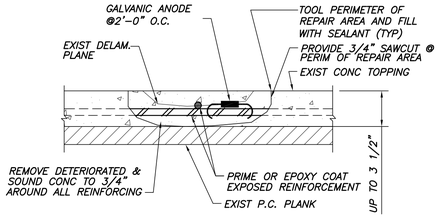


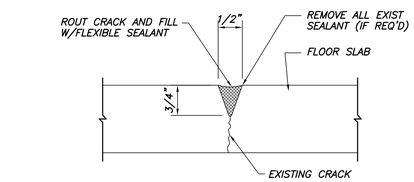
TYPICAL DEEP CONCRETE REPAIR

N.T.S.

GENERAL:
1. DUST AND MOISTURE PROTECTION SHALL BE PROVIDED AT AND BELOW THE LEVELS OF REPAIR.

CONCRETE REMOVAL:
1. REFERENCES: ICRI 03750, 03732, ACI 546R CURRENT EDITION.
2. AT EACH REPAIR AREA, REMOVE SMALL AREA OF CONCRETE TO CONFIRM DEPTH OF REINFORCEMENT PRIOR TO CUTTING.
3. SAW CUT PERIMETER OF REPAIR AREA TO A DEPTH OF 3/4". REFERENCE PARTIAL SLAB PLAN THIS SHEET FOR ADDITIONAL INFORMATION. NOTE THAT PERIMETER MAY NEED TO BE EXTENDED.
4. REMOVE ALL DETERIORATED, DELAMINATED AND UNSOUND CONCRETE TO THE TOP OF EXISTING PRECAST/PRESTRESSED PLANKS, CONCRETE SHALL BE REMOVED BY A METHOD THAT LIMITS THE DAMAGE TO SURROUNDING SOUND CONCRETE TOPPING, EXIST STEEL TRUSS REINF AND WITH MINIMAL DAMAGE TO EXISTING PRECAST/PRESTRESSED PLANKS.
5. MATERIAL REMOVAL SHALL CONTINUE UNTIL AGGREGATE PARTICLES ARE BEING BROKEN RATHER THAN BEING REMOVED FROM THE CEMENT MATRIX.
6. USE OF MECHANICAL IMPACT CHIPPING HAMMERS SHALL BE LIMITED TO 30lb WITH A 15lb RECOMMENDED. ALL NECESSARY PRECAUTIONS MUST BE TAKEN TO AVOID MICRO CRACKING (BRUISING) OF THE SURFACE OF THE PRECAST/PRESTRESSED PLANKS.
7. ALL EXISTING REINF AND STEEL TRUSS REINF SHALL BE SALVAGED. IF REPAIRS REQ'D SEE TYP DETAIL THIS DWG.

PREPARATION:
1. CLEAN ALL STEEL SURFACES REMOVING ALL RUST AND SCALE TO SSPC-SP3 (POWER TOOL CLEAN).
2. REMAINING EXISTING REINF AND STEEL TRUSS REINF SHALL BE PRIMED OR EPOXY COATED.
3. PRIOR TO PROCEEDING WITH REPAIR, INSPECT ALL CONCRETE SURFACES. INSTALLATION OF REPAIR MATERIAL INDICATES ACCEPTANCE OF ALL SUBSTRATE CONDITIONS.

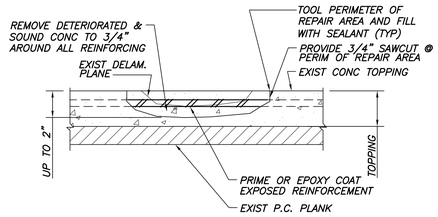


TYP. CRACK/C.J. REPAIR DETAIL

N.T.S.

PREPARATION:
1. CENTER ROUTED GROOVE ON CRACK.
2. REMOVE ALL LOOSE AND DETERIORATED MATERIAL.
3. ALL JOINT-WALL SURFACES MUST BE CLEAN, SOUND, AND FROST FREE. JOINT WALLS MUST BE FREE OF OILS, GREASE, CURING COMPOUND RESIDUES, AND ANY OTHER FOREIGN MATTER THAT MIGHT PREVENT BOND. THIS SHOULD BE ACCOMPLISHED BY BLAST CLEANING OR EQUIVALENT MECHANICAL MEANS.
4. CONFORM TO ALL MANUFACTURER'S PREPARATION REQUIREMENTS.
5. JOINT PREPARATION SHALL BE CONFIRMED BY SEALANT INSTALLER. INSTALLATION OF SEALANT SHALL IMPLY PROPER JOINT PREPARATION.

CRACK SEALANT INSTALLATION:
1. INSTALLATION SHALL CONFORM TO MANUFACTURER'S REQUIREMENTS.
2. INSTALL SEALANT EVENLY AND RECESS 1/16" BELOW SURFACE. DO NOT OVERFILL JOINT.



TYPICAL SHALLOW CONCRETE REPAIR

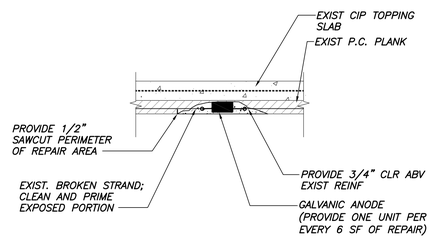
N.T.S.

PREPARATION CONTINUED:
4. APPLY POLYMER ADHESIVE/BONDING AGENT TO ALL CONCRETE SURFACES OR COAT ALL CONCRETE SURFACES WITH A CEMENT SLURRY PRIOR TO PLACING REPAIR MATERIAL.
5. INSTALL NEW REINF IF REQUIRED AND TIE TO EXISTING. PROVIDE CHAIRS AS REQUIRED TO MAINTAIN PROPER PLACEMENT. MINIMUM COVER=2".
6. REPAIR MATERIAL FOR LARGE AREAS (TOTAL PLACEMENTS OVER 1 YARD)

COMPRESSIVE STRENGTH (f'c)	= 5,000 PSI (MIN)
AIR CONTENT	= 6 1/2 ±2%
WATER/CEMENT RATIO (W/C)	= 0.35 (MAX)
AGGREGATE	= 3/8" MIN
ADMIXTURES:	
SHRINKAGE REDUCER	= AS PER MANUFACTURER

7. REPAIR MATERIAL FOR SMALL PLACEMENTS (PLACEMENT LESS THAN 1 YARD) SHALL BE A ONE-COMPONENT, EARLY STRENGTH GAINING, CEMENTITIOUS REPAIR MATERIAL WITH THE FOLLOWING PROPERTIES (REFERENCE SPECIFICATIONS FOR ADDITIONAL INFORMATION): COMPRESSIVE STRENGTH: 5,000 PSI (MIN)
8. PLACEMENT: ALL CIP REPAIR MATERIAL MUST BE TESTED AS PER THE SPECIFICATIONS.
9. ALL JOINTS SHALL BE HAND TOOLED.

CONCRETE CURING:
1. WET CURE FOR A MINIMUM OF 3 DAYS (72 HOURS). REFERENCE THE SPECIFICATION FOR FURTHER CURING INFORMATION.



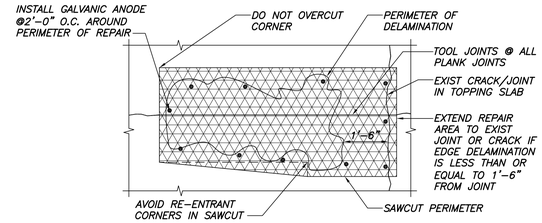
TYP OVERHEAD CONCRETE REPAIR (FORM&PUMP)

N.T.S.

PREPARATION:
1. SAWCUT PERIMETER OF DAMAGED AREA TO A DEPTH OF 1/2". DO NOT CUT REINFORCEMENT OR PRESETRESSED STRAND. REMOVE, BY HAND, A SECTION TO DETERMINE DEPTH OF REINFORCEMENT IF REQUIRED.
2. REMOVE DETERIORATED AND SOUND CONCRETE AS NECESSARY W/ 15LB(MAX) CHIPPING HAMMER. EXCAVATE 3/4" AROUND ALL REINFORCEMENT.
3. STEEL REINFORCEMENT SHOULD BE THOROUGHLY PREPARED BY MECHANICAL CLEANING TO REMOVE ALL TRACES OF RUST. THE STEEL SHOULD BE HIGH-PRESSURE WASHED WITH CLEAN WATER AFTER MECHANICAL CLEANING.
4. REMOVE LOOSE, DETERIORATED, AND BOND INHIBITING MATERIALS FROM SURFACE. PREPARATION WORK SHALL BE DONE BY HIGH PRESSURE WATER BLAST, SHOT BLAST, OR OTHER APPROPRIATE MECHANICAL MEANS TO OBTAIN AN EXPOSED AGGREGATE SURFACE WITH A MINIMUM SURFACE PROFILE OF +/-1/8".
5. SATURATE SURFACE WITH CLEAN WATER. SUBSTRATE SHOULD BE SATURATE SURFACE DRY (SSD) WITH NO STANDING WATER DURING APPLICATION.

INSPECTION:
1. INSPECT ALL CONCRETE SURFACES PRIOR TO APPLICATION OF PRIMERS/ADHESIVES TO INSURE PROPER PREPARATION AND SURFACE DRYING.
2. CONFORM TO ALL THE MANUFACTURERS PREPARATION INSTRUCTIONS.
3. ESTIMATE SECTION LOSS OF DETERIORATED REINFORCEMENT. IF SECTION LOSS EXCEEDS 25%, NOTIFY ENGINEER PRIOR TO PROCEEDING WITH REPAIR. SEE TYPICAL DETAIL THIS DWG.
4. ANY DAMAGED PRESTRESSING STRANDS SHALL BE REVIEWED BY ENGINEER PRIOR TO REPAIRS. IF MULTIPLE ADJACENT STRANDS ARE DAMAGED SUPPLEMENTAL STRUCTURE MAY BE REQ'D.

REPAIR:
1. ALL REINFORCEMENT SHALL BE PRIMED OR EPOXY COATED WITH A PRODUCT COMPATIBLE WITH THE CONCRETE REPAIR MATERIAL.
2. APPLY PRIMER TO CONCRETE SUBSTRATE COMPATIBLE WITH REPAIR MATERIAL.
3. FORMWORK MUST BE CONSTRUCTED/INSTALLED TO A STRENGTH SUFFICIENT TO HANDLE INDUCED PRESSURE BY HYDROMATIC PRESSURE AND THE ADDITIONAL PUMP PRESSURE REQUIRED TO CONSOLIDATE REPAIR MATERIAL.
4. FORM SHALL BE VENTED.
5. FORMS SHALL BE CONSTRUCTED TO FIT TIGHTLY AGAINST EXISTING CONCRETE SURFACES.
6. MATERIAL: PROVIDE PRE-PACKAGED REPAIR MATERIALS WHICH ARE DESIGNED FOR PUMPING AND INCORPORATE SHRINKAGE COMPENSATING ADMIXTURES.
7. ARRANGE PORTS BASED ON SIZE OF PUMP AND MATERIAL MANUFACTURERS RECOMMENDATIONS.
8. PLACEMENT: START PUMPING FROM THE LOWEST POINT, FILLING IN A MANNER THAT PREVENTS AND ENTRAPMENT.
9. PRESSURE GAGE SHALL BE ATTACHED TO THE PUMP LINE NEAR THE EXIT PORT TO MONITOR CAVITY PRESSURE. CAVITY PRESSURE SHALL NOT EXCEED FORM DESIGN PRESSURE.
10. FORMWORK SHALL REMAIN IN PLACE UNTIL MATERIAL ACHIEVES MINIMUM STRENGTH OF f'c=4,000 PSI.

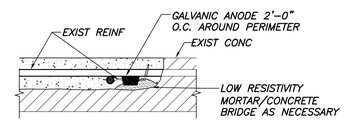


PARTIAL SLAB PLAN

N.T.S.

NOTES:
1. AREA OF CONCRETE REPAIR.
2. PROVIDE TOOLED JOINTS AROUND PERIMETER OF REPAIR AND AS NOTED IN PLAN.

REPAIR:
1. INSTALL GALVANIC ANODE
   A. ENSURE ALL EXPOSED EXISTING REINFORCEMENT IS TIED W/STEEL TIE WIRES.
   B. INSTALL ANODES USING A SUITABLE WIRE TWISTING TOOL TO ELIMINATE FREE MOVEMENT AND ENSURE GOOD ELECTRICAL CONNECTION. ANODE SHALL HAVE 3/4" MINIMUM COVER AND BE PLACED WITHIN 6" OF EDGE OF REPAIR. (SEE NOTES BELOW FOR ADDITIONAL INFO)



GALVANIC ANODE DETAIL

N.T.S.

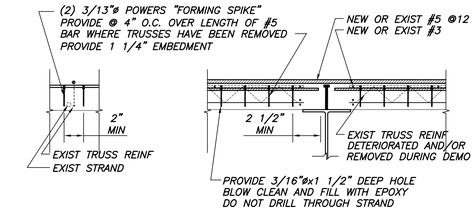
GALVANIC ANODE NOTES

PRODUCT:
EMBEDDED GALVANIC ANODES SHALL CONSIST OF A MINIMUM OF 100 GRAMS OF ZINC IN COMPLIANCE WITH ASTM B6 SPECIAL HIGH GRADE CAST AROUND A PAIR OF STEEL TIE WIRES IN COMPLIANCE WITH BRIGHT ANNEALED ASTM A82 AND ENCASED IN A HIGHLY ALKALINE CEMENTITIOUS SHELL WITH A PH OF 14 OR GREATER. THE CEMENTITIOUS SHELL SHALL CONTAIN NO ADDED SULFATE NOR SHALL IT CONTAIN CHLORIDE, BROMIDE OR OTHER CONSTITUENTS THAT ARE CORROSIVE TO REINFORCING STEEL. ANODE UNITS SHALL BE SUPPLIED WITH INTEGRAL UNSPLICED WIRES WITH LOOP TIES FOR DIRECTLY TYING TO THE REINFORCING STEEL.

GALVANIC ANODE INSTALLATION:
1. INSTALL ANODES AND REPAIR MATERIAL IMMEDIATELY FOLLOWING PREPARATION AND CLEANING OF THE STEEL REINFORCEMENT.
2. GALVANIC ANODES SHALL BE INSTALLED ALONG THE PERIMETER OF THE REPAIR OR INTERFACE AT A SPACING AS SPECIFIED ON THE DRAWINGS. ANODE SPACING WILL VARY WITH CHANGES IN THE REINFORCING STEEL DENSITY, THE LEVEL OF CHLORIDE IN THE STRUCTURE AND THE CORROSIVITY OF THE LOCAL ENVIRONMENT, ETC.
3. PROVIDE SUFFICIENT CLEARANCE BETWEEN ANODES AND SUBSTRATE TO ALLOW REPAIR MATERIAL TO ENCASE ANODE.
4. SECURE THE GALVANIC ANODES AS CLOSE AS POSSIBLE TO THE REPAIR EDGE USING THE ANODE TIE WIRES. THE TIE WIRES SHALL BE WRAPPED AROUND THE CLEANED REINFORCING STEEL AND TWISTED TIGHT TO ALLOW LITTLE OR NO FREE MOVEMENT.

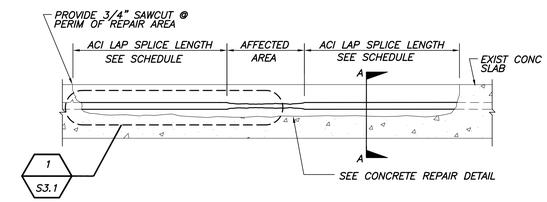
ELECTRICAL CONTINUITY
1. CONFIRM ELECTRICAL CONNECTION BETWEEN ANODE TIE WIRE AND REINFORCING STEEL BY MEASURING DC RESISTANCE (OHM,Ω) OR POTENTIAL (MV) WITH A MULTI-METER.
2. ELECTRICAL CONNECTION IS ACCEPTABLE IF THE DC RESISTANCE MEASURED WITH MULTI-METER IS LESS THAN 1 Ω OR THE DC POTENTIAL IS LESS THAN 1 MV.
3. CONFIRM ELECTRICAL CONTINUITY OF THE EXPOSED REINFORCING STEEL WITHIN THE REPAIR AREA. IF NECESSARY, ELECTRICAL CONTINUITY SHALL BE ESTABLISHED WITH STEEL TIE WIRE.
4. ELECTRICAL CONTINUITY BETWEEN TEST AREAS IS ACCEPTABLE IF THE DC RESISTANCE MEASURED WITH MULTI-METER IS LESS THAN 1 Ω OR THE POTENTIAL IS LESS THAN 1MV.

CONFORM TO ALL MANUFACTURERS RECOMMENDATIONS FOR PREPARATION INSTALLATION AND TESTING.



TYPICAL REINF TRUSS REPAIR

N.T.S.



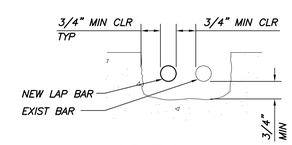
TYPICAL REINFORCEMENT REPAIR

N.T.S.

PREPARATION:
1. SEE TYPICAL CONCRETE REPAIR FOR REMOVAL/REPLACEMENT OF CONCRETE.

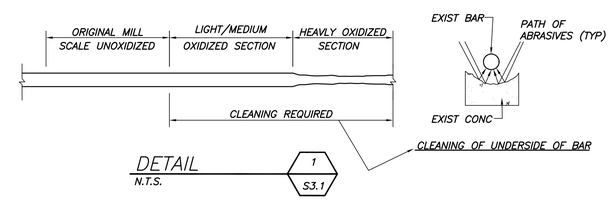
INSPECTION:
1. IF REINFORCEMENT HAS LOST MORE THAN 25% OF ITS CROSS SECTIONAL AREA, NOTIFY STRUCTURAL ENGINEER PRIOR TO PROCEEDING WITH PATCH.

REPAIR:
1. LAP BARS AS NOTED ABOVE.
2. SEE TYPICAL CONCRETE REPAIR.



SECTION A-A

N.T.S.



DETAIL

N.T.S.

1
S3.1

REBAR LAP SPLICE TABLE

BAR SIZE	LAP LENGTH
#3	30"
#4	36"
#5	48"
#6	56"
#7	81"

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STATE OF MAINE
TODD M. NEAL
NO. 9406
LICENSED
PROFESSIONAL ENGINEER

Reviewed for Code Compliance
Inspection Division
Approved as Noted
Date: 03/07/17

Rev. No.	Date	Issued For	Apprd
	10/26/16	ISSUED FOR PRICING	
	12/12/16	ISSUED FOR PERMIT	

FORE STREET PARKING FACILITY
PORTLAND, MAINE
PHASE 10

CONCRETE REPAIR SECTIONS & DETAILS

Designed: ATS	Scale: AS NOTED
Drawn: ATS	Date: 10/26/16
Checked: JMM	Becker Job Number: 3904

S3.1