Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises:

.1 Structural repairs of extent of garage slab on grade as noted on drawings.

.2 Structural repairs of edges of drainage trench within garage slab as noted on drawings.

For the Winnipeg Transit Maintenance Garage located at 421 Osborne Street.

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with the National Building Code of Canada (NBC) including all amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of Contract documents, specifications, as specified standards, codes and referenced documents, latest editions.

1.3 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Contract Administrator.

.2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Contract Administrator, in writing, any defects which may interfere with proper execution of Work.

1.4 WORK SEQUENCE

.1 Construct Work in stages to accommodate City Of Winnipeg's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with City Of Winnipeg occupancy during construction.

.3 The intent of the contract is to carry out the Work in the months of July and August of 2016.

.4 Construct Work in stages to provide for continuous usage. Do not close off usage of facilities unless alternate usage is provided.

.1 The Contractor will be restricted in the number of bus lifts being restricted for use adjacent to area of work to two total.

.1 Work adjacent to bus lift areas must proceed more or less continuously, to limit the amount of time bus lifts are restricted for use.

.5 Contractor is to allow for time in his schedule for the City Of Winnipeg to vacate areas adjacent to construction, areas affected by construction activities.

1.5 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work, for storage, and for access, to allow:

.1 City Of Winnipeg occupancy.

.2 Work by other Contractors.

.3 Continuous usage.

.2 Co-ordinate use of premises under direction of Contract Administrator.

.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Contract Administrator.

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.6 CITY OF WINNIPEG OCCUPANCY

.1 City Of Winnipeg will occupy premises during entire construction period for execution of normal operations.

.2 Co-operate with City Of Winnipeg in scheduling operations to minimize conflict and to facilitate City Of Winnipeg usage.

1.7 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Contract Administrator to facilitate execution of work.

1.8 EXISTING SERVICES

.1 Notify, City Of Winnipeg and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves connecting to existing services, give City Of Winnipeg minimum 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions.

.3 Where unknown services are encountered, immediately advise Contract Administrator and confirm findings in writing.

.4 Protect, relocate or maintain existing active services.

1.9 DOCUMENTS REQUIRED

.1 Maintain at job site one copy of each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 Change Orders.
.6 Other Modifications to Contract.
.7 Field Test Reports.
.8 Copy of Approved Work Schedule.
.9 Health and Safety Plan and Other Safety Related Documents including:
  .1 Material data sheets (MSDS) on all products used in Project.
.10 Other documents as specified.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 11 00 – Summary of Work.

1.2 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, in accordance with relevant municipal, provincial and other regulations.

1.3 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Contract Administrator to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.5 Keep within limits of work and avenues of ingress and egress.

1.4 WORKING HOURS

.1 Working hours for concrete demolition or other work process deemed to be excessively noisy or disruptive will be restricted to between 2:00p.m. and 7:00a.m. Monday through Friday.

.2 Working hours for all other work process will be allowed to take place at all hours of day Monday through Friday, subject to allowing for continual operation within the premises.

.3 Notwithstanding the above, all Work shall be completed in conformance with City of Winnipeg Neighbourhood Liveability By-Law No. 1/2008.

.4 Notwithstanding the above, all Work shall be completed in conformance with the City of Winnipeg Noise Control By-Law No. 2480/79.

1.5 SPECIAL REQUIREMENTS

.1 Coordinate work with City Of Winnipeg operations to provide for continuous City Of Winnipeg usage. Do not close off access to facilities until proper notification has be provided to both the Contract Administrator and City Of Winnipeg and will provide alternate usage/access if necessary.

.2 Contractor to propose phasing layout based on maximum permissible temporary closing of bus lifts. Prior to mobilization, submit a construction schedule coordinated with the proposed phasing layout(s).

.3 All concrete removal and infill work is to be limited to single bays of approximately 25ftx30ft in dimension maximum.

.4 All work which interferes with the normal operation of the facility and/or require closures will have to be precisely coordinated with City Of Winnipeg.

.1 The allowable bus lift closures must not exceed four, with two on each side of central trench, during all portions of work.

.5 Ensure that Contractor personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.6 Keep within limits of work and avenues of ingress and egress.

1.6 BUILDING SMOKING ENVIRONMENT

.1 Smoking is not allowed.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 92 10 – Top Surface Concrete Repairs.

.2 Section 03 99 10 – Slab On Grade Replacement.

1.2 CASH ALLOWANCES FOR TESTING, EXAMINATION

.1 Include in Contract Price, allowances to cover costs of Site and laboratory testing and examination listed.

.2 Tests and testing requirements, as specified shall be carried out by independent examining, testing companies, as appointed by the Contractor and acceptable to the Contract Administrator.

.3 Obtain quotations from examining and testing companies and submit to Contract Administrator for review.

.4 Pay all costs for specified examination, testing work performed by independent examining and testing companies, from cash allowance specified.

.5 The invoices for work performed by the specialist examining and testing companies shall be directed to the Contractor, and forwarded with monthly request for payment. Invoices will be processed onto a Change Order periodically to formalize an expenditure from the Cash Allowance.

.6 Cash Allowance is for payment of examining, testing company invoices only. Contractor costs for Site supervision and coordination is deemed to be part of overhead included in the Total Estimated Contract Price.

.7 Specific testing requirements are outlined in respective technical Sections. Materials failing to meet specified requirements shall be replaced or repaired and retested as directed by Contract Administrator, with all costs involved in retesting borne by the Contractor.

.8 Include testing/examination allowances, as specified in the Bid Opportunity 304-2016, Form B, for:

.1 Materials Testing Cash Allowance

.2 Slab On Grade Soil Support Void Detection Allowance

1.3 ADJUSTMENTS OF CASH ALLOWANCES

.1 Contractor shall not exceed Cash Allowances without authority from Contract Administrator. Contractor will not be allowed expenses or profit on overage unless authority for over expenditure is obtained. Over expenditure of Cash Allowances may, at Contract Administrator's discretion, be deducted from sums of money due Contractor, should Contractor exceed allowance without authority from the Contract Administrator.

.2 Adjustments to the Cash Allowances will be made by a written Change Order, signed by the City Of Winnipeg, or as amendments to the Contract at the time of final payment, on the basis of submitted net cost invoices.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PRECONSTRUCTION MEETING

.1 Within 5 working days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of City of Winnipeg, Contract Administrator, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedule.

.3 Submission of shop drawings, concrete mix statements, samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, Site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.7 Delivery schedule of specified materials.

.8 City Of Winnipeg provided products.

.9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.10 Monthly progress claims, administrative procedures, photographs, hold backs.

.11 Appointment of inspection and testing agencies or firms.

.12 Insurances, transcript of policies.

1.2 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings at biweekly intervals.

.2 Contractor, major Subcontractors involved in Work, Contract Administrator and City Of Winnipeg's representative are to be in attendance.

.3 Contract Administrator will be responsible for recording minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 working days after meeting.

.4 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-Site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REQUIREMENTS

.1 Ensure Schedule is practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Contract Administrator within 7 working days of Award of Contract Bar (GANTT) Chart for planning, monitoring and reporting of project progress.

1.3 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Contract Administrator will review and accept/return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will be used as baseline for updates.

1.4 PROJECT SCHEDULE

.1 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

.1 Award.

.2 Mobilization.

.3 Slab-on-grade repairs (as per phasing).

.4 Concrete repairs (as per phasing).

.5 De-mobilization.

.2 Provide commentary and/or alternative Project Schedules to dictate potential changes to overall project schedule based on acceptance of specific Fixed Add and Unit Add price items as per Section 00 41 13 – Bid Form.

1.5 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on biweekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.6 PROJECT MEETINGS

.1 Discuss Project Schedule at regular progress meetings, identify activities that are behind schedule and provide measures to regain schedule slippage. Activities considered

behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 20 00 – Concrete Reinforcing.

.2 Section 03 92 10 – Top Surface Repairs.

.3 Section 03 99 10 – Slab On Grade Replacement.

.4 Section 07 92 10 – Concrete Joint Sealants.

1.2 ADMINISTRATIVE

.1 Submit to Contract Administrator submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be considered rejected and will be returned without being examined.

.4 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.5 Verify field measurements and affected adjacent Work are co-ordinated.

.6 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.

.8 Keep one reviewed copy of each submission on Site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Manitoba, Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment,

indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 working days for Contract Administrator's review of each submission.

.5 Adjustments made on shop drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.6 Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.

.7 After Contract Administrator's review, distribute copies.

.8 Submit electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Contract Administrator may reasonably request.

.9 Submit electronic copy in PDF format of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where shop drawings will not be prepared due to standardized manufacture of product.

.10 Delete information not applicable to project.

.11 Supplement standard information to provide details applicable to project.

.12 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.4 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Contract Administrator's business address.

.3 Notify Contract Administrator in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is a criterion, submit full range of samples.

.5 Adjustments made on samples by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing prior to proceeding with Work.

.6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

.1 Erect mock-ups in accordance with Section 01 45 00 - Quality Control.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit proof of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 21 00 – Allowances.

1.2 INSPECTION

.1 Allow Contract Administrator 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 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator instructions, or law of 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 Contract Administrator 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.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged for purpose of inspecting and/or testing portions of Work. Cost of such services will be paid by the Contractor via the testing cash allowance.

.2 Allocated costs: to Section 01 21 00 - Allowances.

.3 Provide equipment required for executing inspection and testing by appointed agencies.

.4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.5 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no cost to City Of Winnipeg. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work.

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

.1 Notify appropriate agency 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.

1.6 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 Contract Administrator 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 the Contract Administrator it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, City Of Winnipeg 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 Contract Administrator.

1.7 REPORTS

.1 Submit copies of inspection and test reports to City Of Winnipeg and Contract Administrator.

.2 Provide copies to Subcontractor of work being inspected or tested, and manufacturer or fabricator of material being inspected or tested.

.3 Provide copies of concrete test results to Concrete Supplier.

1.8 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 Contract Administrator and may be authorized as recoverable.

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Specification Sections required to provide mock-ups.

.2 Construct in locations acceptable to Contract Administrator and as specified in specific Section.

.3 Prepare mock-ups for Contract Administrator's review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Mock-ups may remain as part of Work.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.10 MILL TESTS

.1 Submit mill test certificates as requested.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from Site all such work after use.

1.2 WATER SUPPLY

.1 The City Of Winnipeg will make available, for the extent that it is available, a supply of potable water for construction use at no charge to the Contractor.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

.3 The Contractor shall provide all necessary hoses, lines, connections, and other ancillary hardware which may be required.

.4 The services are to be returned to their original condition at the temporary locations, or left in an altered condition only as approved by the City Of Winnipeg.

1.3 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

.1 Facilitate progress of Work.

.2 Protect Work and products against dampness and cold.

.3 Prevent moisture condensation on surfaces.

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.5 Ventilating:

.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.

.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.

.5 Ventilate temporary sanitary facilities.

.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.7 Maintain integrity of building security and fire exits.

.6 Permanent heating system of building, may be used for heating. Be responsible for damage to heating system if use is permitted.

.7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.4 TEMPORARY POWER AND LIGHT

.1 The City Of Winnipeg will make available, for the extent that it is available temporary power during construction for temporary lighting and operating of power tools.

.2 Connect to existing power supply in accordance with Canadian Electrical Code.

.3 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.

.4 Temporary power for equipment requiring in excess of that available on-Site is responsibility of the Contractor.

.5 Provide and maintain temporary lighting throughout project.

1.5 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for cellular telephone for Site superintendent and use of Contract Administrator.

1.6 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on Site.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SITE STORAGE/LOADING

.1 Confine work and operations of employees to Contract Documents. Do not unreasonably encumber premises with product or equipment.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.2 CONSTRUCTION PARKING

.1 Parking will be permitted on site and within the maintenance garage after hours, provided it does not interfere with normal garage operations, access by tenants or the public, or disrupt performance of Work.

1.3 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof enclosures for storage of tools, equipment and materials.

.2 Materials not required are to be stored in weatherproof sheds on site in manner to cause least interference with normal operations of the garage.

1.4 SANITARY FACILITIES

.1 The Contractor may use on-site sanitary facilities for the duration of the project. The facilities must be maintained in a neat condition or use will be revoked.

1.5 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 51 00 – Temporary Utilities.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from Site all such work after use.

1.3 HOARDING

.1 The Contractor must barricade off the area under construction to prevent improper access to the construction area. Suitable barricades and protection systems include:

.1 Stanchions with a minimum of three (3) horizontal bands of fluorescent warning tape and/or snow fencing around perimeter of work area. Spacing of stanchions not to exceed 20'.

.2 All surface patches and through-slab openings not able to be completed or able to support their own weight prior to days' end are to be covered with plywood, secured and anchored to the existing slab to prevent shifting.

.1 Ensure coverings are capable of supporting a construction load of 250 PSF.

.3 Erect temporary site enclosures to provide appropriate dust containment over course of work. Maintain enclosure in good repair.

.1 Provide dust tight screens to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

.3 Provide local exhaust ventilation to enclosure as specified in Section 01 51 00 – Temporary Utilities.

.2 Repair surface coatings and/or finishes which are damaged by temporary hoardings and barricades.

.3 Provide adequate signage, fencing, etc. to inform the public of the work being undertaken.

1.4 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.6 PROTECTION OF BUILDING FINISHES

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

.1 Repair of damaged finishes or equipment may be completed by City Of Winnipeg selected Contractor(s)/supplier(s). Expenses for all such repair work to be paid for by Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.

.2 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Contract Administrator reserves right to have such products or systems tested to prove or disprove conformance.

.4 The Cost for such testing will be borne by the Contractor or Supplier.

1.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

.3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.4 Should disputes arise as to quality or fitness of products, decision rests strictly with Contract Administrator based upon requirements of Contract Documents.

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Contract Administrator at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Contract Administrator reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from Site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.

.9 Touch-up damaged factory finished surfaces to Contract Administrator's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that Contract Administrator will establish course of action. Where conflicts exist, the more stringent instruction will be enforced.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from Site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Contract Administrator, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work using specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Contract Administrator.

1.11 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by City Of Winnipeg or other Contractors.

.2 Remove waste materials from Site at daily regularly scheduled times. 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.

1.2 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 other than that caused by City Of Winnipeg or other Contractors.

.5 Remove waste materials from Site at regularly scheduled times. Do not burn waste materials on Site.

.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 existing surfaces, fixtures, and finishes within the work area or affected by the affected by the Work.

.8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.9 Remove dirt and other disfiguration from exterior surfaces.

.10 Remove construction debris from drains and pits.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Contract Administrator in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Contract Administrator's inspection.

.2 Contract Administrator's Inspection:

.1 Contract Administrator and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Contract Administrator, and Contractor.

.2 When Work incomplete according to Contract Administrator, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Contract Administrator considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of City Of Winnipeg's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Contract Administrator considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with Contractual agreement.

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This section covers the general conformance standards for all reinforcing steel required for specific concrete repair work as part of Contract.

.2 This section also covers general conformance standards for all supplemental reinforcing steel instructed to be installed on Site, dependant on extent of steel reinforcing corrosion identified.

1.2 RELATED SECTIONS

.1 Section 03 92 10 – Top Surface Repairs.

.2 Section 03 99 10 – Slab On Grade Replacement.

1.3 REFERENCES

.1 ASTM International

- .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- .2 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.2 CSA International

- .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
- .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
- .4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

.4 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 MEASUREMENT PROCEDURES

.1 Include reinforcement costs in items of concrete work in associated sections. No measurement will be made for work incorporated under this Section.

- .1 Additional reinforcing steel shown on drawings for all slab on grade replacement work, including perimeter doweling of supplementary steel to be included in slab on grade replacement fixed price.

.2 Supplemental reinforcing steel to replace significant corroded existing steel will be measured individually and will be covered by the rate per kilogram unit prices. The Contract Administrator and the Contractor will field measure and agree upon the numbers and lengths of bars. The agreed upon number will form the basis for payment.

.3 Doweling of supplemental reinforcing steel will be covered by the rate per dowel unit prices. The Contract Administrator and the Contractor will field measure and agree upon the number of bars to be doweled. The agreed upon number will form the basis for payment.

.1 The unit costs for work to include associated dowel drilling, cleaning, preparation, epoxy supply and placement, per dowel, excluding steel costs which will be covered by the rate per kilogram unit prices.

1.5 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.

.1 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

.1 Provide type B tension lap splices unless otherwise indicated.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Contract Administrator.

.2 Reinforcing steel: All reinforcing steel to be CAN/CSA-G30.18M grade 400R deformed bars except column ties and beam stirrups which shall be grade 400W.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.1 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2. All accessories to be non-corroding or epoxy coated.

.2 Mechanical splices: subject to approval of Contract Administrator.

.3 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Upon approval of Contract Administrator, weld reinforcement in accordance with CSA W186.

.3 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Contract Administrator with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Upon request inform Contract Administrator of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Contract Administrator.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Prior to placing concrete, obtain Contract Administrator's approval of reinforcing material and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 DOWELING PROCEDURES

.1 For bars that are indicated as being dowelled, drill in and grout bars into slab as follows, unless otherwise noted on drawings:

.1 10M bars, 6" (150 mm)
.2 15M bars, 8" (200 mm)
.3 20M bars, 12" (300 mm)

.2 Use only approved adhesive to manufacturer's instructions.

.1 Acceptable product:
.1 Hilti HIT HY-200 by Hilti Canada.
.2 Sikadur AnchorFix 4^{CA} by Sika Canada Inc.

.3 Clean hole thoroughly prior to application of adhesive. Use injection or caulking gun to ensure that the adhesive fills the bottom of the hole prior to embedment of bar.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section covers the removal of deteriorated concrete and surface preparation for the repair of deteriorated concrete resulting from reinforcing steel corrosion and is applicable to horizontal, vertical, and overhead repairs.

.2 The care that is exercised during the removal and preparation phases of concrete repairs can be the most important factor in determining the longevity of the repair, regardless of the material or technique used.

.3 All delaminated or deteriorated concrete must be removed down to sound concrete. The reinforcing may have to be exposed at these locations by removing additional concrete, if there is any sign of corrosion. All concrete and exposed reinforcing shall be cleaned of all corrosion by mechanical means.

1.2 RELATED SECTIONS

.1 Section 03 20 00 – Concrete Reinforcing.

.2 Section 03 92 10 – Top Surface Repairs.

.3 Section 03 99 10 – Slab On Grade Replacement.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

.1 ACI 546-04, Concrete Repair Guide.
.2 ACI RAP-5, Surface Repair Using Form-and-Pump Techniques.
.3 ACI RAP-7, Spall Repair of Horizontal Concrete Surfaces.
.4 ACI RAP-3, Spall Repair by Low-Pressure Spraying.
.5 ACI RAP-4, Surface Repair Using Form-and-Pour Techniques.
.6 ACI RAP-6, Vertical and Overhead Spall Repair by Hand Application.
.7 ACI RAP-9, Spall Repair by the Preplaced Aggregate Method.

.2 Canadian Standards Association (CSA)

.1 CSA- S448.1-10, Repair of Reinforced Concrete in Buildings.

.3 International Concrete Repair Institute (ICRI)

.1 ICRI concrete Repair Terminology (2010 Edition).
.2 ICRI Guideline No. 120.1–2009, Guidelines and Recommendations for Safety in the Concrete Repair Industry.
.3 ICRI Guideline No. 130.1R–2009, Guide for Methods of Measurement and Contract Types for Concrete Repair Work (formerly No. 03735).
.4 ICRI Guideline No. 310.1R–2008, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (formerly No. 03730).

.5 ICRI Guideline No. 310.2–1997, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays (formerly No. 03732).

1.4 MEASUREMENT PROCEDURES

.1 No measurements will be made under this Section. Refer to applicable Sections for measurement procedures for each type of repair.

1.5 DEFINITIONS

.1 Delamination: A separation along a plane parallel to a surface as in the separation of a coating from a substrate or the layers of a coating from each other, or in the case of a concrete slab, a horizontal splitting, cracking, or separation of a slab in a plane roughly parallel to, and generally near, the upper surface.

.2 Laitance: A weak layer of cement and aggregate fines on a concrete surface that is usually caused by an overwet mixture, overworking the mixture or excessive finishing, underwater concrete placement, or combinations thereof.

.3 Sounding: A technique to evaluate the condition of hardened concrete by striking the surface with a hammer; sound concrete will exhibit a clear ringing sound, whereas dull or hollow sounds indicate delaminated areas.

.4 Spall: A fragment, usually in the shape of a flake, detached from a larger mass by a blow, by the action of weather, by pressure, or by expansion within the larger mass; a small spall involves a roughly circular depression not greater than 120 mm in depth and 150 mm in any dimension; a large spall, may be roughly circular or oval or in some cases elongated, is more than 20 mm in depth and 150 mm in greatest dimension

.5 Substrate: The layer immediately under a layer of different material to which it is typically bonded; an existing concrete surface that receives an overlay, partial-depth repair, protective coating, or some other maintenance or repair procedure.

.6 Surface Preparation: The process whereby a method or combination of methods is used to remove deteriorated or contaminated concrete and roughen and clean a substrate to enhance bond of a repair material or protective coating.

.7 Surface Profile: The topographic contour of the exposed surface of a material or substrate.

1.6 QUALITY ASSURANCE

.1 Contractor Qualifications:

.1 Minimum of 5 years' experience in the repair and restoration of concrete structures.

.2 Provide minimum 5 examples of local projects demonstrating successful performance concrete repairs of similar size and complexity to specified Work within the last 3 years upon request.

.3 Site Superintendent to have a minimum of 5 years' experience exhibiting successful performance in concrete restoration projects. Provide references upon request.

.4 Ensure all personnel involved with concrete restoration is adequately trained and familiar with the requirements of this Section.

.2 Field Mock-ups (Upon Contract Administrator Request):

.1 Complete a field mock-up for each type of repair and surface preparation implemented as requested by Contract Administrator. Locations to be Site determined.

.2 Field mock-up shall be a minimum of 2 sq.ft. and incorporate all aspects of the concrete surface preparation described in this Section. Trial repairs areas shall be chosen to include exposure of embedded reinforcing steel.

.3 Field mock-up areas shall be used as a standard against which subsequent work shall be judged.

Part 2 Products

2.1 EQUIPMENT

.1 Electric or pneumatic chipping hammers are to be used for demolition within the following limits:

.1 Initial bulk removal of delaminated concrete above corroded reinforcing steel: maximum 30 lb. electric or pneumatic chipping hammers.

.2 Final removal and undercutting of reinforcing steel: maximum 15 lb. electric chipping hammers.

.1 All surface preparation of slab on grade perimeters previously saw cut, to be completed with maximum 15 lb. electric chipping hammers.

.3 Bulk removal of full depth repairs: electric or pneumatic jack hammers with weight ratings above 30 lbs. may be used upon approval by Contract Administrator.

.4 Chisel-type blades are to be used for removal only. Do not use pointed chisels for removal.

.2 Sandblast equipment shall consist of:

.1 Air compressor of sufficient capacity to drive the equipment and blast media selected.

.2 Blast media hopper (meters the media into the air stream passing through the hose and nozzle).

.3 Moisture and oil separators to insure clean, dry air supply.

.4 Blast nozzle and hose.

.5 Materials. The blast medium consistent with equipment, Site conditions, and capable of obtaining specified surface profile.

Part 3 Execution

3.1 EXAMINATION

.1 The location number and extent of repairs shown on Drawings are indicative only. Repairs areas will be identified on-Site by the Contract Administrator in the presence of and with the assistance of the Contractor. The approximately periphery of the repair will be marked on the surface of the member and the location and extent recorded on drawings.

.2 Allow time in the Schedule for survey and inspection work carried out by the Contract Administrator ahead of repairs. Provide sufficient safe access to enable review of all areas designated for repairs.

.3 The Contractor shall make available as required throughout the Contract labour to carry out the following under the direction of Contract Administrator:

.1 Identification of repairs.

.2 Sample chipping and/or drilling.

.3 Operators for access equipment.

.4 The Contractor shall make available as required throughout the Contract equipment for the use of the Contract Administrator:

.1 Marking paint and chalk.

.2 Hammer and chain for sounding surveys.

.3 Tape measure.

3.2 PREPARATION

.1 All necessary measures shall be taken to provide protection to the general public, occupants of the building.

.2 Remove or protect all surface attachments (e.g. signs, notices, electrical fittings) from the areas to be repaired or from positions that obstruct access or which may be damaged from Work.

.3 Carefully store items removed during the course of the works. Reinstall when restoration work is complete.

.4 The Contractor shall make good or rectify any damage caused as a result of insufficient protection.

.5 Provide temporary access required to facilitate Work.

3.3 CONCRETE DELAMINATION REMOVAL

.1 Refer also to Figure 1 in this Section.

.2 Remove all loose and or delaminated concrete above corroded reinforcing steel.

.3 Do not operate hammers or mechanical chipping tools at an angle in excess of 45° measured from the surface of the slab.

.4 Use chipping to extend concrete removal along reinforcing bars and ensure bars are completely free of corrosion and well bonded to the surrounding concrete. Notify Contract Administrator of increases in areas.

.5 Where the bond between existing concrete and reinforcing steel or mesh has been destroyed (either by the concrete's deterioration or corrosion of the reinforcing steel) or if the chipping operation has caused more than 1/3 the periphery of a bar to be exposed for a distance of 6 inches (150 mm) or more, the concrete adjacent to the bar shall be removed by maximum 15 lb. electric chipping hammers to provide sufficient clearance between the reinforcement and concrete.

.1 Provide a minimum 3/4 inches (20 mm) clearance, or 1/4 inch (6 mm) larger than the largest aggregate in the repair material, whichever is greater.

.6 If non-corroded reinforcing steel is exposed, do not damage the bar's bond to the surrounding concrete. If bond between the bar and concrete is destroyed, exposing the bar will be required.

.7 The perimeter of the areas marked as delaminated are to be saw cut. Feather edging is not permitted. If reinforcing steel is encountered, the saw depth must be immediately reduced as required. Check depth of the cut regularly.

.8 Ensure the entire area within the saw cut is removed to a depth consistent with the type of repair and repair material specified in other Sections.

.9 Chip patch edges to provide a clean vertical edge along the patch perimeter to the required minimum depth.

.10 Conduct soundings to determine if any further unsound or delaminated concrete is present, which must be removed.

3.4 SURFACE PREPARATION OF CONCRETE AND REINFORCING STEEL

.1 Refer also to Figure 1 in this Section.

.2 Within 24 hours prior to infilling, wire brush and vacuum, sandblast, or high pressure waterblast at a minimum 4,000 psi the substrate to remove loose and deteriorated concrete, laitance, dust, dirt, oil, and any other material that could interfere with the bond of the new concrete.

.3 Provide a uniform surface profile of ICRI-CSP-5 or better. Sample surfaces are available for inspection in the Contract Administrator's office. These samples will be used as the standard of acceptance.

.4 Surface preparation applies equally to any horizontal or vertical concrete surfaces to which the concrete is to bond.

.5 Exposed reinforcing steel to be cleaned to near white metal and free of rust for the full circumference of the bar.

.6 Secure any reinforcement which is loose by tying to other secured bars or by other methods approved by Contract Administrator.

.7 Vacuum clean surface and/or air blast with oil free compressed air to remove residue and spent media created by surface preparation.

.8 Maintain substrate in a clean condition using polyethylene film until the patch material is ready to be placed.

.9 After all surface preparation is complete the Contractor shall request an inspection from the Contract Administrator to review the existing reinforcing steel.

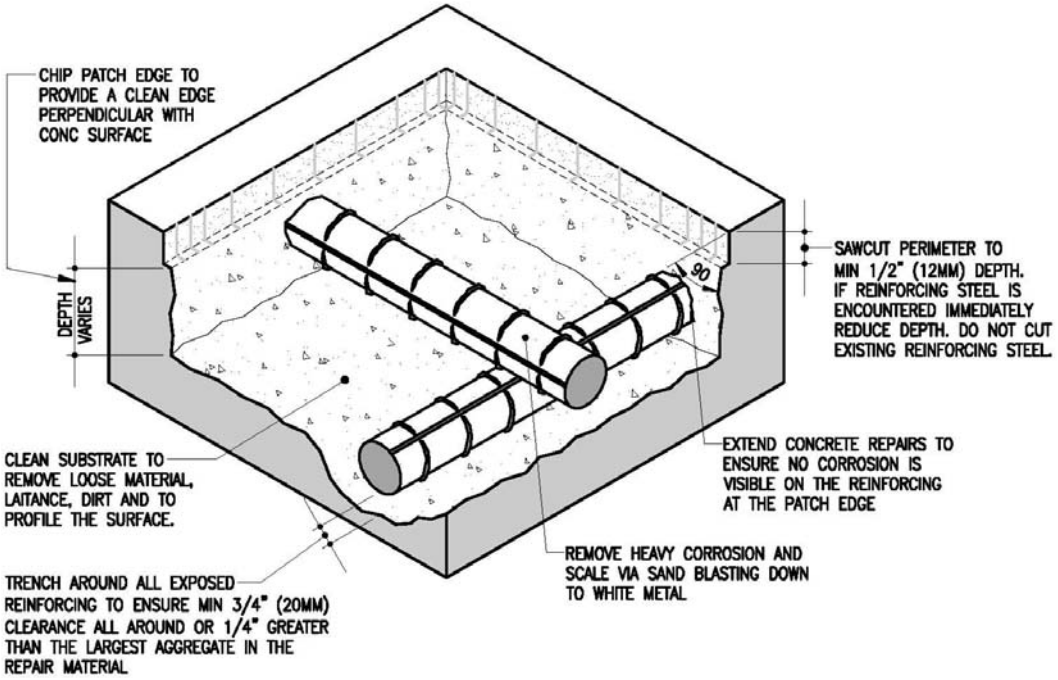
.1 The purpose of this inspection is to provide assurance that all heavy corrosion and scale is removed from the bar. At that time, the Contract Administrator will review the condition of the reinforcing steel and determine if the addition of supplemental reinforcing steel will be required.

.2 At locations identified by the Contract Administrator, provide supplemental reinforcing steel to Section 03 20 00.

.3 Additionally this inspection is to provide assurance to the Contract Administrator that all loose material has been removed and the substrate is sound. If any further Work is required, the Contractor is to complete it immediately.

.10 Maintain substrate in a saturated condition for a period of not less than 4 hours prior to infilling. Do not allow the concrete surface to dry. If the concrete surface becomes wet and subsequently dries, the surface preparation and cleaning procedure must be repeated.

Figure 1: Surface Preparation for Concrete Delamination Repair



3.5 FIELD QUALITY CONTROL

.1 Coordinate Site work and inspections with Contract Administrator. Provide minimum 24 hours notice.

.2 Contract Administrator inspection of surface preparation to be completed at the following times:

.1 Prior to demolition to identify and quantify repair locations and types.

.2 Following initial demolition to confirm all loose, deteriorated, or unsound concrete has been removed from the substrate.

.3 Following concrete substrate preparation to review concrete surface profile and condition of reinforcing steel.

.1 Contract Administrator to complete inspection of substrate preparation and condition of reinforcing steel prior to infill of all delamination repair areas.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 The top surface of slabs and drainage trench walls are to be repaired by mechanical removal of the deteriorated concrete and infilling with ready-mix concrete.

.2 All spalling and/or delaminated concrete must be removed down to sound concrete in accordance with Section 03 91 10.

1.2 RELATED SECTIONS

.1 Section 01 32 16 – Construction Progress Schedules.

.2 Section 03 20 00 – Concrete Reinforcing.

.3 Section 03 99 10 – Slab On Grade Replacement.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

- .1 ACI 309R-96, Guide for the Consolidation of Concrete.
- .2 ACI 360R-10, Guide for the Design of Slab-on-Ground.
- .3 ACI 546-04, Concrete Repair Guide.
- .4 ACI RAP-7, Spall Repair of Horizontal Concrete Surfaces.

.2 American Society for Testing and Materials (ASTM)

- .1 ASTM C260/C260M-10a, Specification for Air-Entraining Admixtures for Concrete.
- .2 ASTM C309-07, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C928-09, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

.3 Canadian Standards Association (CSA)

- .1 CSA-A3000-08, Cementitious materials compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .2 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- .3 CSA-A23.1/A23.1-09, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .4 CSA- S448.1-10, Repair of Reinforced Concrete in Buildings.

.4 International Concrete Repair Institute

- .1 ICRI concrete Repair Terminology (2010 Edition).
- .2 ICRI Guideline No. 120.1–2009, Guidelines and Recommendations for Safety in the Concrete Repair Industry.

.3 ICRI Guideline No. 130.1R–2009, Guide for Methods of Measurement and Contract Types for Concrete Repair Work (formerly No. 03735).

1.4 MEASUREMENT PROCEDURES

.1 All top surface repairs along the concrete slab and adjacent trench side walls will be paid as a fixed price items. With minimum concrete removal extents shown on drawings.

1.5 SUBMITTALS

.1 Provide certification that mix proportions selected will produce ready mix concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA-A23.1. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

.2 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA-A23.1. Certification letter to be sealed by an engineer registered in the Province of Manitoba.

1.6 QUALITY ASSURANCE

.1 Contractor Qualifications:

.1 Minimum of 5 years experience in application of specified (or similar) products on projects of similar size and scope.

.2 Successful completion of a minimum of 5 projects of similar size and complexity to specified Work within the last 3 years.

.2 Field Mock-up:

.1 Install field mock-up at Project Site or pre-selected area of building or location approved by Contract Administrator. Install material in accordance with this Section.

.2 Field mock-up will be standard for judging workmanship on remainder of Project.

.3 Manufacturer's representative or designated representative will review technical aspects; surface preparation, repair, and workmanship.

1.7 PROJECT CONDITIONS

.1 Environmental Requirements:

.1 When infilling with ready-mix concrete:

.1 Ensure that substrate temperature is minimum of 10°C and remains above 10°C for entire curing period. Ensure that frost or frozen surfaces are thawed and dry.

.2 When infilling with rapid-setting mortar:

.1 Ensure that substrate surface and ambient air temperature are minimum of 4°C and rising at application time and remain above 4°C for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.

.3 Ensure that substrate surface and ambient air temperature are below of 32°C and remain below 32°C for at least 8 hours after application.

.4 Do not apply material if snow, rain, fog, and mist are anticipated within 12 hours after application. Allow surfaces to attain temperature and conditions specified before proceeding with application.

1.8 ABBREVIATIONS

.1 Cement: hydraulic cement or blended hydraulic cement (XXb - where b denotes blended).

.1 Type GU or GUb - General use cement.

.2 Type CI - with CaO content ranging from 8 to 20%.

.2 SCM – Supplemental cementing materials.

.3 SSD - Saturated surface dry.

.4 WRA – Water reducing agent.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Comply with Section 01 61 00.

.2 Concrete hauling time: maximum allowable time for concrete to be delivered to Site of Work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to Contract Administrator and concrete producer as described in CSA A23.1/A23.2. Deviations to be submitted for review by Contract Administrator.

.3 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.4 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.5 Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

.6 Keep materials in manufacturer’s original, unopened containers and packaging until installation.

.7 Protect materials during storage, handling, and application to prevent contamination or damage.

Part 2 Products

2.1 MATERIALS

.1 Ready Mix Concrete:

.1 The ready mix concrete constituents shall comply with the following standards:

.1 Hydraulic cement: to CAN/CSA-A3001.

.2 Blended Hydraulic cement: to CAN/CSA-A3001.

.3 Supplementary cementing materials: to CAN/CSA-A3001.

.4 Water: To CSA-A23.1.

.5 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density.

.6 Air entraining admixture: ASTM C260.

.7 Chemical admixtures: ASTM C494/C494M. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather.

.2 Mix Requirements

.1 Proportion normal density concrete in accordance with CSA-A23.1, Table 5, Alternative 1 to obtain the following performance:

.2 Minimum compressive strength at 28 days: 32 MPa.

.3 Class of exposure: C-1

.4 Air category: 1 (5 to 8%)

.5 Supplemental Cementing Materials (SCM): Class CI Fly-Ash.

.6 Volume of SCM: Normal (less than 30% replacement).

.7 Nominal size of coarse aggregate: 20 mm.

.8 Slump at point of discharge: consistent with placement and consolidation methods, equipment, and Site conditions and as approved by Contract Administrator.

.2 Bonding Slurry – Ready Mix Concrete:

.1 The bonding slurry shall consist of a cement/sand grout mixed in a 1:1 ratio by weight to a maximum water/cement ratio of 0.40 in accordance with CSA-A23.1 and as follows:

.1 1.0 kg Type GU to CSA A3001.

.2 1.0 kg SSD concrete sand to CSA A23.1.

.3 0.40 kg Water to CSA A23.1.

.4 MRWRA or HRWRA to ASTM C494/C494M as required and approved by Contract Administrator.

.5 Volume batching will be permitted provided the volumes are calibrated by weight prior to batching. The measuring containers shall be clearly labeled, indicating material type, calibrated weight of material, and calibrated volume. The Contract Administrator reserves the right to randomly check batch weights.

.6 Shovel batching is strictly prohibited.

.2 Alternative Method: Utilize plastic concrete from same mix utilized for overlying concrete as bonding slurry.

.1 Scrub plastic concrete.

.2 Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8” over entire area.

.3 Collect and remove all coarse aggregate prior to placement of the overlay.

2.2 ACCESSORIES

.1 Supplemental Reinforcing: to Section 03 20 00 – Concrete Reinforcing.

.2 Evaporation Retardant:

.1 MasterKure ER 50, (formerly Confilm) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.3 Cure And Sealing Compound:

.1 Properties

.1 Compliance: ASTM C309, Type 1.

.2 Acceptable product(s):

.1 Florseal WB by Sika Canada Inc. at a minimum application rate of 4.9 m²/L.

.2 MasterKure CC 160 WB (formerly Kure-N-Seal WB) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

Part 3 Execution

3.1 PREPARATION

.1 Protect adjacent Work areas and finish surfaces from damage during repair materials application.

.2 Surface Preparation:

.1 Complete to Section 03 91 10 – Surface Preparation for Concrete Delamination Repairs.

.2 Provide a uniform surface profile of ICRI-CSP-5 or better. Sample surfaces are available for inspection in the Contract Administrator's office. These samples will be used as the standard of acceptance.

.3 The extent of concrete adjacent to and within the area of repair are to be determined to be sound by the Contract Administrator with the Contractor in attendance.

.4 Within 24 hours prior to infilling, shotblast/sandblast the substrate to remove loose and deteriorated concrete, laitance, dust, dirt, oil, and any other material that could interfere with the bond of the new concrete.

.5 Vacuum clean surface and/or air blast with oil free compressed air to remove residue and spent media created by surface preparation.

.6 Maintain substrate in a clean condition using polyethylene film until the overlay is ready to be placed.

.7 The repair area must be thoroughly cleaned and well soaked prior to infilling. The surface should be thoroughly wetted for a period of not less than two (2) hours. The repair areas shall be kept continuously wet until just before infilling. Any standing water must be removed prior to grouting.

.8 Maintain the substrate in a saturated, surface-dry (SSD) condition with no surface water, and concrete that is turning from dark to light.

.9 Obtain Contract Administrator's approval before placing concrete. Provide 24 hours notice prior to placing of concrete.

.10 Forming:

.1 Unless otherwise indicated provide plywood formwork to match existing profiles.

.2 Install chamfers at outside corners and filets at inside corners or to match existing profiles.

.3 Design formwork to accommodate the mass and pressure of the repair material and construction live loads.

.4 Securely anchor formwork to substrate. Anchors to be sized and space to prevent deflection of the forms during placement and curing.

.5 Construct forms to fit tightly against existing concrete surfaces.

.6 Anchors shall be completely removable. All anchor holes shall be patched with same grout mixed to dry pack consistency. Completely fill all anchor holes.

.7 A minimum of 30 mm concrete cover over the primary reinforcing steel will be required. Thus, an adjustment of the formwork such as a notch may be required to ensure sufficient cover.

.8 Use form-release agent to facilitate removal of forms from cast material.

.9 Test formwork for leaks. Any areas of leakage are to be sealed prior to placement of repair material. Re-test as required.

.10 Ensure forms are pre-wet prior to repair material infill.

3.2 INFILLING PROCEDURES

.1 Obtain Contract Administrator's approval before placing repair material. Provide minimum 24 hours notice.

.1 Request a final inspection from the Contract Administrator. This inspection shall be done in the presence of the Contractor, who shall complete any further work at the time of the inspection.

.2 Maintain the substrate in a saturated surface-dry (SSD) condition with no surface water, and concrete that is turning from dark to light.

.3 Concrete to be mixed, delivered and placed in accordance with CSA-A23.1.

.4 Transport and place concrete by pump or trolley.

.5 Bonding Slurry Application:

.1 The bonding slurry shall be consistent with the type of material used as specified in this section.

.2 Apply the bonding slurry to a saturated surface dry (SSD) substrate with no standing water and dry to the touch. A SSD substrate typically exhibits a colour change of dark grey to light grey. Remove standing water by vacuuming.

.3 Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8” over entire area. Collect and remove all coarse aggregate prior to placement of the concrete.

.1 Alternatively, bonding slurry may be pressure sprayed directly into substrate.

.4 Place concrete while the bonding slurry is still plastic. Do not apply more slurry than can be covered with concrete before it dries. Do not retemper. If the bond slurry dries prior to placement of the concrete, removal of the dried slurry will be required. The concrete surface will then be cleaned and prepared in accordance with the requirements described in the previous sections.

.6 When concrete is placed by pump, the initial slurry used to prime the pump shall not be incorporated into the topping. The slurry shall be trapped and disposed off-Site.

.7 Immediately place repair material, into the prepared patch area from one side to the other. Work the repair material firmly into the bottom and sides of the patch, and underneath reinforcing steel, to assure good bond.

.8 Ensure that rate of placing is sufficient to complete proposed placing, finishing and curing operations within scheduled time. Limit batch sizes as required if placing procedures are slower than anticipated.

.9 The addition of water ready-mix concrete to increase slump is strictly prohibited. The use of a high range water reducing agent (HRWRA) may be required to aid in placement of the concrete and obtain adequate consolidation in heavily reinforced sections. Site addition HRWRA will be the responsibility of the concrete supplier.

.10 Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur. Install a construction dam or bulkhead in case of a delay longer than 60 minutes. During delays between 5 and 60 minutes, protect the end of the placement with damp burlap.

.11 Ready-mix concrete must be internally vibrated by means of standard immersion “pencil” vibrators meeting the requirements of ACI 309R. Pencil vibrators must be used in all delamination and through slab repair areas.

.1 The maximum layer depth of fresh concrete should be limited to 10 inches (250 mm) and/or approximately equal to the vibrator head length.

.12 Vibrate the form while pumping, as required, to achieve flow and compaction.

.13 Continuously consolidate and finish to matching elevations, ensuring patch thickness and required elevations are maintained.

.14 Ensure reinforcement, floor drains, inserts, etc. are not disturbed during concrete placement.

3.3 FINISHING

.1 Following consolidation and screeding, the surface shall be immediately floated to close and smooth the surface to required finish.

.2 Provide a smooth floated finish free of ridges to match existing.

.3 Hard trowelling the final finished surface shall not be allowed.

.4 The surface finish provided on the mock-up will be the standard of acceptance and will be used to ascertain acceptability of the finish.

.5 Apply evaporation retardant at manufacturers recommended coverage rate immediately following final finishing. Do not apply evaporation retardant during any finishing operation nor should it be worked into the surface.

.6 Protect freshly placed concrete from exposure to dust, debris and precipitation.

3.4 CURING

.1 Concrete repairs to be wet cured for the following minimum periods:

.1 When infilled with ready-mix concrete: minimum of 7 days at 10°C or time to reach 70% strength.

.2 Provide supplemental heat and hoarding as required throughout curing period.

.2 Immediately after final finishing, apply evaporation retardant to prevent drying shrinkage until the concrete has enough strength to support the placement of the wet burlap.

.3 Wet curing with burlap and water must be maintained throughout entire wet curing period. All alternative wet curing methods proposed to be submitted to Contract Administrator for approval prior to repair material placement.

.4 Burlap to be thoroughly presoaked by immersing it in water for a period of at least 24 hours immediately prior to placement.

.5 Commence wet curing as soon as the surface will support the weight of the wetted burlap without deformation. Burlap to be applied in one layer with strips overlapping at least 3" and be securely held in place without marring the concrete surface.

.6 Workers shall not be allowed on the curing repair materials for 12 hours after placement. Do not place load upon new concrete until curing period is over.

.7 Leave any required formwork in place and continuously wet forms over course of curing period specified.

.8 Should forms be removed prior to end of curing period, apply two coats curing compound to all surfaces not wet curing in accordance with manufacturer's specifications.

.1 Apply the first coat immediately upon removal of forms.

.2 Apply the second coat about 24 hours later.

.3 All surfaces to receive membrane/waterproofing application to have residual cure and seal compound must be removed via sandblasting/shotblasting.

3.5 FINAL FINISHING

.1 After stripping of formwork as required, any spaces not filled should be trimmed, cleaned, and dry-packed with grout to the desired profile. Do not proceed with repairs without Contract Administrators written approval.

3.6 JOINTS

.1 Install control joints at locations to match existing.

.2 Control joints to be formed while concrete is still plastic or alternatively saw cut via specialized dry-process cutting (e.g. "Soff Cut") to a minimum of one (1) inch (25 mm).

.1 Timing of the dry-process saw cutting will vary with weather conditions however are typically completed within 1 to 4 hours after final finishing. Timing of the saw cutting will be the responsibility of the Contractor.

.2 Saw cutting 24 hours following placement will not be permitted.

.3 Following a minimum 28 days cure, re cut joints to 1/2" wide x 1/2" deep. Clean joints, install bond breaker tape, and infill joints with approved sealant in accordance with manufacturer's recommendations.

3.7 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CSA-A23.1 and Section 01 45 00 - Quality Control and as described herein.

.2 The Contractor will pay for costs of tests via the testing cash allowance as per Section 01 2 10 - Allowances.

.3 Not less than one test per 50 square feet of patching material placed and not less than one test for each day of placement.

.4 Direct pull-out tensile tests to determine bond strength will be completed upon Contract Administrator Request throughout the course of the work at intervals in general accordance with the following:

.1 Two (2) tests will be completed within the first phase of repairs.

.2 Not less than one (1) bond test will be completed in each phase.

.3 The Contract Administrator reserves the right to take additional bond tests if concrete or bonding system is suspect.

.4 Infilling of the core hole will be the responsibility of the General Contractor. Unless otherwise directed by the Contract Administrator, repair in accordance with this Section.

.5 Testing agency to submit copies of concrete test reports directly to City Of Winnipeg and Contract Administrator.

.6 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve Contractual responsibility.

3.8 DEFECTIVE CONCRETE

.1 Defective concrete: bond strengths below minimum specified value, cracking, spalling, scaling and concrete not conforming to required lines, details, dimensions, tolerances, finishes or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Contract Administrator, based on the specifications and the above guidelines.

.3 Do not patch, fill, touch up, repair or replace exposed concrete except upon express direction of Contract Administrator for each individual use.

3.9 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Ensure concrete slurry does not enter drainage system.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 20 00 – Concrete Reinforcing.

.2 Section 03 92 10 – Top Surface Repairs.

.3 Section 07 92 10 – Concrete Joint Sealants.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)

.1 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)

.3 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.2 American Concrete Institute (ACI)

.1 ACI 309R-96, Guide for the Consolidation of Concrete.

.3 American Society for Testing and Materials International (ASTM)

.1 ASTM C260/C260M-10a, Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C494/C494M-10a Standard Specification for Chemical Admixtures for Concrete.

.3 ASTM C1116/C1116M-10a, Standard Specification for Fiber- Reinforced Concrete.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.5 City of Winnipeg Standard Construction Specifications

.1 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction.

1.3 MEASUREMENT PROCEDURES

.1 Slab-on-grade replacement will be completed as a fixed price item. Refer to drawings for extents of slab on grade replacement.

1.4 QUALITY ASSURANCE

.1 Contractor Qualifications:

.1 Minimum of 5 years' experience in application of specified (or similar) products on projects of similar size and scope.

.2 Successful completion of a minimum of 5 projects of similar size and complexity to specified Work within the last 3 years.

.2 Field Mock-up:

.1 Install field mock-up at Project Site or pre-selected area of building or location approved by Contract Administrator. Install material in accordance with this Section.

.2 Field mock-up will be standard for judging workmanship on remainder of Project.

.3 Manufacturer's representative or designated representative will review technical aspects; surface preparation, repair, and workmanship.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Comply with Section 01 61 00.

.2 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.3 Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

.4 Keep materials in manufacturer's original, unopened containers and packaging until installation.

.5 Protect materials during storage, handling, and application to prevent contamination or damage.

1.6 PROJECT CONDITIONS

.1 Environmental Requirements:

.1 Ensure that ambient air temperature are minimum of 4°C and rising at application time and remain above 4°C for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.

.2 Ensure that ambient air temperature are below of 32°C and remain below 32°C for at least 8 hours after application.

.3 Do not apply material if snow, rain, fog, and mist are anticipated within 12 hours after application. Allow surfaces to attain temperature and conditions specified before proceeding with application.

Part 2 Products

2.1 MATERIALS

.1 Ready Mix Concrete:

.1 The ready mix concrete constituents shall comply with the following standards:

.1 Hydraulic cement: to CAN/CSA-A3001.

.2 Blended Hydraulic cement: to CAN/CSA-A3001.

.3 Supplementary cementing materials: to CAN/CSA-A3001.

.4 Water: To CSA-A23.1.

.5 Aggregates: to CSA-A23.1. Coarse aggregates to be normal density.

.6 Air entraining admixture: ASTM C260.

.7 Chemical admixtures: ASTM C494/C494M. Contract Administrator to approve accelerating or set retarding admixtures during cold and hot weather.

.2 Mix Requirements

.1 Proportion normal density concrete in accordance with CSA-A23.1, Table 5, Alternative 1 to obtain the following performance:

.2 Minimum compressive strength at 28 days: 35 MPa.

.3 Class of exposure: C-1

.4 Air category: 1 (5 to 8%)

.5 Supplemental Cementing Materials (SCM): Class CI Fly-Ash.

.6 Volume of SCM: Normal (less than 30% replacement).

.7 Nominal size of coarse aggregate: ¾".

.8 Slump at point of discharge: consistent with placement and consolidation methods, equipment, and Site conditions and as approved by Contract Administrator.

.2 Bonding Slurry – Ready Mix Concrete:

.1 The bonding slurry shall consist of a cement/sand grout mixed in a 1:1 ratio by weight to a maximum water/cement ratio of 0.40 in accordance with CSA-A23.1 and as follows:

.1 1.0 kg Type GU to CSA A3001.

.2 1.0 kg SSD concrete sand to CSA A23.1.

.3 0.40 kg Water to CSA A23.1.

.4 MRWRA or HRWRA to ASTM C494/C494M as required and approved by Contract Administrator.

.5 Volume batching will be permitted provided the volumes are calibrated by weight prior to batching. The measuring containers shall be clearly labeled, indicating material type, calibrated weight of material, and calibrated volume. The Contract Administrator reserves the right to randomly check batch weights.

.6 Shovel batching is strictly prohibited.

.2 Alternative Method: Utilize plastic concrete from same mix utilized for overlying concrete as bonding slurry.

.1 Scrub plastic concrete.

.2 Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8" over entire area.

.3 Collect and remove all coarse aggregate prior to placement of the overlay.

2.2 GRANULAR BASE

.1 Granular base material must conform to Government of Manitoba Department of Highways A base designation. Material must be free from clay clumps, cementitious or organic material, frozen material, and other deleterious materials.

2.3 ACCESSORIES

.1 Reinforcing: to Section 03 20 00 – Concrete Reinforcing.

.2 Vapour Barrier: 10 mil polyethylene film to CAN/CGSB-51.34.

.3 Evaporation retardant:

.1 MasterKure ER 50 (formerly Confilm) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.4 Cure and Sealing Compound:

.1 Properties

.1 Compliance: to ASTM C309, Type 1.

.2 Acceptable product(s):

.1 Florseal WB by Sika Canada Inc. at a minimum application rate of 4.9 m²/L.

.2 MasterKure CC 160 WB (formerly Kure-N-Seal WB) by BASF Building Systems at a minimum application rate of 4.9 m²/L.

.5 Sealants: to Section 07 92 10.

Part 3 Execution

3.1 DEMOLITION AND REMOVAL

.1 Demolition and removal of the slab-on-grade must be completed by full depth wet sawcutting to permit removal of the concrete in larger sections without the use of chipping hammers. Maximum length of removal immediately adjacent to building foundation is **not** to exceed 15 feet. All slurry and water from the cutting process must be vacuumed. Slurry must not be allowed to flow to adjacent areas or to space below.

.2 The existing slabs-on-grade are conventionally reinforced with two layers of welded wire reinforcing and is 8" thick. Note that the thickness tends to increase adjacent to columns etc. Sections of the slab including all embedded welded wire reinforcing are designated for removal and replacement. The extent of the approximate slab-on-grade replacement is shown on the drawings and will be identified on Site by the Contract Administrator.

.3 Except where full depth sawcutting is required, the perimeter of localized removal areas are to be sawcut to a depth of 1". If reinforcing steel is encountered, the saw depth must be immediately reduced as required. The depth of the cut shall be checked on a regular basis. Wet cutting is the only acceptable method. All slurry and water from the cutting process must be vacuumed. Slurry must not be allowed to flow to adjacent areas or to space below.

.4 Remove excessive subbase and subgrade material as required to meet required grades. Install new compacted granular fill.

3.2 INSTALLATION OF GRANULAR BASE

.1 Do not place granular base until finished surface is inspected and approved by Contract Administrator.

.2 Place using methods which do not lead to segregation or degradation of aggregate.

.3 Remove and replace that portion of layer in which material becomes segregated during spreading.

.4 Compaction equipment must be capable of obtaining required densities in materials on project.

.5 Compact to density not less than 95% maximum dry density in accordance with Standard Proctor Density measurement procedures.

.6 Apply water as necessary during compacting to obtain specified density. If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.

.7 In area not accessible to rolling equipment, compact to specified density with mechanical compaction equipment approved by Contract Administrator.

.8 Finished base surface to be within plus or minus ½" of established grade and cross section but not uniformly high or low.

.9 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

.10 Install minimum 10 mil polyethylene vapour barrier over compacted granular. Lap minimum 6" with existing.

3.3 REINFORCEMENT PLACEMENT

.1 Provide 5/8" diameter smooth epoxy coated dowels drilled in and epoxy-grouted into the existing slab-on-grade at 12" on-centre all around the perimeter.

.1 Grease ends of dowels within slab on grade infill area to ensure dowel does not bond to concrete.

.2 Reinforce slab with 10M at 12" on-centre each way in two layers top and bottom unless otherwise noted.

3.4 PENETRATIONS

.1 Wrap all new or existing penetration such as drain stacks and conduit, full depth of pour with ethafoam strip.

.2 Upon minimum 28 days cure, seal around all penetrations with a 3/4" filet of sealant to Section 07 92 10.

3.5 SURFACE PREPARATION

.1 Protect adjacent Work areas and finish surfaces from damage during repair materials application.

.2 Surface Preparation:

.1 Complete to Section 03 91 10 – Surface Preparation for Concrete Delamination Repairs.

.2 Provide a uniform surface profile of ICRI-CSP-5 or better. Sample surfaces are available for inspection in the Contract Administrator's office. These samples will be used as the standard of acceptance.

.3 The extent of concrete adjacent to the area of repair are to be determined to be sound by the Contract Administrator with the Contractor in attendance.

.4 Within 24 hours prior to infilling, shotblast/sandblast the substrate to remove loose and deteriorated concrete, laitance, dust, dirt, oil, and any other material that could interfere with the bond of the new concrete.

.5 Maintain the slab on grade perimeter edges in a saturated surface-dry (SSD) condition with no surface water, and concrete that is turning from dark to light.

3.6 INFILLING PROCEDURES

.1 Concrete to be mixed, delivered and placed in accordance with CSA-A23.1.

.2 Obtain Contract Administrator's approval before placing repair material. Provide minimum 24 hours' notice.

.1 Request a final inspection from the Contract Administrator. This inspection shall be done in the presence of the Contractor, who shall complete any further work at the time of the inspection.

.3 Bonding Slurry Application:

.1 The bonding slurry shall be consistent with the type of material used as specified in this section.

.2 Apply the bonding slurry to a saturated surface dry (SSD) substrate with no standing water and dry to the touch. A SSD substrate typically exhibits a colour change of dark grey to light grey. Remove standing water by vacuuming.

.3 Scrub plastic concrete into substrate with stiff bristled broom or brush to produce a uniform thickness of 1/8" over entire area. Collect and remove all coarse aggregate prior to placement of the concrete.

.1 Alternatively, bonding slurry may be pressure sprayed directly into substrate.

.4 Place concrete while the bonding slurry is still plastic. Do not apply more slurry than can be covered with concrete before it dries. Do not retemper. If the bond slurry dries prior to placement of the concrete, removal of the dried slurry will be required. The concrete surface will then be cleaned and prepared in accordance with the requirements described in the previous sections.

.4 When concrete is placed by pump, the initial slurry used to prime the pump shall not be incorporated into the topping. The slurry shall be trapped and disposed off-Site.

.5 Immediately place repair material, into the prepared patch area from one side to the other. Work the repair material firmly into the bottom and sides of the patch, and underneath reinforcing steel, to assure good bond.

.6 Ensure that rate of placing is sufficient to complete proposed placing, finishing and curing operations within scheduled time. Limit batch sizes as required if placing procedures are slower than anticipated.

.7 The addition of water ready-mix concrete to increase slump is strictly prohibited. The use of a high range water reducing agent (HRWRA) may be required to aid in placement of the concrete and obtain adequate consolidation in heavily reinforced sections. Site addition HRWRA will be the responsibility of the concrete supplier.

.8 Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur. Install a construction dam

or bulkhead in case of a delay longer than 60 minutes. During delays between 5 and 60 minutes, protect the end of the placement with damp burlap.

.1 Installation of temporary bridging may be required to allow access to all areas of the slab to permit placement, finishing and curing procedures to be completed.

.9 Ready-mix concrete must be internally vibrated by means of standard immersion “pencil” vibrators meeting the requirements of ACI 309R.

.10 For larger areas infilled with ready-mix concrete, use of a floating vibratory screed to consolidate the top surface of the concrete may be required. Move vibrating screed forward as rapidly as possible while allowing proper consolidation and finishing of the concrete surface. Extended use of a vibratory screed may result in segregation of the concrete producing excessive mortar at the surface which can result in a weak surface layer.

.11 Continuously consolidate and finish to matching elevations, ensuring patch thickness and required elevations are maintained.

.12 Ensure reinforcement, floor drains, inserts, etc. are not disturbed during concrete placement.

3.7 FINISHING

.1 Following consolidation and screeding, the surface shall be immediately floated to close and smooth the surface to required finish.

.2 Provide a smooth floated finish free of ridges to match existing.

.3 Hard trowelling the final finished surface shall not be allowed.

.4 Apply evaporation retardant at manufacturers recommended coverage rate immediately following final finishing. Do not apply evaporation retardant during any finishing operation nor should it be worked into the surface.

.5 Protect freshly placed concrete from exposure to dust, debris and precipitation.

3.8 CURING

.1 Concrete slab replacement areas to be wet cured for the following minimum periods:

.1 When infilled with ready-mix concrete: minimum of 7 days at 10°C or time to reach 70% strength.

.2 When infilled with rapid-setting mortar: minimum manufacturer specified time required.

.3 Provide supplemental heat and hoarding as required throughout curing period.

.2 Immediately after final finishing, apply evaporation retardant to prevent drying shrinkage until the concrete has enough strength to support the placement of the wet burlap.

.3 Wet curing with burlap and water must be maintained throughout entire wet curing period. All alternative wet curing methods proposed to be submitted to Contract Administrator for approval prior to repair material placement.

.4 Burlap to be thoroughly presoaked by immersing it in water for a period of at least 24 hours immediately prior to placement.

.5 Commence wet curing as soon as the surface will support the weight of the wetted burlap without deformation. Burlap to be applied in one layer with strips overlapping at least 3" and be securely held in place without marring the concrete surface.

.6 Workers shall not be allowed on the curing repair materials for 12 hours after placement. Do not place load upon new concrete until curing period is over.

.1 Alternatively, apply two coats of curing compound to all surfaces not wet cured over specific minimum period in accordance with curing compound manufacturer's specifications.

.1 Apply the first coat immediately following final finishing or immediately following wet curing.

.2 Apply the second coat about 24 hours later.

.3 All surfaces to receive membrane/waterproofing application to have residual cure and seal compound must be removed via sandblasting/shotblasting.

3.9 JOINTS

.1 Install control joints at locations to match existing.

.2 Control joints to be formed while concrete is still plastic or alternatively saw cut via specialized dry-process cutting (e.g. "Soff Cut") to one-third the depth of the slab on grade. Timing of the dry-process saw cutting will vary with weather conditions however are typically completed within 1 to 4 hours after final finishing. Timing of the saw cutting will be the responsibility of the Contractor.

.1 Saw cutting 24 hours following placement will not be permitted.

.3 Following a minimum 28 days cure, re cut joints to 1/2" wide x 1/2" deep. Clean joints, install bond breaker tape, and infill joints with approved sealant in accordance with manufacturer's recommendations.

.4 Where concrete slab abuts walls, form in a 1/2" wide x 1 1/4" deep reglet. Upon minimum 28 days cure, prepare joint surface, install backer rod, and infill joints with approved sealant in accordance with manufacturer's recommendations.

3.10 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory designated by Contract Administrator in accordance with CSA-A23.1 and Section 01 45 00 - Quality Control and as described herein.

.1 Slump and air measurements shall be obtained at point of discharge for initial load. Concrete from initial load shall not be used for test cylinders.

.2 The Contractor will pay for costs of tests via the testing cash allowance as per Section 01 21 00 - Allowances.

.3 Not less than one test per 50 square feet of patching material placed and not less than one test for each day of placement.

.4 Testing agency to submit copies of concrete test reports directly to City Of Winnipeg and Contract Administrator.

.5 Inspection or testing by Contract Administrator will not augment or replace Contractor quality control nor relieve Contractual responsibility.

3.11 DEFECTIVE CONCRETE

.1 Defective concrete: cracking, spalling, scaling and concrete not conforming to required lines, details, dimensions, tolerances, finishes or specified requirements.

.2 Repair or replacement of defective concrete will be determined by the Contract Administrator, based on the specifications and the above guidelines.

.3 Do not patch, fill, touch up, repair or replace exposed concrete except upon express direction of Contract Administrator for each individual use.

3.12 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Ensure concrete slurry does not enter drainage system.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Specification to detail all installation, storage & field welding of metal fabrications as appropriate.

.2 All trench angle support metal fabrications to be fabricated by the City of Winnipeg. All other metal fabrications required for work to be supplied by Contractor.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.

.4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.4 The Environmental Choice Program

.1 CCD-047a-98, Paints, Surface Coatings.

.2 CCD-048-98, Surface Coatings - Recycled Water-borne.

1.3 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Protection:

.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to Site.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: to ASTM A307.

.5 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble work, ready for erection.

.3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

.2 Shop coat primer: to CAN/CGSB-1.40.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 SHOP PAINTING

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

2.5 TRENCH COVERS AND FRAMES

.1 Existing trench cover plate set in L 1 1/2" x 1 1/2" x 1/4" back to back with L 3" x 3" x 1/4" steel angles. Include 1/2" diameter Nelson Stud anchors at 18" on centre for embedding in concrete.

.2 Finish: galvanized.

2.6 VENT/CLEANOUT COVERS AND FRAMES

.1 Existing trench cover plate set in L 3"x2"x1/4" (LLV) steel angles. Include welded Nelson stud anchors in locations shown on drawings.

.2 Finish: galvanized.

Part 3 Execution

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Exposed fastening devices to match finish and be compatible with material through which they pass.

.4 Provide components for building by other sections in accordance with shop drawings and schedule.

.5 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.6 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.7 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.8 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This section covers the installation of an elastomeric joint sealant in cleaned and routed cracks and joints in concrete.

.2 The work covered under this section consists of all labour, material, equipment, supervision and incidentals required to prepare and seal the joints, cracks, and other areas as shown and detailed on the drawings, and as specified herein.

1.2 RELATED SECTIONS

.1 Section 03 92 10 – Top Surface Repairs

.2 Section 03 99 10 – Slab-On-Grade Replacement.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM C719-93(2010), Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

.2 ASTM C920-11, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM C1193-09 Standard Guide for Use of Joint Sealants.

.4 ASTM C1330-02(2007) Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

.5 ASTM C1521-13 – Standard Practice for Evaluating Adhesion Of Installed Weatherproofing Sealant Joints.

1.4 MEASUREMENT PROCEDURES

.1 Existing control joints, designated for routing and caulking will be identified and quantified by the Contract Administrator in the presence of and with the assistance of the Contractor. The areas will then be measured and agreed upon by the Contractor and Contract Administrator prior to commencement of work.

.2 Unit prices must include all supervision, labour and materials, and equipment. Joints/reglets to be uniform in size over the given length and conform to one of the following configurations. The following unit prices have been requested for miscellaneous joint/crack routing and caulking. The minimum unit of payment will be one (1) lineal foot for various reglet sizes.

.1 ¼" width.

.2 ½" width.

.3 ¾" width.

.4 1" width.

.3 The Contractor is to note that if he increases the area of repair over that originally measured of his own accord and without consultation with the Contract Administrator, he will not be paid for the increased area.

1.5 SUBMITTALS

.1 Comply with Section 01 33 00.

.2 Product Data: Submit manufacturer's technical bulletins and MSDS on each product.

.3 Samples: For each product exposed to view, manufacturer's standard bead consisting of strips of actual products showing full range of colors available.

1.6 QUALITY ASSURANCE

.1 Contractor Qualifications:

.1 Minimum of 5 years of experience in application of specified (or similar) products on projects of similar size and scope.

.2 Successful completion of a minimum of 5 projects of similar size and complexity to specified Work within the last 3 years.

.2 Field Mock-Ups (Upon Contract Administrator Request):

.1 Perform mock-up of required sealant Work at location identified by the Contract Administrator. Perform minimum of one mock-up for each different combination of substrates to be sealed.

.2 Install mock-ups and test in presence of sealant manufacturer’s authorized representative and Contract Administrator to assure installation procedures are consistent with warranty requirements and Specifications.

.3 After sealant has achieved sufficient cure the Contract Administrator will conduct adhesion pull-tests, or non-destructive testing, at discretion of the Contract Administrator. Conduct tests per ASTM C1521.

.4 Leave approved mock-ups in place to establish standards and guidelines for acceptable installation of sealant Work and acceptable appearance.

1.7 DELIVERY STORAGE AND HANDLING

.1 Comply with Section 01 61 00.

.2 The sealant shall be delivered to the jobsite in the manufacturer's original unopened

.3 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.4 Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight per manufacturer's recommendations.

.5 Handle products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.8 PROJECT CONDITIONS

.1 Environmental Requirements:

.1 Ensure that substrate surface and ambient air temperature are minimum of 4°C and rising at application time and remain above 4°C for at least 24 hours after application. Ensure that frost or frozen surfaces are thawed and dry.

.2 Ensure that substrate surface and ambient air temperature are below of 32°C and remain below 32°C for at least 8 hours after application.

.3 Do not apply material if snow, rain, fog, and mist are anticipated within 12 hours after application. Allow surfaces to attain temperature and conditions specified before proceeding with application.

1.9 WARRANTY

.1 The Contractor and/or system manufacturer shall furnish a written performance warranty covering labour and materials at the time of tender submission or approval, stating that the installed sealant will be free of defects related to workmanship or material deficiency for a minimum of five (5) years from the date of Substantial Performance. The Contractor shall co-sign the warranty and the approved warranty shall be made part of the Contractual agreement. The following problems shall be specifically covered under the warranty in writing:

.1 Cohesive or adhesive failure of the seal.

.2 Abrasion or tear failure of the seal resulting from normal weathering.

.3 Moisture leakage through a sealed joint or crack.

.4 Chalking, cracking, sliding, debonding, shrinkage in the sealant.

.2 The manufacturer to provide a 5-year material warranty. and/or Contractor shall submit a detailed warranty statement consistent with the terms of this specification at the time of tender submission for approval. The approved warranty shall be made part of the Contractual agreement.

Part 2 Products

2.1 MATERIALS

.1 Two-component polyurethane joint sealant for control joints in new and existing concrete.

.1 Compliance: ASTM C920, Type M, Grade NS, Class 25, Use T.

.2 Acceptable products:

.1 Sikaflex 2C/NS by Sika Canada Inc.

.2 MasterSeal SL 2 (Slope Grade) by BASF Building Systems.

2.2 ACCESSORIES

.1 Primers, bond breakers and miscellaneous materials required to install the sealant shall be in accordance with manufacturer's recommendations, and as approved by the Contract Administrator. Use of aggregate bond breakers is prohibited.

.1 Primer: Use only manufacturer's approved primer.

.2 Closed-cell foam backing rod shall conform: to ASTM C1330.

.3 Bond breaker tape: self-adhesive, pressure sensitive tape made from TFE-flourocarbon (Teflon), polyethylene, or similar which will not react with or adhere to the sealant.

Part 3 Execution

3.1 PROTECTION

.1 Protect adjacent surfaces against any damage that could result from sealant installation.

3.2 EXAMINATION

.1 Inspect existing caulked joints and cracks to ensure there is no deteriorated sealant, adhesion loss or non elastomeric sealants installed in joints. Remove and replace deficient sealant at location identified by Contract Administrator.

3.3 PREPARATION

.1 Substrates must be sound and free of dust, dirt, laitance, paints, oils, grease, curing compounds, or any other contaminants.

.2 All new concrete surfaces to have minimum compressive strength of 21 MPa and be cured for minimum of 28 days or 80 percent of design strength.

.3 Joint and crack preparation:

.1 Completely remove sealant from existing joints and cracks designated for repair.

.2 Sawcut reglet along cracks and joints identified by Contract Administrator.

.3 Reglet dimensions are to be Site confirmed based on crack dimensions and pattern and be uniform over the given length. The depth of the reglet must be consistent with the type of backing material (e.g. bond breaker tape, or backing rod) and sized to produce a width to depth ratio of approximately 2:1.

.4 Thoroughly clean joints and reglets by grinding, sandblasting, or wire brushing to expose a sound surface free of contamination and in order to provide a clean, sound substrate for optimum seal adhesion.

.5 Remove loose particles present or resulting from grinding, abrading, or blast cleaning by blowing out joints with oil-free compressed air, or vacuuming prior to primer application.

.6 Ensure that surfaces to be sealed are sound, dry, free from dirt, water, frost, loose scale, corrosion, oil, grease, waterproofing or water-repellent treatments, or other contaminants which may adversely affect the performance of the sealing materials.

.7 If the substrate is suspected of being substandard, an on-Site trial application is to be conducted to verify that the substrate is satisfactory. Work will not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the manufacturer. All costs associated with verification to be carried by Contractor.

.8 Prior to installation of the sealant an inspection of both the joint and substrate is required to confirm the joint design and to ensure that the substrate is sound and acceptable for sealant application. A substrate that is unsound, cracked, or weak must be repaired prior to sealant.

.9 Do not proceed with Work until any unsatisfactory conditions have been corrected in a manner acceptable to the Contract Administrator.

3.4 INSTALLATION

.1 Primer: Unless otherwise approved by the sealant manufacturer, priming of all substrates is mandatory.

.1 Prime substrates as recommended by the sealant manufacturer.

.2 Primer to be installed prior to installation of the sealant backing.

.3 Allow primer to dry until all the solvent evaporates. This typically takes 15 to 120 minutes, depending on temperature and humidity.

.4 Prime only those surfaces that will be sealed with sealant the same day. If a previously primed surface that was performed the day before is encountered it must be re-primed.

.2 Sealant backup: Where joint depth requires backup, pack joints continuously with closed cell backer rod meeting ASTM C1330

.1 Backer rod to be installed under adequate compression to hold it in-place in the joint opening and to resist the pressure applied when tooling a non-sag sealant into place. Backer rod diameter to be at least 25% greater than the joint width.

.2 Do not install backer rod with a sharp tool which could puncture the rod. Ensure surface skin of the backer rod is not punctured or cut during installation. A puncture in the backer rod may result in out-gasing into the uncured sealant resulting in voids or other defects in the cured sealant.

.3 Install backer rod without stretching.

.4 Under no circumstances should backer rod that is too small for the joint be doubled up or braided together to fit the opening.

.3 Bond breaker: A bond breaker will be required in the bottom of all joints containing a rigid, non-flexible backing material to preclude three-side adhesion where movement will occur. A bond breaker is not required to prevent a sealant from adhering to a soft, flexible, sealant backing material that would not significantly restrict movement.

.1 Install bond breaker tape in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material. The tape shall be installed continuously with no skips or voids in the tape application.

.4 Mixing:

.1 Prepare sealants that require mixing; follow manufacturer's recommended procedures, mixing thoroughly.

.2 Mix only as much material as can be applied within manufacturer's recommended application time period.

.3 Mix in a manner to prevent inclusion of foreign materials.

.5 Sealant installation:

.1 Apply sealants only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

.2 Application of sealants must be completed by skilled applicators installed in accordance with manufacturer's printed directions and this Section.

.3 Apply sealants to meet Specification and design requirements.

.4 Do not install sealant on wet or damp substrates. Wet or damp substrates should be allowed to dry before application of primer and/or sealant.

.5 Do not install sealants under conditions of precipitation or temperatures below 4°C. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.

.6 All sealants have a temperature range for optimum handling which can vary considerably, and should be stored at a temperature within this range for at least 4 hours before use.

.7 Do not use sealant that has started to set in its container, exceeded shelf life or installation times as stated by the manufacturer.

.8 Sealant to be installed in a manner that will completely fill the cavity formed in the joint opening by the substrates and sealant backing or bond breaker.

.9 Apply sealant by any of the common types of hand operated guns. Nozzles shall be sized and shaped to fit the intended joint opening width, which will confine the sealant to the joint and aid in building pressure to force the sealant into the cavity. joint. Ensure that mixing and placing procedures do not entrain air within the sealant.

.10 Immediately after applying the sealant, tool the bead. Tooling forces material into cavities and into more intimate contact with the substrate. Wet tooling will not be permitted.

.11 Tool sealant to produce a concave shaped surface. Specifically, the sealant and concrete are to be flush at the edges but recessed at the joint centre, forming a parabolic arc. Do not re-use any material forced outside of the joint by the tooling procedure.

.12 Sealant bead to be free of air pockets, embedded impurities, and free of ridges, wrinkles and sags.

.13 Use anti-tack solutions only with the approval and directions of the sealant manufacturer.

3.5 CLEANING

.1 Do not clean inadvertent spills or splatters of sealant on concrete or masonry with solvent because of possible permanent staining of the substrate. Scrape, wipe or scrub such spills with dry tools or rags.

.2 Clean bulk caulking guns, barrel and nozzle completely after every day's use.

.3 The special precautions recommended by the manufacturer shall be rigidly followed where hazardous materials are involved.

3.6 FIELD ADHESION TESTING

.1 Field adhesion testing of miscellaneous joints and cracks will be complete at the discretion of the Contract Administrator.

.2 Field adhesion testing will be performed during the field mock-up and throughout the course of the work by the Contract Administrator in the presence of and with the assistance of the Contractor and be completed throughout the course of the work. The purpose of the field adhesion testing is to help detect application problems such as improper cleaning, use of improper primer, poor primer application, or improper joint configuration.

.3 A minimum three (3) field adhesion tests will be completed for each type of sealant used for the first 500 lineal feet and two (2) tests per 500 lineal feet thereafter.

.4 The field adhesion test shall be performed as follows:

.1 Make a knife cut across the full width of the joint.

.2 Make two (2) cuts (from the cross cut) approximately 3" long, along both sides of the joint.

.3 Place a 1" mark on the sealant tab.

.4 Grasp the 3" sealant tab firmly 1" from its bonded edge and pull at a 90° angle.

.5 If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately. This is accomplished by extending the vertical cut along one side of the joint, checking adhesion to the opposite side and then repeating for the other surface.

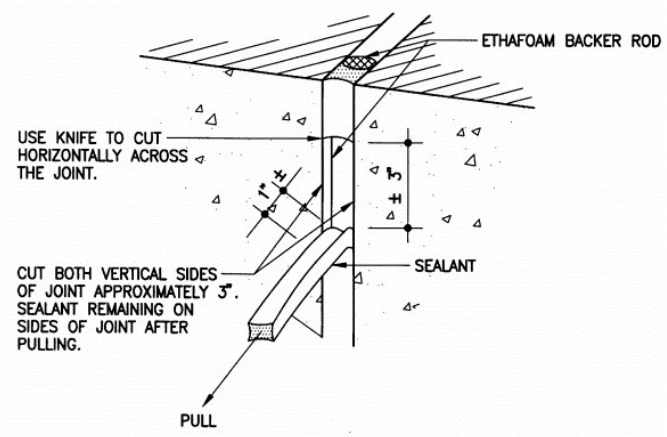


FIGURE 1.1 HAND PULL TEST

.5 Field adhesion test criteria:

.1 Urethane Sealants: the sealant should tear cohesively within itself without bond loss.

.6 At this time the joint will be inspected for complete fill. The joint should not have voids, and joint dimensions should match those shown on the drawings.

.7 This testing will be completed by the Contract Administrator in the presence of and with the assistance of the Contractor and results recorded by the Contract Administrator, retained and made available for review upon request. A sample log form has been appended with this specification.

.8 Repair of Sealant at Field Adhesion Test Locations

.1 Repair the sealant pulled from the test area by applying new sealant to the test area. Assuming good adhesion was obtained, use the same application procedure to repair the area as was used originally for the joint. Care should be taken to ensure that the original sealant surfaces are clean and that the new sealant is in contact with the original sealant.

.2 Contractor shall carry costs associated with sealant testing and repair in their bid including but not limited to access, labour, materials, etc.

END OF SECTION