitted to physically matched mounting devices. Install Class R rejection clips for HRCI-R fuses.
3. Ensure correct fuses fitted to assigned electrical circuit.
4. Fuses protecting motor loads and transformers to be type J1 for up to and including 600A and L1 for ratings above 600A.

5. Fuses protecting feeder circuits to be type J2 for up to and including 600A and type L2 ratings above 600A.
6. Fuses protecting other services or equipment shall be of the type required for that purpose.

End of Section

SECTION 26 28 23: DISCONNECT SWITCHES - FUSED AND NON-FUSED

PART I - GENERAL

1.1 Work Included:

1. Provide all disconnect switches shown on the drawings and as required for motors.

PART II - PRODUCTS

2.1 Equipment

1. Fuseholder assemblies to CSA C22.2 No. 39
2. Fusible and non-fusible disconnect switches shall be installed in CSA enclosures.
3. Provide for padlocking in "OFF" switch position by one lock.
4. Provide a mechanically interlocked door to prevent opening when handle in "ON" position.
5. Provide fuses sized as required.
6. Fuseholders in each switch shall be suitable without adapters, for type of fuse as specified.
7. Provide quick make, quick break action.
8. Provide ON-OFF switch position indication on switch enclosure cover.
9. Enclosures shall be CSA/EEMAC Type 1 modified to sprinkler proof enclosure.

PART III - EXECUTION

3.1 Installation:

1. Install disconnect switches with or without fuses as required.
2. Provide **watertight connections** for all services entering the top of the disconnect switches.

End of Section

SECTION 26 50 00: LIGHTING

PART I - GENERAL

1.1 Work Included:

1. Provide lighting fixtures as shown on the drawings and described below.

PART II - PRODUCTS

2.1 Lamp Standards:

1. Incandescent lamps shall be manufactured to CSA C22.2 No. 84.
2. Fluorescent lamps shall be manufactured to ANSI C78.
3. Incandescent, fluorescent and HID lamps shall be of one (1) manufacturer, either in total, or in groups defined by lamp type.
4. Ballast and lamps provided under this contract must be an approved combination by both respective manufacturers.

PART III - EXECUTION

3.1 Lamp and Ballast Installation:

1. Refer to luminaire schedule and drawings, for lamp and ballast requirements.
2. Install lamps only when the luminaires are clean.
3. Ensure that lamps are suitable for luminaires before energization and lamp length and colours are that as specified. Report any discrepancies to the consultant.

3.2 Luminaire Installation:

1. Install luminaires accurately and carefully aligned complete with all mounting hardware. Ensure any suspension rods are vertical.
2. All luminaires shall be supplied with accessory items such as yokes, plaster rings, frame adjusters, etc., where required for proper installation.
3. At the time of date of "Substantial Completion" all luminaires, lenses, louvers and lamps must be clean and the lamps illuminated.

3.3 Luminaire Support:

1. All fluorescent fixtures must be chained by 2 points directly to main structure such that they are supported independently of the Lay-in ceiling system.
2. All fixtures in exposed ceiling areas (no T-bar or Drywall) shall be mounted on 1-5/8" unistrut, running the full length of the run of fixtures. The unistrut is to be suspended from the ceiling deck by 3/8" threaded rod from unistrut between the joists. Do not puncture ceiling deck.
3. All lighting feeds for suspended fixtures shall be dropped from the deck or slab straight down into the fixture or raceway. Fixture to fixture conduits will not be permitted. Conduit must go to the deck then to the next fixture.

3.4 Cleaning:

1. All luminaires must be cleaned before lamping and installing lenses or louvres.
2. Use dry, clean, soft cloths if luminaires are dusty. Use mild solvents to clean soiled luminaires.

End of Section

SECTION 26 60 01: ELECTRICAL IDENTIFICATION.

PART I - GENERAL

1.1 Work Included:

1. Identify electrical equipment as specified herein.

1.2 Manufacturer's Nameplates:

1. Have the manufacturer's nameplates affixed to each item of all equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, cycle, phase, horsepower, etc., and the name of the manufacturer and his address. Ensure that all stamped, etched or engraved lettering on plates is perfectly legible. Ensure that nameplates are not painted over. Where apparatus is to be concealed, attach the nameplate in an approved location on the equipment support or frame.
2. Ensure that panels and other apparatus which have exposed faces in finished areas do not have any visible trademarks or other identifying symbols. Mount nameplates behind doors.

PART II - PRODUCTS

2.1 Lamacoid Plates:

1. As noted on drawings for normal power distribution.
2. As noted on drawings for EPS power distribution.

2.2 Conductor Markers:

1. Cable diameter less than 13 mm (1/2") - Electrovert type Z.
2. Cable diameter 13 mm (1/2") and larger - Electrovert #510 strap-on.
3. Colour - white with black markings except fire alarm and life safety system which shall be white with red markings.

PART III - EXECUTION

3.1 Conduit Services - Power:

1. Locate identification:
 - Behind each access door.
 - At each change of direction and at junction boxes.
 - At not more than 10 m (40') apart in straight runs of conduit behind removable enclosures such as lay-in type ceiling, but on both sides of sleeves through walls or floors.
 - Above each floor or platform for vertical exposed conduits, preferably 1500 mm (60") above floor or platform.
 - Use stencils and stencil paint or lamacoid plates on all conduit.
 - Use minimum 25 mm (1") high letters.
 - The identification shall describe system voltage and service, i.e., "120 / 208 volt lighting to panel AA".

3.2 Conduits and outlet boxes:

1. Identify conduits and outlet boxes for the various systems by the use of the following distinctive colour paints. Apply a small area of paint to the inside of each outlet box, pull box and panel as it is being installed. Identify junction boxes in suspended ceiling areas with colour on both inside and outside.
2. Use the colour coding as defined in CGSB Code 24-GP-3A and CSA Standard B53.
3. Where the existing colour coding differs from these Specifications, notify the Consultant of colours used and maintain existing colour coding.

3.3 Equipment Nameplates:

1. Identify all equipment listed below with lamacoid plates, letters 10 mm (0.4") high, unless otherwise noted.
 1. Lighting and Power Panels - Plates to be on outsides of door. Typical identification: "Lighting Panel C 120/208 v, 3 phase, 4 W MAINS 225 AMP 18KA RMS. Supplied from Panel BB".
 2. Disconnect switches and starters - Plates to be mounted externally on switch cover. Typical identification: "Fan S4, 208 v, 3 phase".
 3. Transformers - Plates to be mounted externally on case. Typical identification: "Transformer TR-UPSA 225 KVA/416/120/208 v, 3 PH / 4W fed from Panel UPS A".
2. Secure with mechanical fastening devices except on the inside of panel doors where gluing will be acceptable.

3.7 Wiring Colour Code:

1. Power and Lighting Conductors:

- | | |
|------------|---------|
| 1. Phase A | - Red |
| 2. Phase B | - Black |
| 3. Phase C | - Blue |
| 4. Neutral | - White |
| 5. Ground | - Green |

2. For sizes available in black only, use coloured tape markers at junction boxes and terminal points to match phase coding described above.
3. Band green isolated ground conductors with yellow tape.
4. Control conductors - Orange
5. Fire Alarm System Conductors.
 1. Alarm initiating devices and manual pull stations - red and blue.
 2. Alarm signaling devices - black and white.

3.8 Conductor Markers:

1. For power feeders, install markers at either end of the conductors where terminated inside of equipment to match wiring diagram conductor identification or panelboard circuit numbers. Typical identification Panel AA circuits - 21; use "AA-21". For a three phase circuit provide identification on phase A conductor only. For a single phase circuit provide identification on the phase conductor.
2. For Branch circuits supplying single phase and three phase devices such as receptacles and connections to equipment identify conductors at panel and in device outlet box. Install marker on phase conductor inside outlet box. Typical identification if device is connected to Panel B - circuit 14, marker identification "B-14".

End of Section

SECTION 26 60 02: TESTING AND COMMISSIONING OF ELECTRICAL SYSTEMS.

PART I - GENERAL

1.1 Description:

1. Include in work of this section, the testing and commissioning of all new electrical and component systems.
2. Include any specific testing of equipment required by the Hydro Inspection or Supply Authorities.
3. The complete costs of the site, load bank and factory testing and commissioning witnessing of Electrical Equipment is to be included in the Bid price.
4. Inform manufacturers of all factory and site testing requirements and include all their costs in the Bid price.
5. At their own discretion, testing is to be witnessed by the Owner and the Electrical Consultant.

1.2 Scope:

1. Include factory testing and approved certification, where required.
2. Coordinate with the equipment manufacturer, notify the Electrical Consultant in writing, ten (10) days before any factory testing to confirm Consultant's desired presence, and be present for all site testing.

1.3 Completion of Work:

1. All electrical systems and equipment shall be totally commissioned and operating before date of "Substantial Completion".
2. Coordinate with other trades and the building operations staff for work which affects the operation of the electrical systems, before submitting request for testing and commissioning. Failing to comply, bear all costs including Consultant's time cost, incurred for re-testing and re-commissioning.

PART II - PRODUCTS

2.1 Materials:

1. Provide all tools, equipment, labour and materials required to perform electrical testing and commissioning as specified. Provide the test results report (s).

PART III - EXECUTION

3.1 General:

1. Perform site testing and commissioning only after all equipment is installed and operational.
2. Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
3. Provide 4 (four) copies of certificates of all factory and site testing in complete detail bearing in each case, the seal of the engineer responsible for the tests.
4. Submit all test results for Consultant's review.
5. All equipment or system deficiencies identified by factory or site testing procedures, to be corrected by the Contractor prior to obtaining a "Certificate of Substantial Completion".
6. Submit report, at completion of measurements, listing phase and neutral currents on panelboards, dry-type transformers and motor control centres, operating under normal load. Include hour and date on which load was measured, and voltage at time of test.
7. General operations: energize and operate electrical circuit and item. Repair, alter, replace, test and adjust as necessary for a complete and operating electrical system.
8. Test systems and obtain written confirmation from manufacturers that components have been installed correctly and system functioning as intended. Submit certification for power distribution, communications systems and emergency power to Owner's Consultant.
9. Provide labour, instruments, apparatus and pay expenses required for testing. Owner's Consultant reserves right to demand proof of accuracy of instruments used.
10. Perform the following tests on completed power systems:
 1. Supply voltage: measure line voltage of each phase at load terminals of main breakers and report results in writing to Owner's Consultant. Perform test with majority of electrical equipment in use.
 2. Motor loading: measure line current of each phase of motors with motor operating under load, and report results in writing to Owner's Consultants.
 1. Upon indications of imbalances or overloads, thoroughly examine electrical connections and rectify defective parts or wiring.
 2. If electrical connections are correct, report overloads due to defects in driven machines in writing to Owner's Consultant.
 3. Insulation resistance tests:
 1. Megger circuits, feeders and equipment up to 350V with a 500V instrument for at least one (1) minute.
 2. Megger 350-600V circuits, feeders and equipment with a 1000V instrument for at least one (1) minute.
 3. Check resistance to ground before energizing.
 4. Coordinate and carry out motor testing at same time as driven equipment is being tested. In addition to motor loading tests, provide labour and instruments to read and record motor load readings required to supplement tests on driven equipment through various load sequences, as required by driven equipment tests.
11. Immediately prior to occupancy, test entire electrical system by performing loss and return of utility power test. Demonstrate operation of:
 1. Low voltage service equipment and metering
 2. Exit and emergency lighting
 3. Restabilization of systems after power return. Attach report printouts as evidence of expected operation on systems.
 4. User equipment shut-down and auto-restart.

3.2 Field Tests

1. Provide advance notice to Owner's Consultant of proposed testing schedule.
2. Perform tests at time of acceptance of work.
3. Conduct and pay for field tests:
 1. Power distribution, including phase voltage, grounding and load balancing.
 2. Circuits originating from branch distribution panels.
 3. Lighting and lighting control. Motors, heaters and associated control equipment, including sequenced operation.
 4. Emergency Power Systems
4. Perform tests in presence of Owner's Representative.
 1. Provide instruments, meters, equipment and personnel required to conduct required tests.
 2. Test systems to verify operation as specified.
5. Conduct di-electric tests, hi-pot tests, insulation resistance tests and ground continuity tests as required by nature of various systems and equipment

3.3 General Testing:

1. With the system completely connected, perform the following tests:
 1. Control and Switching - all circuits shall be tested for the correct operation of devices, switches and controls.
 2. Polarity Tests - all sockets shall be tested for correct polarity.
 3. Voltage Test - a voltage test shall be made at the last outlet of each circuit. The maximum drop in potential permitted will be 2% on 120 and 208 volt branch circuits and on 208 volt feeder circuits. Any deficiency in this respect shall be corrected.
 4. Phase Balance - measure the load on each phase at each splitter, and lighting and power panelboard and report the results in writing to the Consultant. Rearrange phase connections as necessary to balance the load on each phase as instructed by the Consultant, with the re-arrangement being restricted to the exchanging of connections at the distribution points mentioned in this paragraph. After making any such changes, make available to the Consultant drawings or marked prints showing the modified connections.
 5. General Operations - energize and put into operation each and every electrical circuit and item. Necessary repairs, alterations, replacements, tests and adjustments required shall be made for complete and satisfactory operating systems.

3.4 Sealing:

1. Ensure and verify that all penetrations of electrical equipment have been properly sealed with appropriate material and to the manufacturer's requirements.

3.5 Noise and vibration:

1. Ensure and verify that all isolation equipment has been installed where required and to the manufacturers' recommendations. Include the locations of and measurements of static deflection of spring isolators.

3.6 Coordination Study

1. For the entire electrical distribution system provided as part of this contract and for the existing high voltage base building switchgear and low voltage base building switchgear, supply a report from an independent test agency of the short circuit, protection, co-ordination study of the electrical distribution system. An existing coordination study is not available for contractor's use.

Co-ordination of Protective Devices:

- .1 Ensure circuit protective devices such as overcurrent trips, relays, circuit breakers and fuses are installed to values and settings so as to provide protection by means of opening the closest device to the fault.
- .2 Submit a short circuit, protection and co-ordination study as follows:
 1. Obtain and organize all electrical protection data for all the equipment. This will consist of obtaining the relay types and settings, transformer impedances, cable sizes, fuse sizes and types, motor data, etc., required to carry out the short circuit.
 2. Perform a short circuit analysis to determine short circuit current levels at all critical points in the distribution system, having obtained the available short circuit current available from the Hydro Supply Authority.
 3. Generate appropriate settings for all relays and protective devices from the level of the Hydro Supply Authority feeder protective devices to the largest downstream device on all the feeder secondary distribution levels.
- .3 Provide a complete, comprehensive report at the conclusion of the short circuit, protection and co-ordination study consisting of the following:
 1. A set of time current curve characteristics of all protective devices in the system plotted on log/log graph paper with corresponding short circuit current levels.
 2. Time current damage curves for all transformers, large motors and cables are also to be plotted.
 3. Provide a complete schedule of all main protective relays, fuses and other protective device listing device locations, function number, manufacturer, model number, size, range, setting, etc.
 4. The complete study will illustrate and ensure that the settings and sizes of all protective devices for each voltage level have been chosen to ensure maximum or optional protection and co-ordination during electrical fault or overload conditions.
 5. These generated settings will then be applied by "in-field" testing methods to the respective devices.

3.7 Ground Fault Protection System

1. Inspect relays visually for condition and clean where necessary.
2. Check all connections for tightness.
3. Apply settings to each relay as specified in the short circuit, protection and co-ordination study and test operation by means of a relay test set.
4. Verify each protective system by means of a primary current injection through the zero phase sequence transformer. This will provide correct operation of both the transformer and relay as well as proper functioning of the circuitry through to the breaker tripping elements.

3.8. Arc Flash Analyses

1. For the entire electrical distribution system provided as part of this contract and the existing electrical distribution system shown on the drawings, conduct an electrical arc flash hazard analysis as prescribed under NFPA 70E (CSA Z462-18) and provide a written report summarizing the findings and recommended control measures to be taken. The arc flashing analysis results must be deemed acceptable prior to the equipment purchase.
2. The power systems software utilized to perform the study must be SKM Powertools
3. Provide appropriate labels for all equipment (including all prepurchased equipment and equipment supplied by owner). The labels shall warn a qualified worker who intends to open the equipment for analysis or work that a serious hazard exists and that the workers should follow appropriate work practices and wear appropriate personal protection equipment (PPE) for the specific hazard.
4. An existing coordination study is not available for the electrical contractor's use.

3.9 Emergency Light Level Measurements

1. As part of this scope of work procure the services of a professional engineer to properly aim remote light heads, measure and record emergency lighting levels in foot candles throughout the scope of work areas with a calibrated light meter. Readings shall be taken based on a minimum of one reading for every 20' center in open office areas, equipment rooms and corridors / hallways and one reading in each closed office, meeting room, boardroom and stairwell.
2. All light level readings are to be taken during non-daylight hours.
3. Provide a sealed letter identifying light level readings and stating that the emergency lighting levels meet the requirements of the Ontario Building Code. Notify Owner and Consultant at least ten (10) days prior to proposed testing date and schedule testing at time and date acceptable to Owner and Consultant.

3.10 Test Results

1. Submit test results to Owner's Consultant for review.
2. Testing methods and test results: to CSA, CEC and authorities having jurisdiction.
3. Remove and replace conductors found damaged with new materials.
4. Provide required labour and tools, if during testing Owner's Representative requests equipment be opened and removed from their housings to examine equipment, terminations and connections.

End of Section

Project: 21251

Panelboard: RP-A1

Voltage (V):

Phase/Wire:

Bus and Lugs Rating (A):

CCT NO	Load	Breaker		CCT NO	Load	Breaker	
		Amp	Pole			Amp	Pole
1	WOMEN'S SINK/FAUCET/DRYER	20	1	2	MEN'S SINK/FAUCET/DRYER	20	1
3	WOMEN'S SINK/FAUCET/DRYER	20	1	4	MEN'S SINK/FAUCET/DRYER	20	1
5	WOMEN'S SINK/FAUCET/DRYER	20	1	6	MEN'S SINK/FAUCET/DRYER	20	1
7	WOMEN'S SINK/FAUCET/DRYER	20	1	8	MEN'S SINK/FAUCET/DRYER	20	1
9	WOMEN'S SINK/FAUCET/DRYER	20	1	10	MEN'S SINK/FAUCET/DRYER	20	1
11	WOMEN'S SINK/FAUCET/DRYER	20	1	12	MEN'S SINK/FAUCET/DRYER	20	1
13	WOMEN'S SINK/FAUCET/DRYER	20	1	14	MEN'S SINK/FAUCET/DRYER	20	1
15	WOMEN'S SINK/FAUCET/DRYER	20	1	16	MEN'S SINK/FAUCET/DRYER	20	1
17				18			
19	WOMEN'S MISC RECEPTACLE	20	1	20	MEN'S MISC RECEPTACLE	20	1
21	WOMEN'S MISC RECEPTACLE	20	1	22	MEN'S MISC RECEPTACLE	20	1
23	WOMEN'S MISC RECEPTACLE	20	1	24	MEN'S MISC RECEPTACLE	20	1
25				26			
27				28			
29				30			
31	WOMEN'S TOILET	15	1	32	MEN'S URINAL/TOILET	15	1
33	WOMEN'S TOILET	15	1	34	MEN'S URINAL/TOILET	15	1
35	WOMEN'S TOILET	20	1	36	MEN'S URINAL/TOILET	15	1
37	SPARE	15	1	38	SPARE	20	1
39	SPARE	15	1	40	SPARE	20	1
41	SPARE	15	1	42	SPARE	20	1

Project: 21251

Panelboard: RP-A1

Voltage (V):

Phase/Wire:

Bus and Lugs Rating (A):

CCT NO	Load	Breaker		CCT NO	Load	Breaker	
		Amp	Pole			Amp	Pole
43	DOOR OPERATOR	15	1	44	LIGHTING CCT	20	1
45	HWT	20		46	LIGHTING CCT	20	1
47			2	48	24 HOUR LIGHTING CCT	20	1
49	SAS-1	15	1	50			
51	ERV-1	15		52			
53			2	54			
55				56			
57				58			
59				60			
61				62			
63				64			
65				66			
67				68			
69				70			
71				72			
73				74			
75				76			
77				78			
79				80			
81				82	CONTROL CCT	15	1
83				84	CONTROL CCT	15	1