GUIDELINES FOR DEVELOPING DETAILS FOR REPAIR OF MSE WALL FACING

REVISIONS

GUIDELINES FOR DEVELOPING DETAILS FOR REPAIR OF MSE WALL FACING IN FRONT OF THE WALL TO MATCH THE ADJACENT AREA.

1. PANEL REPAIR METHOD 1
   - NEAR COAST COSMETIC FACING REPAIR BY PART DEPTH REMOVAL AND INSTALLATION OF FRESH CONCRETE WITH SOILS AND BONDING AGENTS. THIS INCLUDES AVOIDING THE REPAIR AREA TO AVOID DAMAGE TO THE SURROUNDING PANELS.

2. PANEL REPAIR METHOD 2
   - NEAR FULL DEPTH REPAIR WITH USE OF A CAST-IN-PLACE CONCRETE PANEL OR PRECAST PANEL.

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   - NEAR FULL DEPTH REPAIR WITH USE OF A CAST-IN-PLACE CONCRETE PANEL OR PRECAST PANEL.
SAMPLE CONSTRUCTION SEQUENCE FOR REPAIR OF DAMAGED WALL
FACING WITH FUNCTIONAL MSE REINFORCEMENT:

1. EXCAVATE SPILLED SELECT GRANULAR BACKFILL AND DEBRIS FROM THE OUTSIDE OF THE DAMAGED WALL AREA TO THE LIMITS OF THE NEW CAST-IN-PLACE WALL FACING.


3. SANDBLAST EXISTING CONCRETE SURFACES BEHIND THE NEW CAST-IN-PLACE FACING TO PRODUCE SURFACE CONDITIONS SUITABLE FOR BONDING WITH NEW CONCRETE.

4. COVER THE OPENING IN THE EXISTING WALL WITH TEMPORARY FORMWORK BEHIND THE MSE WALL PRECAST CONCRETE PANELS AND SEAL THE Junctions BETWEEN THE PANELS TO THE LIMITS NEEDED TO PREVENT ITEM 4. EXISTING PRECAST CONCRETE PANELS FROM ESCAPING FROM BEHIND THE EXISTING WALL DURING PLACEMENT. THE FORMING MATERIALS SHALL BE SECURELY BRACED TO EXISTING GROUND TO WITHSTAND THE HYDROSTATIC PRESSURE OF THE LSM.

5. BRACE EXISTING PRECAST CONCRETE PANELS IN THE DAMAGED AREA AND VICINITY TO PREVENT OUTWARD MOVEMENT OR ROTATION DURING PLACEMENT OF THE LSM.

6. CORE-DRILL HOLES THROUGH THE CONCRETE OF THE EXISTING WALL OR THE FORMWORK TO PERMIT PUMPING AND VENTING OF THE LSM. ENTRY AND VENT HOLES SHALL BE IN THE LOCATIONS AS SHOWN ON THE PLANS.

7. PUMP LSM INTO THE VOID SPACE BEHIND THE EXISTING WALL UNTIL IT EXITS THROUGH THE VENT HOLES.

8. FORMING MATERIALS AND BRACING MAY BE REMOVED 3 DAYS AFTER PLACING LSM. NO WOOD SHALL REMAIN IN OR AROUND THE DAMAGED AREA.

9. INSTALL CONCRETE PANEL, STEEL REINFORCEMENT IN THE DOWEL HOLES AS SHOWN ON THE PLANS. INSTALL ALL ADDITIONAL STEEL REINFORCEMENT AS SHOWN ON THE PLANS.

10. PLACE EXPANDED POLYSTYRENE BETWEEN THE EXISTING MSE WALL PANELS AND THE PANEL UNDER REPAIR, AND INSTALL TEMPORARY FORMWORK WITH THE APPROPRIATE ARCHITECTURAL FINISH THAT MATCHES THE ORIGINAL FINISH PROVIDED ON THE EXISTING MSE WALL PANELS.

11. PLACE PREFORMED EXPANSION JOINT FILLER (PFJF) AS SHOWN ON THE PLANS WHEN REQUIRED FOR TOP PANELS.

12. CAST THE CONCRETE TO FORM THE PANEL AND REMOVE THE TEMPORARY FORMWORK AFTER 48 HOURS.


14. COVER THE OPENING IN THE EXISTING WALL WITH TEMPORARY FORMWORK BEHIND THE MSE WALL PRECAST CONCRETE PANELS AND SEAL THE JUNCTIONS BETWEEN THE PANELS TO THE LIMITS NEEDED TO PREVENT ITEM 4. EXISTING PRECAST CONCRETE PANELS FROM ESCAPING FROM BEHIND THE EXISTING WALL DURING PLACEMENT. THE FORMING MATERIALS SHALL BE SECURELY BRACED TO EXISTING GROUND TO WITHSTAND THE HYDROSTATIC PRESSURE OF THE LSM.

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21. PLACE PREFORMED EXPANSION JOINT FILLER (PFJF) AS SHOWN ON THE PLANS WHEN REQUIRED FOR TOP PANELS.

22. CAST THE CONCRETE TO FORM THE PANEL AND REMOVE THE TEMPORARY FORMWORK AFTER 48 HOURS.

23. REMOVE EXPANDED POLYSTYRENE THAT WAS PLACED BETWEEN THE EXISTING MSE WALL PANELS AND THE PANEL UNDER REPAIR.

24./Core-drill holes through the concrete of the existing wall or the formwork to permit pumping and venting of the LSM. Entry and vent holes shall be in the locations as shown on the plans.

25. Pump LSM into the void space behind the existing wall until it exits through the vent holes.

26. Forming materials and bracing may be removed 3 days after placing LSM. no wood shall remain in or around the damaged area.

27. Install concrete panel, steel reinforcement in the dowel holes as shown on the plans. install all additional steel reinforcement as shown on the plans.

28. Place expanded polystyrene between the existing MSE wall panels and the panel under repair, and install temporary formwork with the appropriate architectural finish that matches the original finish provided on the existing MSE wall panels.

29. Place preformed expansion joint filler (PFJF) as shown on the plans when required for top panels.

30. Cast the concrete to form the panel and remove the temporary formwork after 48 hours.

31. Remove expanded polystyrene that was placed between the existing MSE wall panels and the panel under repair.

32. Fill joints with foam backer rod or expanding foam. follow the manufacturer's recommendations for application. if using expanding foam, use a foam that can be applied in cold weather.

33. Seal the joints by applying a silicone sealant to the foam in the joints. follow the manufacturer's recommendations for application. use a sealant that can be applied in cold weather, and that comes in a color to match or complement the color of the MSE wall facing panels.

34. Smooth the surface of the sealant.

NOTED:
The location of helical anchors shall be specified in the design. dependent on the location of soil reinforcement used in the existing MSE wall, the helical anchor locations shall be such that they do not coincide with the location of existing soil reinforcement.
PARTIAL AND FULL REPLACEMENT OF 5' x 5' PANEL

PANEL REPAIR METHOD 2

REMOVE EXISTING CONCRETE AND REBAR

ALL REINFORCEMENT SHALL BE EPOXY COATED

REPAIR DAMAGED AREA

AREA TO BE REMOVED

PLACE 3/4" EXPANDED POLYSTYRENE TO BE REMOVED (TYP.)

TEMPORARY FORMWORK

CONCRETE REMOVAL LIMIT (MIN. OF 2 INCH BEYOND LIMITS OF SOUND CONCRETE)

LIMITS OF SOUND CONCRETE (DETERMINED IN FIELD)

REPAIR DAMAGED AREA

PLACE 3/4" EXPANDED POLYSTYRENE BEFORE PLACING THE CONCRETE FOR THE PANEL

TEMPORARY FORMWORK
**Panel Repair Method 2**

**Partial and Full Replacement of 5' x 10' Panel**

**Section A-A**

- **Nonmarring Nonmetallic Grout**
- **Helical Anchor** (Typ.)
- **#4 Rebar** (Typ.)
- **#4 Rebar** to be removed and replaced
- **CIP MSE Panel**

**Section B-B**

- **Area to be removed**

**Section C-C**

- **Temporary Formwork**
- **Helical Anchor** (Typ.)
- **6 Panel Joint** (Typ.)
- **Place 3/4" Expanded Polystyrene before placing the concrete for the panel**

**Section D-D**

- **Partial Replacement of Typical MSE Panel Repair Method-2**
  - **Place 3/4" Expanded Polystyrene before placing the concrete for the panel**

**Section E-E**

- **All MSE Panel Reinforcement shall be epoxy coated**

**Section F-F**

- **Remove Existing Concrete and Rebar**

**Section G-G**

- **Temporary Formwork**
- **Helical Anchor** (Typ.)
- **N" Expanded Polystyrene**

**Section H-H**

- **Full Replacement of Typical MSE Panel Repair Method-2**
  - **Temporary Formwork**
  - **Plate 3/4" Expanded Polystyrene before placing the concrete for the panel**

**Notes**

- **All** MSE Panel Reinforcement shall be epoxy coated.
- **Helical Anchor** (Typ.)
- **#4 Rebar** (Typ.)
- **#4 Rebar** to be removed and replaced.
- **Concrete Removal limit (min. of 2 inch beyond limits of sound concrete)**
- **Bottom of Moment Slab Mounted Deflector Panel** (Typ. for MSE Wall Top Row Panel) SEE SHEET 5/8 WALL TOP ROW PANELS.
- **Partial and Full Replacement of 5' x 10' Panel**
- **Nonmarring Nonmetallic Grout**
MISCELLANEOUS DETAILS

MISCELLANEOUS REPAIR DETAILS ARE SHOWN TO PROVIDE GUIDANCE FOR SPECIFIC DETAILS THAT MAY BE PART OF OVERALL REPAIRS REQUIRED. THESE DETAILS WILL REQUIRE MODIFICATION TO ACCOMMODATE PROJECT SPECIFIC REQUIREMENTS.

DEFLECTOR PARAPET ON MSE WALL DETAIL

EXISTING SLIP JOINT

SLIP JOINT

SCALE 1" = 2'
SAMPLE REINFORCEMENT REPAIR
PLAN SHEET 1 - INSTALLATION OF SOIL NAILS

LOW STRENGTH MORTAR (LSM) NOTES:
1. CONSTRUCT FORMWORK WITHIN EXISTING WALL OPENING AND INSTALL WALL BRACING PRIOR TO PLACING THE CMS ITEM 613 - LOW STRENGTH MORTAR (LSM), TYPE 2. THE DESIGN OF FORMWORK AND BRACING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. DRILL HOLES NUMBER 1, 2 AND 3 THROUGH THE EXISTING PRECAST PANELS. HOLE 2 WILL BE THE GROUT FILL HOLE AND HOLES 1 AND 3 WILL BE THE VENT HOLES. IF NECESSARY, CREATE A PASSAGE THROUGH THE REINFORCED FILL INTO THE EXISTING Voids AREA USING A DRILL, REINFORCING BAR OR OTHER MEANS TO ENSURE CLEAR PASSAGE OF THE LSM INTO AND OUT OF THE Voids AREA. THE PASSAGE THROUGH THE BACKFILL SHALL HAVE A MINIMUM DIAMETER OF 3 INCHES. ADJUST DRILLED HOLES TO AVOID CONFLICT WITH REINFORCEMENT CONNECTIONS.

3. ONLY HOLES 1, 2 AND 3 SHOULD BE DRILLED PRIOR TO PLACING THE LSM. ADDITIONAL HOLES (HOLES 8 AND 9) MAY BE DRILLED TO PROVIDE ADDITIONAL VENTING AND MONITORING OF GROUT FILLING.

4. PUMP THE LSM INTO THE SPACE BEHIND THE EXISTING WALL THROUGH HOLE NO. 2 UNTIL SLURRY EXITS AT THE VENT HOLES.

5. THE FORMING MATERIALS AND WALL BRACING SHALL REMAIN IN PLACE FOR A MINIMUM 3 DAYS AFTER PLACING THE LSM.

LOW STRENGTH MORTAR (LSM) NOTES:
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**ELEVATION**

### Dowel Notes:

- **#4** DOWEL (IN EXISTING PANEL)
- **#4 x 6"** DOWEL (IN EXISTING PANEL)

### Section A-A

- Low Strength Mortar Backfill
- Low Strength Mortar Backfill

### Section B-B

- **#4** DOWEL, SEE NOTES THIS SHEET
- **#4** DOWEL IN A ½" DIAMETER x 5" DEEP DRILLED HOLE WITH AN APPROVED环氧 ADHESIVE. THE epoxy ANCHORAGE SHALL DEVELOP A MINIMUM TENSILE PULLOUT STRENGTH OF 5.5 KIPS.

### Section C-C

- Existing MSE Wall
- New CIP Fascia Wall
- #4 Harp Pins
- 0.5" Rustication

**Hairpin Note:**

Hairpin bars are to be bent in the field and used where wall thickness exceeds 4.0" anchor plate to base of rustication exceeds 10".

### Section D-D

- Existing MSE Wall
- New CIP Fascia Wall
- 0.5" Rustication

### Plan Sheet 2 - New Concrete Fascia Wall

**Sample Reinforcement Repair**

**Limit of Low Strength Mortar and CIP Fascia Wall**

**Low Strength Mortar Backfill**

**PROPOSED SOIL NAILS**

**BASE OF RUSTICATION**

**6" x 0.5" DEEP REVEAL TO MATCH PANEL JOINTS**

**HOLDS NOTES:**

Install **#4** DOWEL IN A ½" DIAMETER x 5" DEEP DRILLED HOLE WITH AN APPROVED epoxy ADHESIVE. The epoxy ANCHORAGE SHALL DEVELOP A MINIMUM TENSILE PULLOUT STRENGTH OF 5.5 KIPS.
1. Services for work inspection, material testing, and surveying and monitoring of soil nail installation will be provided by the contractor. The drilling contractor shall cooperate with the inspection and testing agencies selected by the contractor, and shall furnish equipment, tools, and labor on site as required to facilitate such tasks.

2. The drilling contractor shall take photographs to document conditions of alignment existing structures, malls, streets, pavements, utilities, etc., prior to commencement of work. One set of these photos shall be submitted to the engineer before beginning any work.

3. The contractor shall survey every other nail in the top row of nails to monitor horizontal and vertical ground movements. The survey shall be done on a daily basis until wall construction is complete, and the daily results shall be made available to the engineer by the following work day.

4. Should excessive stress greater than 0.5% or a sudden increase in ground settlement, lateral deformation, or soil nail movement be detected, the soil nail wall contractor shall notify the engineer immediately.

5. The alignment load shall be the minimum load required to align the drilling apparatus and shall not exceed 2.5% of the proof test load (PTL). Dial gauges should be set to zero after the load has been applied.

6. Do not stress the nail bar to more than 80% of its minimum guaranteed ultimate tensile strength for grade 50 steel or more than 90% of the minimum yield strength for grade 60 or 75 steel.

7. Details on this sheet apply to all soil nail wall drawings unless otherwise noted.

8. Soil nail reinforcement requirements are shown on sheet 6 of 8.

9. The contractor is responsible for locating all utilities in the vicinity of the soil nail wall prior to beginning construction.

10. Proof testing shall be conducted in accordance with the special provisions provided. The design bond strength for testing purposes shall be 0.5 kips/ft.

11. Soil nails shall be monitored for creep at the 1.00 PTL increment. Nail movements during the creep portion of the test shall be measured and recorded at 1, 2, 3, 4, 5, 6, 10, 20, 30, 50, and 90 minutes. The load during the creep test shall be maintained within 2 percent of the PTL by use of the load cell. The nail shall be uncaged in increments of 25% of the PTL with movements recorded at each uncage load. Each uncage load increment shall be held for a sufficient time to allow stabilization of the movement readings.

12. The proof test acceptance criteria shall be used. Nails failing this criteria shall not be accepted and replacement nails shall be proposed and installed after approval by the engineer.

13. Total movement at the PTL must exceed 80% of the theoretical pullout resistance. If this criterion is not met, replacement nails shall be proposed and installed after approval by the engineer.

14. Proof testing shall be performed after shotcrete and prior to excavation.

15. Soil nail inclinations requirements are shown on sheet 6 of 8.

16. Soil nails shall be monitored for creep at the 1.00 PTL increment. Nail movements during the creep portion of the test shall be measured and recorded at 1, 2, 3, 4, 5, 6, 10, 20, 30, 50, and 90 minutes. The load during the creep test shall be maintained within 2 percent of the PTL by use of the load cell. The nail shall be uncaged in increments of 25% of the PTL with movements recorded at each uncage load. Each uncage load increment shall be held for a sufficient time to allow stabilization of the movement readings.

17. The proof test acceptance criteria shall be used. Nails failing this criteria shall not be accepted and replacement nails shall be proposed and installed after approval by the engineer.