



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Small Craft Harbours Pacific Region

SPECIFICATIONS

ROOF JOINT REPAIRS

FALSE CREEK HARBOUR – LOCKER BUILDING

VANCOUVER, BC

December 2021

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1 SITE LOCATION

- .1 False Creek Small Craft Harbour is located in Vancouver, British Columbia. The works will be completed within the park area which is located directly above the Storage Locker Building. Refer to Drawing 001 for the location of the harbour and location of the works.

2 WORK SCHEDULE

- .1 All work including site clean-up and demobilization must be completed by September 30, 2022. Refer to Section 01 13 00 - General Requirements.

3 DEFINITIONS

- .1 Throughout contract documents, the words "Owner," "Harbour Authority," "Engineer," or "Department," shall be defined as follows:
 - .1 Owner
Small Craft Harbours, Department of Fisheries and Oceans Canada,
200-401 Burrard Street Vancouver BC V6C 3S4
 - .2 Harbour Authority (HA)
False Creek Harbour Authority, 1505 West 1st Avenue, Vancouver, BC, V6J 1E8.
 - .3 Engineer / Departmental Representative
An employee of the Owner or Consultant assigned by the Owner as the Engineer for this project, or the Engineer's representative assigned by the Engineer as his representative for the project.
 - .4 Contractor
The party accepted by the Owner with whom a formal contract is entered to complete the work for this project.
 - .5 Department
The Department of Fisheries and Oceans Canada.

4 WORK INCLUDED

- .1 In general, the nature of work consists of light to heavy expansion joint repairs. Refer to Drawing 001 for the general arrangement of the work.
- .2 In general, work to be performed under this contract includes, but is not limited to:
 - .1 Waterproofing of three interior expansion joints in the roof slab.
 - .2 Waterproofing one building separation joint at the northeast corner of the roof slab.
- .3 The work under this contract does not cover landscaping work. The stripping of the top soil will be completed before this work takes place. The contractor will have direct access to the expansion joints and building separation joint at the northeast corner of the roof slab.
- .4 A list of Owner supplied materials is provided in Section 01 15 00.
- .5 All labour, equipment and materials shall conform to Technical Specifications herein.

.5 Description of Items

With reference to the Unit Price Table in the Invitation to Tender, Appendix 1 – Price Form, work for each item is described as follows:

.1 Mandatory Work Items**.1 Mobilization / Demobilization**

The lump sum cost of mobilization/demobilization includes all labour, equipment and materials to complete the following:

- .1 Move all crew, equipment and materials on and off False Creek Small Craft Harbour.
- .2 Allow the Owner to inspect ALL Contractor supplied materials after delivery to the harbour. Provide the Owner with minimum one (1) week notice when materials will be ready for inspection.
- .3 Move materials, including Owner supplied materials, around the site as required to complete the work.
- .4 Cover all crew costs such as food and accommodations.
- .5 Provide site clean-up daily throughout construction.
- .6 Cover all overhead costs not included in other items.
- .7 Cover all disposal costs not included in other items.
- .8 Supply and install appropriate barriers to construction to restrict public access to the park during construction

.2 Supply Waterproofing Material for Three Interior Expansion Joints in Roof Slab

- .1 The contractor shall supply 100 m of waterproofing seal (c/w manufacturer's bonding agent and elastomeric concrete). The materials will be stored on site at False Creek Harbour. It is the contractor's responsibility to verify the quantities of the supplies.

.3 Supply Waterproofing Material for One Separation Joint at Northeast Corner of Roof

- .1 The Contractor shall supply the materials for the waterproofing of one building separation joint at the northeast corner of the roof slab. The materials will be stored on site at False Creek Harbour. It is the contractor's responsibility to verify the quantities of the supplies.

.4 Install Waterproofing at Three Interior Expansion Joints in Roof Slab

The lump sum cost to install manufactured joint waterproofing at the three expansion joints includes all labour, equipment and materials (unless provided by Owner) to complete the following:

- .1 Examine the roof slab for as-built anomalies, concrete distress and deterioration. Remedy the concrete substrate or make good anomalies to ensure it meets the requirements of the waterproofing manufacturer and Owner. Refer to Section 07 71 29 and Drawing 001.
- .2 Install the manufactured waterproofing seal and cast blockouts using non-flowable elastomeric concrete at each joint. Refer to Section 07 13 53 and 03 33 00 and Drawing 001.
- .3 Install Owner Supplied elastomeric waterproofing tape over the waterproofing seal and blockouts. Refer to Section 01 15 00, Section 07 13 53 and Drawing 001.
- .4 Install Owner Supplied protection boards over the elastomeric sheet membrane. Refer to Section 01 15 00, Section 07 13 53 and Drawing 001.

.5 Install Waterproofing at Separation Joint at Northeast Corner

The lump sum cost to install manufactured joint waterproofing and cover plate at the separation joint includes all labour, equipment and materials (unless provided by Owner) to complete the following:

- .1 Examine the roof slab and stairs for as-built anomalies, concrete distress and deterioration. Remedy the concrete substrate or make good anomalies to ensure it meets the requirements of the waterproofing manufacturer and Owner. Refer to Section 07 71 29 and Drawing 001.
- .2 Install a concrete curb (including epoxy-grouted rebar and expanding waterstop) along the edge of the cantilever roof slab. Refer to Section 07 71 29 and 03 33 00 and Drawing 001.
- .3 Install a manufactured joint waterproofing in the joint space between the new concrete curb and the existing concrete stairs. Refer to Section 07 13 53 and Drawing 001.
- .4 Install a manufactured cover plate on the concrete stairs to rest on the new concrete curb. Refer to Section 07 13 53 and 07 71 29 and Drawing 001.

2. Optional Work Items

1. Minor Concrete Repairs

- .1 The optional work items will be completed at an hourly rate which will include all labour and equipment to complete the following:
- .2 Repair of any minor concrete as-built anomalies, including work around the roof slab and stairs.

END OF SECTION

1 COMMENCEMENT AND COMPLETION

- .1 Work shall commence upon **Contract Award**.
- .2 All work including clean-up and demobilization must be completed by **September 30, 2022**.

2 INSPECTION OF SITE

- .1 It is the responsibility of each bidder to obtain all necessary information pertaining to local site conditions and existing works, beyond the information provided in this Specification and accompanying drawing(s).

3 PERMITS, CERTIFICATES, LAWS AND ORDINANCES

- .1 The Contractor must, at his own expense, procure all permits, certificates and licenses required of him by law for the execution of his work under this contract. He shall comply with all Federal, Provincial or Municipal laws, ordinances or rules and regulations relating to the performance of his work and in force during the duration of this contract.
- .2 The Contractor is required to give all required notices, comply with all local, municipal, provincial, and federal laws, ordinances, codes, by-laws, rules and regulations relating to the work.
- .3 All work to be done in accordance with Work Safe BC regulations.
- .4 The Contractor shall comply with Federal and Provincial laws, orders and regulations concerning the control and abatement of water and air pollution.
- .5 The Contractor shall comply with the requirements of any local or other Noise By-Laws.

4 MINIMUM STANDARDS

- .1 In the absence of other standards specified in the contract documents, all work is to conform to, or exceed, the minimum standards of the Canadian Government Specifications Boards, the Canadian Standards Association, the American Society for Testing of Materials, or the National Building Code of Canada, whichever is applicable.
- .2 All work to be done in accordance with Work Safe BC regulations.

5 INTERFERENCE WITH OPERATION

- .1 The Contractor shall upon instruction of the Owner or Engineer, promptly remove any of the Contractor's equipment located outside the specified work area and obstructing any harbour and park operations.

6 COMPLIANCE WITH STANDARD SPECIFICATIONS CODES AND REGULATIONS

- .1 Unless expressly stated to the contrary, all materials, equipment and articles furnished by the Contractor shall comply with the applicable provisions of the standards of the Canadian Standards Association (CSA) or the Canadian Government Specification Board (CGSB) with the applicable provisions of the American Society for Testing Materials (ASTM), National Dredging Association (NFPA), American Concrete Institute (ACI) and the American Water Works Association (AWWA).
- .2 The Contractor shall follow all regulations in accordance with the Fisheries Act. Best management practices to provide sufficient Erosion and Sediment Control (ESC) measures shall be implemented. Care shall be taken not to release any deleterious materials to fish habitat, into the water or any catch basins.
- .3 All work to be done in accordance with Work Safe BC regulations.

7 CONTRACTOR'S PERSONNEL

- .1 The Contractor's representative on site shall be completely familiar with the method of work to be employed. Such personnel shall remain on site for the duration of the work.

8 RESPONSIBILITY TO PERSONNEL

- .1 The Contractor shall have full responsibility for the board, lodging and transportation of his personnel and subcontractors. The cost for this shall be incorporated into his pricing. He shall comply with all labor requirements, and Worker's Compensation regulations.

9 BARRIERS, LIGHTS AND WATCHING

- .1 The Contractor shall provide all requisite barriers, fences, warning signs, lights and watching for the protection of persons and property on or adjacent to the site.

10 SITE ACCESS

- .1 The Contractor shall provide access to the work for the Owner's inspectors and surveyors as required.
- .2 General site access shall be coordinated with the Owner.
- .3 The Contractor shall maintain routes of travel, with the Owner and Harbour Authority being the sole judge as to what may be deemed reasonable.
- .4 The Contractor shall erect and maintain barriers, fences, lights, warning devices, and other protective devices as may be required for prevention of theft or damage of goods and protection of the public and workmen, or if so ordered by the Owner.

11 CONSTRUCTION AREA

- .1 The Contractor shall regulate construction traffic on public areas and comply with all local ordinances in connection therewith, including load limitation and removal of debris.
- .2 The Contractor shall confine his operations on the site to those areas specifically required for the work including routes and regulations approved by the Owner and Harbour Authority for haulage of materials.

12 NIGHT WORK

- .1 The Contractor shall keep proper lights each night between the hours of sunset and sunrise in such locations as required by a governing authority. When work is done at night, maintain from sunset to sunrise such lights on or about the work and plant as necessary for the proper observation of the work and the efficient prosecution thereof. No night work will be allowed, except for work that can be completed within the City of Vancouver work hours, which extends to 8 pm (Monday to Saturday).

13 CLEAN-UP

- .1 At all times the Contractor shall keep the site free from accumulation of waste material and debris and leave the site clean and tidy on completion.

14 TEMPORARY SERVICES

- .1 On site the Contractor shall make his own arrangements for supply of water and electricity. Electricity may be used from the power in the underlying bays, but it is the contractor's responsibility to get the power from the underlying bays to the work site.
- .2 The Contractor shall supply for his own use; sanitary, first aid, and all other temporary services and facilities required for the work.

15 PROGRESS REPORT

- .1 The Contractor shall keep a daily record of progress of the work available for inspection by the Engineer.
- .2 The daily record shall include particulars of weather conditions, number of men working and equipment working and work performed.

16 ENGINEER'S ACCESS

- .1 The Contractor shall provide access to the work for the Owner's inspectors and surveyors as required.

17 PERMITS AND ROYALTIES

- .1 Permits and licenses required for the Contractors work are the responsibility of the Contractor and shall be for the Contractor's account. The Contractor shall have the appropriate business license.

18 PROTECTION OF EXISTING STRUCTURES

- .1 Existing structures, paths, pavers, landscaped areas, adjacent marine facilities, roads, services, piping or equipment within the work area which are not to be replaced shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractor's expense to the satisfaction of the Engineer and Owner.

19 WEATHER

- .1 Time lost by the Contractor due to stoppage on account of adverse weather conditions may be allowed, at the discretion of the Engineer, as an extension of time for the completion of the work over and above the date of completion specified in the contract agreement.

20 SOILS DATA AND EXISTING TOPOGRAPHY

- .1 The Contractor shall notify the Engineer of any subsurface conditions at the place of the work that may differ materially from those indicated in the contract documents.

21 UTILITIES AND SERVICES

- .1 The Contractor shall be responsible for any damage to overhead and/or underground utilities and/or services caused by the Contractor's operations and shall repair and make good the repairs at the Contractor's own expense.
- .2 The Contractor is required to complete a BC ONE CALL and utility locate to identify utility services for the site.
- .3 The Contractor shall be responsible, unless otherwise agreed to by the Engineer, for all temporary or construction services and utilities, and first aid facilities.

22 CARE OF FINISHED WORK

- .1 The Contractor shall protect all finished work from injury, defacement, unauthorized entry, or trespass until such time as the work described in the contract documents is substantially complete.

23 DISPOSAL

- .1 All material designated to be replaced or removed will become the property of the Contractor and will be disposed of in an environmentally acceptable manner so that they neither become a menace to the public park space nor a nuisance to the public on adjacent or any other property.
- .2 All replaced items, cut-offs and waste material shall be disposed by the Contractor in strict accordance with provincial, local, and municipal regulations and Part 8 of the National Building Code and with the Canadian Construction Safety Code.
- .3 Conduct clean-up and disposal operations to comply with local ordinances and antipollution laws.

24 MATERIAL HANDLING AND STORAGE

- .1 Any materials damaged by the Contractor during handling, transportation and storage shall be replaced at the Contractor's expense.

- .2 While the Contractor is mobilized on site, the Contractor is responsible for protecting all materials (including Owner supplied materials) from damage and theft. As a minimum, the Contractor shall provide fencing around any stored materials that are accessible to the general public.

25 CONSTRUCTION WORK SCHEDULE

- .1 The Contractor shall work whatever shifts required in order to ensure the work meets regulatory windows and is completed by the completion date of the contract.
- .2 The Contractor shall normally perform all work within daylight hours, except in instances where the Contractor has requested and received approval for longer working hours from the Owner.
- .3 Within 14 days of award the Contractor shall supply a week by week schedule of proposed activities related to the contract.
- .4 The Contractor must notify the Owner immediately whenever a variation from the construction schedule is expected to occur or when the submission of the submittals will be delayed.
- .5 The Contractor shall comply with the requirements of any local or other Noise By-Laws.
- .6 The Contractor will need to work within the designated hours outlined by Harbour Cove/Winford Properties, Harbour Authority and City of Vancouver. For example, based on the City of Vancouver bylaws, construction may be carried out between 7:30AM and 8:00PM on any weekday that is not a holiday, and between 10:00AM to 8:00PM on and Saturday that is not a holiday. Construction is not permitted on Sundays.

26 SETTING OUT OF WORK

- .1 The Contractor is expected to familiarize themselves with the site, facilities and amenities within.
- .2 The Contractor shall not enter on nor occupy with workers, tools, equipment or material, any ground outside the property of the Harbour Authority without the written consent of the party owning such ground. Other Contractors or employees or representatives of the Department may, for all necessary purposes, enter upon the work and premises used by the Contractor, and the Contractor shall conduct his work so as not to impede unnecessarily any work being done by others nor adjacent to the site.
- .3 The Contractor is responsible to notify the property owner of Harbour Cove/Winford Properties, City of Vancouver and the Port of Vancouver in addition to the Harbour Authority.

27 AS-BUILT DRAWINGS

- .1 The Contractor shall mark up one set of plans with any changes or amendments implemented during the Contract. These plans shall be submitted to the Engineer before the Final Certificate of completion is issued.

28 SITE SECURITY

- .1 The Contractor is responsible for all materials and equipment either supplied by the Contractor, the Client Department, or the Owner. The Contractor is responsible for the repair and replacement of stolen or damaged items.

29 SITEWORK

- .1 All heavy construction equipment shall be free of leaks and cleaned prior to construction.
- .2 The Contractor shall have absorbent pads on site in case of any oil leaks or contaminants entering the water.
- .3 The Contractor shall develop a construction plan that minimizes disruption to harbour and park operations.
- .4 The site shall be left in a safe condition at the completion of each work day.

30 CO-OPERATION WITH HARBOUR AUTHORITY AND HARBOUR COVE/WINFORD GROUP

- .1 The Contractor shall give the Harbour Authority **minimum 2 weeks' notice** for start of construction.
- .2 The Contractor shall give the Harbour Cove/Winford Group **minimum 2 weeks' notice** for start of construction.
- .3 The Contractor shall give the Harbour Authority **minimum 48 hours' notice** for work that may interrupt harbour operations.
- .4 The Contractor shall give the Harbour Cove/Winford Group **minimum 48 hours' notice** for work that may interrupt harbour operations.
- .5 The Contractor should also notify the Port of Vancouver prior to the works.

31 CONDITION OF STRUCTURES

- .1 Existing structures, paths, pavers, landscaped areas, adjacent marine facilities, roads, and all other structures, services, piping or equipment within the work area shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractors expense to the satisfaction of the Owner.

32 INSPECTION OF STRUCTURES

- .1 The Owner or Engineer, shall inspect the completed works. The Contractor shall be responsible for the costs of any re-inspections that may be required due to errors or omissions of the Contractor.

END OF SECTION

GENERAL**.1 DEFINITIONS**

- .1 This section provides a list of Owner Supplied materials. All other materials required to complete the work shall be supplied by the Contractor.

2 PRODUCTS**.1 JOINT WATERPROOFING MATERIALS**

100 m of waterproofing tape

- FPO rubber
- Removeable centre expansion strip
- 1 mm thick by 300 mm wide
- Standard 25 m rolls

Owner Supplied Hi-Mod Gel epoxy paste

- Two-component modified epoxy resin
- 1:1 mixing ratio by volume

35 pieces of protection boards

- Semi-flexible core board; mineral-fortified asphaltic core between two outside layers of asphalt-impregnated fibreglass mat
- 6 mm thick, 457 mm wide, 1500 mm long

3 EXECUTION**.1 NOT USED**

- .1 Not Used.

END OF SECTION

1 GENERAL**.1 DEFINITIONS**

- .1 Application Specialist:
An individual who performs surface preparation and application of protective coatings and linings to steel and concrete surfaces of complex industrial structures.

.2 INSPECTION

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Provide timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions at Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative will pay cost of examination and replacement.

.3 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

.4 PROCEDURES

- .1 Notify appropriate agency Departmental Representative 7 days in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

.5 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.

- .3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

.6 REPORTS

- .1 Submit 2 copies of inspection and test reports to Departmental Representative.

.7 CERTIFICATES

- .1 Submit appropriate certificates as requested.

.8 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

.9 MILL TESTS

- .1 Submit mill test certificates as requested

2 PRODUCTS

.1 NOT USED

- .1 Not Used.

3 EXECUTION

.1 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL**.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site containers for collection of waste materials and debris.
- .5 Dispose of waste materials and debris off site.
- .6 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Remove stains, spots, marks and dirt from decorative work.
- .8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

- .9 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .10 Remove dirt and other disfiguration from exterior surfaces.
- .11 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .12 Sweep and wash clean paved areas.
- .13 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

2 PRODUCTS

.1 NOT USED

- .1 Not Used.

3 EXECUTION

.1 NOT USED

- .1 Not Used.

END OF SECTION

1 GENERAL

This section refers to Environmental Procedures required as part of this Contract.

.1 References

.1 Definitions:

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

.2 In Water Works

- .1 Construction equipment to be operated on land and no work is anticipated to be completed in water.

.3 Notification

- .1 Engineer will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Engineer of proposed corrective action and take such action after approval by Engineer.
 - .1 Take action only after receipt of written approval by Engineer.
- .3 Engineer will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

2 PRODUCTS

- .1 Not Used

3 EXECUTION

.1 Cleaning

- .1 Leave work area clean at end of each day.
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment to the approval of the Owner.

END OF SECTION

1. GENERAL

Work in this Section includes the supply of all materials, equipment and labour to install rebar, waterstop and concrete curb along the north edge of the roof cantilever slab at the northeast corner of the building. See Drawing 001.

.1 REFERENCE STANDARDS

The latest edition of these reference standards shall apply:

- .1 City of Vancouver By-Laws;
- .2 CSA A23.1 "Concrete Materials and Methods of Concrete Construction";
- .3 CSA A23.2 "Test Methods and Standard Practices for Concrete"
- .4 CSA S269.1 "Falsework and Formwork"
- .5 CSA A283 "Qualification Code for Concrete Testing Laboratories"
- .6 CSA A23.2-3C "Making and Curing Concrete Compression and Flexural Test Specimens"
- .7 CSA A23.2-5C "Slump of Concrete"
- .8 CSA A23.2-9C "Compressive Strength of Cylindrical Concrete Specimens"
- .9 CSA G30.18 "Billet-steel bars for concrete reinforcement"
- .10 DIN EN12350-5 "Testing Fresh Concrete – Part 5: Flow Table Test"
- .11 ICRI PC1-10 - Concrete Surface Profile chip set
- .12 ASTM C157 "Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete"
- .13 ASTM D412 "Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension"
- .14 ASTM D624 "Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers"
- .15 ASTM D638 "Standard Test Method for Tensile Properties of Plastics"
- .16 ASTM D695 "Standard Test Method for Compressive Properties of Rigid Plastics"
- .17 ASTM D790 "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials"
- .18 ASTM D792 "Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement"
- .19 ASTM D2240 "Standard Test Method for Rubber Property—Durometer Hardness"

.2 RELATED REQUIREMENTS

- .1 Section 07 13 53 Elastomeric Sheet Waterproofing
- .2 Section 07 71 29 Manufactured Roof Joints

.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Names and relevant experience of proposed Site Superintendent and site personnel.
- .2 Proposed materials, work methodology, weather protection measures and construction schedule
- .3 Submit photographs on a daily basis during construction, with a minimum of six photos a day (actual number to be confirmed by Engineer depending on nature of work).

.4 QUALITY ASSURANCE

- .1 Personnel:

All personnel performing the work shall have minimum five years of similar work experience. No changes of personnel shall be permitted unless approved by the Owner. Site Superintendent shall not be replaced at any time unless requested by the Owner.

- .2 Work Documentation:

Contractor shall record and submit representative photographic and/or video records of the daily work for all phases of the work. Photographs and/or video records shall include the overall site work as well as close-ups of the work items. These recordings may be waived by the Engineer on days when field reviews are conducted by the Engineer.

.5 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:

Deliver all materials to the site in original unopened factory packaging with a summary of shipping contents, and labelled with manufacturer's name and address.

- .2 Storage and Handling Requirements:

Handle, store and protect prefabricated materials from damage, nicks, scratches, and blemishes. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .3 Replace any defective or damaged materials with new.

2 PRODUCTS

.1 GENERAL

All materials, equipment and accessories shall be supplied by Contractor.

.1 Concrete

- CSA Exposure C-1
- 20 mm max. size coarse aggregates
- Min. compressive strength 35 MPa @ 28 days
- Minimum slump at placement 125 mm
- Nominal air content 6%

.2 Hydrophilic Swelling Waterstop

- Non-bentonite, modified chloroprene rubber
- 7 mm x 25 mm profile
- Min. hardness 50
- Min. tensile strength 9.0 MPa
- Min. elongation 400 %
- Min. tear resistance 0.7 MPa

.3 Rebar Grouting Adhesive

- Two-component, solvent and styrene-free, epoxy acrylate
- Min cure temperature -10°C
- Moisture insensitive
- Min. 24 hr compressive strength 73 MPa
- Min. 24 hr tensile strength 12 MPa
- Min. 24 hr elongation at break 6.2%
- Min. 24 hr tensile modulus 3.7 MPa
- Min. 24 hr flexural strength 28 MPa

.4 Rebar

- CSA G30.18
- Min. yield strength 400 MPa
- New 15M rebar

.2 FABRICATION

.1 All rebar and waterstop shall be provided in full lengths. No splicing is permitted.

.2 Concrete curb shall be poured with no construction joints.

3 EXECUTION

.1 EXAMINATION

.1 Inspect all concrete substrate to identify construction anomalies or concrete deterioration (cracks, delamination, spalls, honeycombing, joint damaged nosing, etc.). Verify that conditions are acceptable for concrete curb construction. Inform Engineer of any anomalies or unacceptable conditions immediately upon discovery.

.2 Proceed with work only after anomalies or unacceptable conditions have been remedied and after receipt of written approval to proceed by Engineer.

.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue detailed installation instructions, product carton detailed installation instructions, and data sheets.
- .2 Do not proceed with moisture-sensitive work or temperature sensitive work unless the site conditions fully comply with manufacturer's specifications, or a written approval is provided by the manufacturer and submitted to the Engineer.

.3 FIELD QUALITY CONTROL

- .1 Contractor shall be responsible for all aspects of quality control for the work, including sampling of concrete by CSA A283 certified testing lab for compressive strength, slump and air content testing.
- .2 Manufacturer's field services: Contractor shall coordinate with product manufacturers for field services including product installation and periodic site visits for inspection of waterstop product installation in accordance with manufacturer's instructions.

.4 CONCRETE CURB

- .1 Sawcut existing asphaltic concrete base in a straight line. Do not sawcut wider than required to construct the concrete curb except for formwork installation. Remove the asphaltic concrete to completely expose the concrete slab.
- .2 Roughen the concrete slab to provide a minimum CSP #7. Grind and abrasive-blast the substrate to remove any concrete bruises, grease, oil, contaminants, foreign matter etc.
- .3 Drill holes vertically into the slab surface for the diameter and depth required to develop yield strength of 15 mm rebar using procedures and equipment approved by adhesive manufacturer. Clean the drilled holes by brushing inside the holes and using dry oil-free compressed air to remove all dust and debris. Remove all free moisture in the holes. Protect the holes from contamination and moisture.
- .4 New rebar may be relocated +/- 25 mm maximum along the longitudinal direction of the curb to avoid hitting existing slab rebar without compromising edge cover and waterstop installation. Completely fill any abandoned drilled holes with the adhesive.
- .4 Epoxy-grout 15M rebar in the cleaned holes.
- .5 Tie horizontal rebar to the vertical rebar after the epoxy has cured. Provide 60 mm cover for the top horizontal bar.
- .6 Construct formwork. Apply form-release oil and install the formwork. Ensure all joints are leak-proof before placing concrete.
- .7 Clean the concrete substrate by pressure-washing, and moisture condition the concrete to saturated surface dry (SSD).
- .8 Install waterstop on the SSD concrete substrate alongside the vertical rebar in accordance with manufacturer's instructions. Locally grind concrete projections

below the waterstop if required to ensure full contact between waterstop and concrete. Do not expose the waterstop to water for more than 2 hrs before start of concrete placement to prevent premature hydration and expansion of the waterstop.

- .9 Do not place concrete until a final review of the rebar and waterstop has been conducted by the Engineer.
- .10 Mix, place and consolidate concrete in accordance with CSA A23.1
- .11 Finish the top curb surface flat with no undulations to provide a uniform bearing surface for the new cover plate. Match the gradient of the concrete stair surface. Ensure the top surface elevation of the cover plate when sitting on the curb surface matches the top surface of the concrete stairs within ± 3 mm. Cover plate surfaces at the joint shall match evenly to avoid tripping hazard.
- .12 Arrange for a concrete testing firm to sample and test the concrete to ensure the design concrete properties are provided.
- .13 Do not remove formwork for minimum three full days.
- .14 Provide continuous wet curing of all exposed surfaces of the concrete curb until concrete is seven days old.

.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning. Leave Work area clean at end of each day.
- .2 Remove traces of primer, caulking, epoxy, filler materials and other construction wastes. Clean all excess adhesive around the edges and top of the joint with a trowel or scraping tool. Using a clean rag dampened with concrete cleaner to remove all residual epoxy from exposed concrete surfaces before the epoxy sets up.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.6 PROTECTION

- .1 Protect all work-in-progress and installed products and components from damage and adverse weather during construction.
- .2 Repair damage to adjacent structures caused by construction work.

END OF SECTION

1. GENERAL

Work in this Section includes the supply of all materials, equipment and labour for installation of elastomeric sheet with an epoxy resin adhesive sealing system and membrane protection board at three interior expansion joints in the roof slab. See Drawing 001.

.1 REFERENCE STANDARDS

The latest edition of these reference standards shall apply:

- .1 City of Vancouver By-Laws;
- .2 CSA A23.1 “Concrete Materials and Methods of Concrete Construction”;
- .3 CSA A23.2 “Test Methods and Standard Practices for Concrete”
- .4 ISO 9001 “Quality Management Systems”
- .5 ICRI PC1-10 - Concrete Surface Profile chip set;
- .6 AASHTO M235 “Standard Specification for Epoxy Resin Adhesives”
- .7 ASTM D412 “Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension”
- .8 ASTM D570 “Standard Test Method for Water Absorption of Plastics”
- .9 ASTM D624 “Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers”
- .10 ASTM D638 “Standard Test Method for Tensile Properties of Plastics”
- .11 ASTM D695 “Standard Test Method for Compressive Properties of Rigid Plastics”
- .12 ASTM D732 “Standard Test Method for Shear Strength of Plastics by Punch Tool”
- .13 ASTM D790 “Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials”
- .14 ASTM C881 “Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete”
- .15 ASTM C882 “Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear”

.2 RELATED REQUIREMENTS

- .1 Section 03 33 00 Cast-In-Place Concrete
- .2 Section 07 71 29 Manufactured Roof Joints

.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Documentation of manufacturer’s certification for Contractor to install the specified products.

- .2 Submit a minimum of four waterproofing projects completed by the Contractor over the past ten years using similar waterproofing systems and provide information of the project Clients for possible reference contacts.
- .3 Names and relevant experience of proposed Site Superintendent and site personnel.
- .4 Proposed work methodology, weather protection measures and construction schedule
- .5 Proposed Samples, product data and installation instructions (if alternate products are proposed).
- .6 Submit photographs on a daily basis during construction, with a minimum of six photos a day (actual number to be confirmed by Engineer depending on nature of work).

.4 QUALITY ASSURANCE

.1 Certification

Contractor shall have current certification by the waterproofing manufacturer to install the waterproofing products.

.2 Experience

Contractor shall have completed a minimum of four waterproofing projects over the past ten years using similar waterproofing systems.

.3 Personnel:

All personnel performing the work shall be trained by the manufacturer and have minimum five years of waterproofing installation experience. No changes of personnel shall be permitted unless approved by the Owner. Site Superintendent shall not be replaced at any time unless requested by the Owner.

.4 Work Documentation:

Contractor shall record and submit representative photographic and/or video records of the daily work for all phases of the work. Photographs and/or video records shall include the overall site work as well as close-ups of the work items. These recordings may be waived by the Engineer on days when field reviews are conducted by the Engineer.

.5 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

Deliver all materials to the site in original unopened factory packaging.

.2 Storage and Handling Requirements:

Handle, store and protect prefabricated materials from damage, nicks, scratches, and blemishes. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.3 Replace any defective or damaged materials with new materials.

2 PRODUCTS

.1 GENERAL

.1 The waterproofing system consists of an elastomeric waterproofing tape bonded to the elastomeric concrete blockouts of the expansion joint waterproofing (Section 07 71 29). The waterproofing tape is protected from mechanical damage by a protection board. See Drawing 001.

.2 Components and Materials

.1 Owner Supplied Waterproofing Tape

.2 Owner Supplied Hi-Mod Gel epoxy paste

.3 Owner Supplied Protection Boards

.4 Contractor Supplied Other Components, Materials, Accessories and Equipment

All other components, materials, accessories and equipment pre-approved by product manufacturers, as required for the work.

.2 FABRICATION

.1 The Owner Supplied waterproofing tapes shall be measured accurately and cut to fit the total length of each joint. Seams are not permitted in the waterproofing tape unless the joint is longer than the 25 m roll of waterproofing tape. The maximum number of seams in a joint shall be the minimum possible.

.2 The Owner Supplied Protection Boards shall be measured accurately and cut lengthwise to provide 457 mm x 1,500 mm size boards. Smaller widths may be required to meet as-built conditions.

3 EXECUTION

.1 EXAMINATION

.1 Inspect all construction materials for manufacturing defects and deficiencies. Inform Engineer of any anomalies or unacceptable conditions immediately upon discovery.

.2 Inspect all concrete substrate to identify construction anomalies or concrete deterioration (cracks, delamination, spalls, honeycombing, joint damaged nosing, etc.). Verify that conditions are acceptable for waterproofing installation in accordance with manufacturer's written instructions. Inform Engineer of any anomalies or unacceptable conditions immediately upon discovery.

.3 Proceed with work only after anomalies or unacceptable conditions have been remedied and after receipt of written approval to proceed by Engineer.

.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue detailed installation instructions, product carton detailed installation instructions, and data sheets.
- .2 Do not proceed with moisture-sensitive work or temperature sensitive work unless the site conditions fully comply with manufacturer's specifications, or a written approval is provided by the manufacturer and submitted to the Engineer.

.3 FIELD QUALITY CONTROL

- .1 Contractor shall be responsible for conducting all aspects of quality control for the work.
- .2 Manufacturer's field services: Contractor shall coordinate with product manufacturers for field services including product installation and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule manufacturers site visits for each type of work, at least once in each phase of the work (waterproofing tape and protection board installation) in the presence of Engineer.

.4 OWNER SUPPLIED WATERPROOFING TAPE

- .1 Existing roof surfaces adjacent to the expansion joints shall be masked with protective tapes and/or have protective sheets to prevent the build-up of repair materials and/or spillage on the roof surfaces resulting from this work.
- .2 Lightly grind the surfaces of the waterproofing joint blockouts and the roof slab at the base of the blockouts to remove all laitance, surface defects, oil, membrane, grease, contaminants etc., and to provide a surface texture of CSP #2 to #3. Protect the waterproofing seal with plywood (or equivalent) during the grinding process from damage.
- .3 Clean the ground surfaces starting from one end of the expansion joint by blowing with dry, oil-free compressed air and/or by vacuuming to remove all water, contamination, oil, grease, foreign matters etc. from the substrate. Brush and wipe with clean cloth and water if necessary. Ensure the waterproofing seal is totally free of any obstructions that can potentially inhibit free movements of the seal. Do not use solvents for cleaning.
- .4 Apply duct tape (or equivalent) to cover the full width of the waterproofing seal. Protect the duct-taped area, remaining blockouts and roof slab at the base of the blockouts from moisture, contamination and other foreign matter with protective sheets until the start of tape installation.
- .5 Standing water or surface runoffs may be expected on some areas of the roof slab. Installation of dams and/or tarps may be required. Remove all dams at the completion of work.
- .6 Unroll and lay the tape in a relaxed flat position to relieve any temporary coiling from shipment packaging.

- .7 Cut an additional length of waterproofing tape for the balance of the joint, allowing for a minimum 100 mm overlap at the seam. Field weld the tapes together using hand-welding tool and procedures approved by Sika. Test the weld for adhesion. Remove the weld and repeat welding if weld does not meet Sika's requirements.
- .8 Pre-stir each component of gel epoxy paste to evenly distribute contents of each part and achieve consistent material. Empty contents of Component A and Component B into a suitably sized and clean mixing vessel. Mix for 3 min using a low-speed drill (300 to 450 rpm) to minimize air entrapment. During the mixing operation, scrape down the sides and bottom of the pail with a flat- or straight-edge trowel at least once to ensure thorough mixing. Mix only that quantity of gel epoxy paste which can be used within its pot life.
- .9 1st Layer Adhesive: Apply a bonding layer of the mixed gel epoxy paste to the prepared surfaces of the blockouts and roof surface at a thickness of 1 to 2 mm. Terminate the adhesive 6 mm from the taped waterproofing seal above the joint. Work the adhesive into the substrate for positive adhesion and work to either masking tape or chalk mark-defined edges to achieve a neat edge.
- .10 Tape Installation: Remove the duct tape from the joint waterproof seal. Set the tape into the epoxy adhesive within the open-time and while the resin layer is tacky. Lay the tape loose with a 12 mm sag over the seal (see Drawing 001). Place the tape centrally over the joint to ensure that the joint is adequately bridged by tape to accommodate any movement. Using a hard roller, similar to a rubber seam or wall paper roller, force the tape down into the epoxy, ensuring that there is complete contact between the tape and the epoxy, with no air entrapment or unbonded locations.
- .11 2nd Layer Adhesive: Apply an encapsulating, 1 to 2 mm thick layer of the mixed gel epoxy paste to the upper surface of the bonded tape, extending this layer beyond the edge of the tape onto the underlying epoxy resin. Ensure that epoxy does not cover the tape over the waterproofing seal. Remove the red expansion strip from the tape before the epoxy gel sets.
- .12 Do not cover the tape until a final review has been conducted by the Engineer.

.5 OWNER SUPPLIED PROTECTION BOARDS

- .1 Ensure the epoxy for the waterproofing tape is properly cured and its installation has been reviewed by manufacturer and Engineer before installing the protection boards.
- .2 Reinstate the landscaping to the top surface of the waterproofing tape. Ensure the elevation of the landscaping matches the elevation of the tape. Remove all debris from the surface of the waterproofing tape.
- .3 Trim the protection boards as required to fit the space between existing pipes and the waterproofing tape.
- .4 Place the protection boards in the long direction tightly together (butt edge) and centred on top of the expansion joint below the waterproofing tape in accordance with manufacturer's requirements. Leave a 6 mm gap between the board and wall at the end of the joint.
- .5 Do not cover the installed protection boards with landscaping materials until a final review has been conducted by the Engineer and manufacturer.

- .6 Cover the protection boards with the remaining landscaping materials within 48 hours of its installation to minimize its exposure to sunlight.

.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning. Leave Work area clean at end of each day.
- .2 Remove traces of primer, caulking, epoxy, filler materials and other construction wastes. Clean all excess adhesive around the edges and top of the joint with a trowel or scraping tool. Using a clean rag dampened with concrete cleaner to remove all residual epoxy from exposed concrete surfaces before the epoxy sets up.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 – Cleaning.

.7 PROTECTION

- .1 Protect all work-in-progress and installed products and components from damage and adverse weather during construction.
- .2 Repair damage to adjacent structures caused by joint waterproofing work.

END OF SECTION

1. GENERAL

Work in this Section includes the supply of all materials, equipment and labour for the installation of manufactured joint waterproofing for:

- Three interior expansion joints in the roof slab; and
- One building separation joint at the northeast corner of the roof slab.

See Drawing 001.

.1 REFERENCE STANDARDS

The latest edition of these reference standards shall apply:

- .1 City of Vancouver By-Laws;
- .2 CSA A23.1 “Concrete Materials and Methods of Concrete Construction”
- .3 ISO 9001 “Quality Management Systems”
- .4 RC 14001 “Certification”
- .5 ASTM C190 “Method of Test for Tensile Strength of Hydraulic Cement Mortars”
- .6 ASTM D56 “Standard Test Method for Flash Point by Tag Closed Cup Tester”
- .7 ASTM D395 “Standard Test Methods for Rubber Property—Compression Set”
- .8 ASTM D412 “Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension”
- .9 ASTM D471 “Standard Test Method for Rubber Property—Effect of Liquids”
- .10 ASTM D518 “Standard Test Method for Rubber Deterioration – Surface Cracking”
- .11 ASTM D573 “Standard Test Method for Rubber—Deterioration in an Air Oven”
- .12 ASTM D638 “Standard Test Method for Tensile Properties of Plastics”
- .13 ASTM D695 “Standard Test Method for Compressive Properties of Rigid Plastics”
- .14 ASTM D925 “Standard Test Methods for Rubber Property—Staining of Surfaces (Contact, Migration, and Diffusion)”
- .15 ASTM D1052 “Standard Test Method for Measuring Rubber Deterioration—Cut Growth Using Ross Flexing Apparatus”
- .16 ASTM D1171 “Standard Test Method for Rubber Deterioration—Surface Ozone Cracking Outdoors (Triangular Specimens)”
- .17 ASTM D1149 “Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment”
- .18 ASTM D2240 “Standard Test Method for Rubber Property—Durometer Hardness”

- .19 ASTM D2471 “Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins”
- .20 SAE J1960 “Accelerated Exposure of Automotive Exterior Materials Using a Controlled Irradiance Water-cooled Xenon Arc Apparatus”
- .21 ICRI PC1-10 – Concrete Surface Profile chip set

.2 RELATED REQUIREMENTS

- .1 Section 03 33 00 Cast-In-Place Concrete
- .2 Section 07 13 53 Elastomeric Sheet Waterproofing

.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Documentation of manufacturer’s certification for Contractor to install the specified products.
- .2 Submit a minimum of four waterproofing projects completed by the Contractor over the past ten years using similar waterproofing systems and provide client information for the projects for possible reference contact.
- .3 Names and relevant experience of proposed Site Superintendent and site personnel.
- .4 Proposed work methodology, weather protection measures and construction schedule.
- .5 Proposed materials product data and installation instructions
- .6 Submit photographs on a daily basis during construction, with a minimum of six photos a day (actual number to be confirmed by Engineer depending on nature of work).

.4 QUALITY ASSURANCE

- .1 Certification

Contractor shall have current certification by the waterproofing manufacturer to install the waterproofing products.
- .2 Experience

Contractor shall have completed a minimum of four waterproofing projects over the past ten years using similar waterproofing systems.
- .3 Personnel:

All personnel performing the work shall be trained by the manufacturer and have minimum five years of waterproofing installation experience. No changes of personnel shall be permitted unless approved by the Owner. Site Superintendent shall not be replaced at any time unless requested by the Owner.

.4 Work Documentation:

Contractor shall record and submit representative photographic and/or video records of the daily work for all phases of the work. Photographs and/or video records shall include the overall site work as well as close-ups of the work items. These recordings may be waived by the Engineer on days when field reviews are conducted by the Engineer.

.5 DELIVERY, STORAGE AND HANDLING**.1 Delivery and Acceptance Requirements:**

Deliver all materials to the site in original unopened factory packaging with a summary of shipping contents, and labelled with manufacturer's name and address.

.2 Storage and Handling Requirements:

Handle, store and protect prefabricated materials from damage, nicks, scratches, and blemishes. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

3 Replace any defective or damaged materials with new materials.**2 PRODUCTS****.1 EXPANSION JOINT WATERPROOFING****.1 Joint Waterproofing System**

The waterproofing seal shall provide a watertight expansion control system that is capable of accommodating multi-directional movement. The system shall consist of preformed thermoplastic rubber profiles with integral side ribbed flanges cast into preformed blockouts by means of utilizing manufacturer's ambient cure elastomeric concrete header.

The thermoplastic rubber seal element shall accommodate a total joint width movement of 51 mm, ranging from 13 mm to 64 mm. The elastomeric membrane seal shall remain under compression throughout the full movement cycle.

.2 Components and Materials**.1 Thermoplastic Rubber Joint Seal**

Provide the seal profile as shown in drawing 001. Profile design shall incorporate integral side flanges exhibiting a pronounced serrated profile and factory punched holes that interlocks the profile into the elastomeric header material.

Elastomeric seal material shall meet these physical and performance properties:

Physical Properties	Test Methods	Min. Requirements
Shore A Hardness	ASTM D2240	63
Tensile Strength, min	ASTM D412	6.8 MPa (986 psi)
Ultimate Elongation, min	ASTM D412	570%
100% Modulus	ASTM D412	2.5 MPa (363 psi)
Compression Set, max	ASTM D395	

22 hrs @ 23°C		17%
70 hrs @ 125°C		40%
Performance Properties	Test Methods	Min. Requirements
Ozone Resistance	ASTM D1171	No Cracks
UV Resistance	SAE J1960	Pass
Staining Resistance	ASTM D925	No Staining
Fatigue Resistance	ASTM D1052	2 Million Cycles

.2 Elastomeric Concrete Header

Elastomeric concrete material shall be an ambient cure, 100% solids, two-component polyurethane with pregraded specialty aggregates that is designed for outdoor exposure, and exhibiting the physical properties listed below.

Physical Properties	Test Methods	Min. Requirements
Compressive Strength	ASTM D695 Mod.	15.2 MPa (2200 psi)
Resilience @ 5% deflection	ASTM D695	90%
Stress @ 5% deflection		5.52 MPa (800 psi)
Adhesion to Concrete	ASTM C190	2.76 MPa (400 psi) 1.72 MPa (250 psi)
Dry Bond		
Wet Bond (7 days submerged)		
Impact Resistance -29°C to 70°C	454 g steel ball dropped from a 1.5 m height on 64 mm Ø x 9.5 mm thick disc	No cracks 9.5 Nm (7 ft.lb)

The elastomeric concrete shall include a manufacturer's approved non-flow additive to provide a sloped finish profile. When properly mixed and poured, the elastomeric concrete shall cure rapidly, fills any voids, spalls or irregularities in the substrate, maintains the sloped finish profile and form a monolithic unit with the substrate.

.3 Bonding Agent

Provide waterproofing manufacturer's approved two-component (resin and activator), 100% solids bonding agent to apply to the concrete substrate in the blockouts prior to placement of elastomeric concrete header.

.4 Other Components, Materials, Accessories and Equipment

All other components, materials, accessories and equipment pre-approved by the product manufacturer, as required for the work.

.2 SEPARATION JOINT WATERPROOFING

.1 Joint Waterproofing System

The joint waterproofing system shall be a complete elastomeric seal system designed by the manufacturer to withstand structural movement and environmental conditions at the building separation joint. The system shall consist of a preformed neoprene profile, installed using the same dimensions as the joint gap at mid-range temperature, bonded with a two-component epoxy adhesive, and pressurized during the adhesive

cure time. The elastomeric seal shall be capable of accommodating joint width of 44 mm to 86 mm.

2 Components and Materials

.1 Elastomeric Seal

Provide the seal profile shown on Drawing 001. The seal material shall be polychloroprene (neoprene) elastomer, performed by extrusion and vulcanized into its definitive shape, complete with end caps.

The seal material shall have these properties:

Physical Properties	Test Methods	Min. Requirements
Tensile Strength	ASTM D412	13.8 MPa (2000 psi)
Elongation at Break	ASTM D412	250%
Hardness, Shore A	ASTM D2240	65 +/- 5
Oven Aging, 70 hrs at 100°C	ASTM D573	20% 20% 0 - 10 points
Tensile Strength, max loss		
Elongation at Break, max loss		
Change in Hardness		
Oil Swell, 70 hrs at 100°C	ASTM D471	45%
Weight Change, max		
Ozone Resistance, 70 hrs at 40°C	ASTM D1149	No Cracks
Low Temperature Stiffening, 7 days at -10°C	ASTM D2240	0 – 15 points

.2 Adhesives

The adhesive for seal installation shall consist of two components (resin and hardener), thixotropic and epoxy-based, designed for mixing and use on site. The choice of adhesive shall be appropriate for the ambient temperatures at the time of work.

The seal adhesive shall have these properties:

Physical Properties	Test Methods	Min. Requirements
Tensile Strength	ASTM D638	24.1 to 27.6 MPa (3500 to 4000 psi)
Axial Compression	ASTM D695	55.2 MPa (8000 psi)
Pot Life	ASTM D2471	40 mins min. @ 25°C
Flash Point	ASTM D56	65.5°C
Tensile Strength, 24 hr	ASTM D638	20.7 MPa (3000 psi)
Axial Compression, 24 hr	ASTM D695	44.8 MPa (6500 psi)

The adhesive product for the end caps shall be provided by the elastomeric seal manufacturer as part of this Work.

.3 Profile Conditioning Agent

Profile conditioning agent shall be provided by the elastomeric seal manufacturer as part of this Work.

.4 Concrete Cleaner

Concrete cleaner shall be provided by the elastomeric seal manufacturer as part of this Work.

Concrete cleaner as approved by manufacturer.

.5 Other Components, Materials, Accessories and Equipment

All other components, materials, accessories and equipment pre-approved by seal product manufacturer, as required for the work

.3 SEPARATION JOINT COVER PLATE

.1 Cover Plate System

Provide a molded elastomeric hinged cover plate system that is capable of spanning joint opening based upon movement requirements. The cover plate shall provide a smooth transition between opposing slabs at the separation joint for vertical and horizontal displacements. The cover plate shall have extruded ethylene propylene diene monomer (EPDM) with independent steel plates for reinforcement. It shall comply with ADA guidelines. The cover plate shall be 305 mm wide, and designed to span 133 mm under service loads and 152 mm under seismic loads.

See drawing 001 for the hinged cover plate requirements.

.2 Components and Materials

.1 EPDM Rubber Cover

The rubber cover plate shall be black in colour. The top surface of the cover profile shall be non-slip.

The material shall have the following properties:

Physical Properties	Test Methods	Min. Requirements
Tensile Strength	ASTM D412	10.4MPa (1500psi)
Ultimate Elongation	ASTM D412	350%
Hardness Shore A 7 days @ -10°C	ASTM D2240	60 +/- 5
Heat Resistance, 70 hrs. @ 100°C Tensile Strength Change Ultimate Elongation Change Hardness Change	ASTM D573	- 25% max - 25% max + 10 pts max
Oil Resistance, 70 hrs. @ 100°C Volume Change	ASTM D471	+ 120% max
Ozone Resistance 50 pphm for 70 hrs @ 40°C	ASTM D518	100 quality retention rating
Compression Set, 22 hrs @70°C	ASTM D395	+ 50% max

.2 Metal Plates

Manufacturer approved metal plates of 4.76 mm (3/16") thick with standard 1.83 m (6 ft) length.

.3 Concrete Anchors

Manufacturer approved heavy duty corrosion resistant anchors of 10 mm

dia. x 70 mm (3/8" dia. x 2 3/4" long).

.4 Other Components, Materials, Accessories and Equipment

All other components, materials, accessories and equipment pre-approved by seal product manufacturer, as required by the work.

.4 FABRICATION

- .1 Elastomeric seals for the expansion joints and separation joint shall be new. Each type of elastomeric seal shall be provided in one continuous piece and include 10% extra length. If the elastomeric seal for the three expansion joints cannot be provided in one piece due to shipping and handling constraints, one continuous piece of elastomeric seal can be provided for each expansion joint, including 10% extra length each.
- .2 Elastomeric seal end caps, air valves, adhesives (end cap and seal), concrete cleaner, profile conditioning agent, etc. shall be new, provided in unopened weatherproof containers and/or packaging, and shall have a minimum shelf life of 16 months from time of delivery. Include quantities for the 10% extra seal length.
- .3 Elastomeric concrete component materials shall be new, provided in unopened weatherproof containers, and shall have a minimum shelf life of 16 months from time of delivery. Include quantities for the 10% extra seal length.
- .4 Hinged cover plates shall be provided in 1.829 m (6 ft) length sections, and protected in weatherproof and hard rigid packaging to prevent damage, bending, nicks, scratches etc. Field fabrication of hinged cover plates is permitted for one end face only
- .5 Concrete anchors shall be shipped in unopened manufacturer's standard cartons, and weatherproof packaging.

3 EXECUTION

.1 EXAMINATION

- .1 Inspect all construction materials for manufacturing defects and deficiencies. Inform Engineer of any anomalies or unacceptable conditions immediately upon discovery.
- .2 Inspect all concrete substrate to identify construction anomalies or concrete deterioration (cracks, delamination, spalls, honeycombing, joint damaged nosing,

etc.). Verify that conditions are acceptable for waterproofing installation in accordance with manufacturer instructions. Inform Engineer of any anomalies or unacceptable conditions immediately upon discovery.

- .3 Proceed with further work only after anomalies or unacceptable conditions have been remedied and after receipt of written approval to proceed by Engineer.

.2 FIELD QUALITY CONTROL

- .1 Contractor shall be responsible for conducting all aspects of quality control for the work.
- .2 Contractor shall coordinate with Departmental Representative and manufacturer for inspection of product installation in accordance with manufacturer's instructions and periodic site visits.
- .3 Schedule manufacturer's site visits for each type of work, at least once in each phase of the work (expansion joint and separation joint) in the presence of Engineer.

.3 EXPANSION JOINT WATERPROOFING

- .1 Existing roof surfaces adjacent to the expansion joints shall be masked with protective tapes and/or have protective sheets to prevent the build-up of repair materials and/or spillage resulting from this work on the adjacent roof surfaces.
- .2 Remove existing roofing membrane and debris from the roof surface to expose the expansion joints. Do not remove existing sealant from the joints.
- .3 Sawcut a continuous 10 mm x 15 mm section reglet in a straight and neat line along the outer edge of each blockout. See Drawing 001. Impact hammer with a small chipping bit may be used to remove the concrete only after reglets have been sawcut and provided the sawcut edges will not be damaged by chipping.
- .4 Conduct abrasive-blasting (wet or dry) of the concrete substrate (including reglets) to provide minimum CSP #2 profile and to remove contaminants and foreign matter (dirt, dust, roofing membrane, joint sealant, oil, grease, soil, etc.) from the substrate.
- .5 If contaminants or foreign matter on the concrete substrate cannot be removed by abrasive-blasting, the concrete substrate shall be ground to remove the contamination or foreign matter, and abrasive-blasting provided to the concrete surfaces again.
- .6 Clean the concrete substrate starting from one end of the expansion joint by blowing with dry oil-free compressed air after abrasive-blasting and/or vacuuming to remove water, contamination, oil, grease, foreign matters etc. from the substrate. Protect the cleaned concrete substrate from further exposure until the start of joint waterproofing.
- .7 Standing water or surface runoffs may be expected on some areas of the roof slab. Installation of dams and/or tarps may be required. Remove all dams at the completion of work.
- .8 Unpack and lay the elastomeric seal in a relaxed flat position to relieve any temporary coiling from shipment packaging, before cutting seal to the required length. Seal shall be wiped clean with manufacturer approved non-petroleum solvent cleaner.

- .9 Position elastomeric seal along the centreline of joint. Cover the top surface of the seal with duct tape to keep the seal clean during placement of the elastomeric concrete. Provide supports to hold the seal in position until blockouts are constructed.
- .10 Mix and apply bonding agent on concrete substrate to receive the elastomeric concrete header in accordance with the manufacturer's instruction. Lift flaps of the seal and brush apply a thin layer of bonding agent to the concrete surface and lay flap back down. Ensure no ponding of bonding agent occurs on the substrate.
- .11 Mix the elastomeric header in accordance with manufacturer's requirements in sufficient quantity to ensure continuous placement of the blockout without cold joints. Do not mix excessive quantity that will not be used within its pot life
- .12 Apply freshly mixed elastomeric concrete while the bonding agent on the concrete substrate is still wet. See Drawing 001 for required blockout profile and dimensions.
- .13 No construction joints are permitted in the blockouts unless approved in writing by the Engineer.
- .14 Do not cover the installed seals and blockouts until Engineer has conducted a final review of each joint.

.4 SEPARATION JOINT WATERPROOFING

All procedures shall be done in accordance to the manufacturer's instructions and requirement.

- .1 Ensure the new concrete curb is a minimum of 28 days old unless approved otherwise by manufacturer of seal joint waterproofing work.
- .2 Remove all foreign materials (dust, oil, grease, wax, membrane, moss, etc.) and unsound concrete from the concrete surfaces on both sides of the joint.
- .3 Concrete surfaces at the joint surfaces shall be parallel and dimensionally consistent, and free of cracks. All anomalies shall be repaired in accordance with requirements of manufacturer.
- 4 The concrete surfaces shall be cleaned by disc grinding or abrasive-blasting and then vacuumed or blown with dry, oil free, compressed air before the two-component epoxy adhesive is mixed and applied.
- .5. Concrete surfaces shall be wiped clean with manufacturer approved concrete cleaner immediately prior to installing the seal.
- 6 Allow seal to be uncoiled and relaxed from shipment packaging before cutting the seal cleanly and neatly to the required length in one continuous piece. No seams shall be permitted in the seal.
- .7 Cut a V-notch groove in middle rib to ensure air flow through each chamber when inflating. Seal both end caps of the profile air tight and install air valve in accordance with manufacturer's instructions. Inflate the profile and test with soapy water to assure there are no air leaks from the profile. Remove and re-install end caps if leakage occurs. Deflate before installation.
- .8 The inflated and air tested profile should be vigorously wire brushed or abrasive-blasted along the entire ribbed area that serves as the bonding surface on both sides of the joint. The ribbed area shall be aggressively scrubbed with conditioning agent

in accordance with manufacturer's instructions. Wipe the seal with Profile Conditioning Agent using a white cotton rag on both sides of the seal.

- .9 Mix the adhesive according to manufacturer's directions after all joint preparation work are complete. Apply adhesive to the concrete surfaces and outer rigid sidewalls of profile in an even manner.
- .10 Insert profile into the gap, without stress or compression. Install the top surface of profile flat and level (no sagging) at the required depth. Remove excess adhesive from joint surfaces.
- .11 Inflate profile through the air valve with a pump at 0.10 to 0.14 MPa (15 to 20 psi) unless noted otherwise by manufacturer. Apply pressurization slowly so as not to cause the joint to squeeze adhesive out of the flanges on the sides of the joint.
- .12 Maintain air pressure for a minimum of 24 hrs at 20C (or longer as required by manufacturer for lower ambient temperatures) before removing valve to bleed off air pressure.
- .13 Do not install the cover plate until a final review of the installed profile has been conducted by the Engineer.

.5 SEPARATION JOINT COVER PLATE

All procedures shall be done in accordance to the manufacturer's instructions and requirement.

- .1 Draw a neat and straight line on the concrete surface at the top of the stairs at 102 mm from the concrete edge. See Drawing 001.
- .2 Remove 13 mm (1/2") deep concrete in the marked area to install the hinged side of the cover plates. The concrete bearing surface shall be flat and smooth to provide a uniform support for the cover plates. The top of the installed cover plate shall be at the same height and level as the top of the stairs to prevent tripping hazard.
- .3 Align the new cover plates "end to end" starting with the first cover plate at 1.5 mm (1/16") from the inside surface of the east wall. Mark 1.5 mm (1/16") from the inside face of west wall on the second cover plate. Cut this cover plate neatly and accurately to allow a 1.5 mm (1/16") gap to the west wall surface.
- .4 Fasten both cover plates to the concrete using concrete anchors provided by the manufacturer
- .5 Use manufacturer approved sealant with the cover plate to fill the gaps between the cover plates and the wall surfaces.

.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning. Leave Work area clean at end of each day.
- .2 Remove traces of primer, caulking, epoxy, filler materials and other construction wastes. Clean all excess adhesive around the edges and top of the joint with a trowel or scraping tool. Using a clean rag dampened with concrete cleaner to remove

all residual epoxy from exposed concrete surfaces before the epoxy sets up.

- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.7 PROTECTION

- .1 Protect all work-in-progress and installed products and components from damage and adverse weather during construction.
- .2 Repair damage to adjacent structures caused by joint waterproofing work.

END OF SECTION

1 GENERAL

This section provides Health and Safety Requirements, required as part of this Contract.

2 REFERENCES

Unless specified otherwise, Health and Safety Requirements shall conform to the current edition of the following standards:

- .1 Government of Canada
Canada Labour Code, Part II
Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA):
CSA S269, Falsework and Formwork
CSA-S350, Code of Practice for Safety in Demolition of Structures.
- .4 Province of British Columbia:
Workers Compensation Act. Part 3 Occupational Health and Safety.
Occupational Health and Safety Regulation
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

3 GENERAL CONDITIONS

- .1 Provide safety barricades around work site as required to provide a safe working environment for workers and protection for pedestrian traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
- .3 Provide appropriate means by use of barricades, fences, and warning signs as required.
- .4 Secure site at nighttime as deemed necessary to protect site against entry.
- .5 Place and maintain markers and lights required to define work, stockpile and disposal areas.

4 RESPONSIBILITY

- .1 Assume responsibility as the Prime Contractor under this Contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .3 Comply with and enforce compliance by employees with safety requirements of contract documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

5 GENERAL REQUIREMENTS

- .1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.
- .3 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, revise, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .4 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

6 COMPLIANCE REQUIREMENTS

- .1 Comply with Workers Compensation Act, B.C.
- .2 Comply with Occupational Health and Safety Regulations.
- .3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.
- .4 Small Craft Harbours may terminate the Contract without liability to Small Craft Harbours where the Contractor, in the opinion of Small Craft Harbours, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .5 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

7 WORKER'S COMPENSATION BOARD COVERAGE

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

8 SUBMITTALS

- .1 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 Risk Management and Safety Procedure for possible events including but not limited to storm, fire, and fall.
- .2 Submit one copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets if requested.
- .6 Departmental Representative may review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .7 Departmental Representative review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .8 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

9 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

10 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

11 MEETINGS

- .1 Schedule and administer Health and Safety meeting prior to commencement of Work.

12 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Harbour Manager.
 - .2 Harbour Cove / Winford Properties Property Manager

- .3 City of Vancouver
- .4 Port of Vancouver
- .5 Departmental Representative

13 UNFORESEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

14 HEALTH AND SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-Ordinator. Health and Safety Co-Ordinator must:
 - .1 Have site-related working experience specific to activities associated with the repairs.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work.

15 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

16 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

17 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

END OF SECTION

Appendix: For Information Purposes Only