### SUMMARY OF APPROXIMATE QUANTITIES:

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### WALL DESCRIPTIONS:

- **WALL S-1**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) S FOURMILE LT.
- **WALL S-2**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) S FOURMILE LT.
- **WALL S-3**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) S FOURMILE LT.
- **WALL S-4**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) S FOURMILE LT.
- **WALL S-5**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) S FOURMILE LT.
- **WALL N-1**: CANTILEVER NON-GRAVITY WALL (SOLDIER PILE WALL) N FOURMILE LT.
- **WALL N-2**: CANTILEVER NON-GRAVITY WALL (SOLDIER PILE WALL) N FOURMILE LT.
- **WALL N-3**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) N FOURMILE LT.
- **WALL N-4**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) N FOURMILE LT.
- **WALL N-5**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) N FOURMILE LT.
- **WALL N-6**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) N FOURMILE LT.
- **WALL N-7**: CANTILEVER RETAINING WALL (SPREAD FOOTING WALL) N FOURMILE LT.

### KEYNOTES:

- Structural Concrete shall be painted brown, equivalent to Federal Standard 595C Color 10059.

### Limits of Concrete Coating for Spread Footing Walls:

See Typical Sections for Soldier Pile Wall Structural Concrete Coating Limits.

![Limits of Concrete Coating Diagram](image-url)
NOTES:
1. SEE GEOMETRIC LAYOUT (2 OF 2) FOR ALIGNMENT DATA.
2. FOR ROADWAY ALIGNMENT AND INFORMATION, REFER TO ROADWAY PLANS.
### WALL S-1 Horizontal Alignment Data Table

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1. SEE GEOMETRIC LAYOUT (2 OF 2) FOR ALIGNMENT DATA.
2. FOR ROADWAY ALIGNMENT AND INFORMATION, REFER TO ROADWAY PLANS.
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<th>Point Type</th>
<th>Station</th>
<th>Northing</th>
<th>Easting</th>
<th>Bearing</th>
<th>Distance</th>
<th>Radius</th>
<th>Length</th>
<th>Delta</th>
</tr>
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<tbody>
<tr>
<td>PCC 3000400.00</td>
<td>239917.25</td>
<td>38087.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-3 Pj</td>
<td>239923.49</td>
<td>38084.61</td>
<td>310.25</td>
<td>47.02'</td>
<td>32° 26' 10&quot;</td>
<td></td>
<td>534.75</td>
<td>30.54'</td>
<td>33° 24' 35&quot;</td>
</tr>
<tr>
<td>PBE</td>
<td>239910.79</td>
<td>38087.12</td>
<td>261627.78</td>
<td>261621.5</td>
<td>28.34'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=3+</td>
<td>239923.49</td>
<td>38084.61</td>
<td>38146.21</td>
<td>38145.97</td>
<td>33.60'</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>POE</td>
<td>239903.53</td>
<td>38061.77</td>
<td>38141.59</td>
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</table>

## WALL N-4 HORIZONTAL ALIGNMENT DATA TABLE

<table>
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<th>Station</th>
<th>Northing</th>
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<th>Bearing</th>
<th>Distance</th>
<th>Radius</th>
<th>Length</th>
<th>Delta</th>
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<tbody>
<tr>
<td>PCC 4000400.00</td>
<td>239862.79</td>
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<tr>
<td>N-4 Pj</td>
<td>239854.22</td>
<td>38117.94</td>
<td>290.75</td>
<td>14.66'</td>
<td>32° 34' 21&quot;</td>
<td></td>
<td>534.75</td>
<td>30.54'</td>
<td>33° 24' 35&quot;</td>
</tr>
<tr>
<td>PBE</td>
<td>239850.42</td>
<td>38117.94</td>
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<td>261621.5</td>
<td>28.34'</td>
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<tr>
<td>N=4+</td>
<td>239854.22</td>
<td>38117.94</td>
<td>38146.21</td>
<td>38145.97</td>
<td>33.60'</td>
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<td>POE</td>
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## WALL N-5 HORIZONTAL ALIGNMENT DATA TABLE

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<th>Bearing</th>
<th>Distance</th>
<th>Radius</th>
<th>Length</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC 1000400.00</td>
<td>239902.85</td>
<td>37749.64</td>
<td>28.95</td>
<td>47.35'</td>
<td>33° 35' 32&quot;</td>
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<tr>
<td>N-5 Pj</td>
<td>239902.85</td>
<td>37749.64</td>
<td>159.25</td>
<td>106.65</td>
<td>23° 35' 24&quot;</td>
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<td>38358.31</td>
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<tr>
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<td>37749.64</td>
<td>261567.78</td>
<td>261523.55</td>
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<td>N=5+</td>
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## WALL N-6 HORIZONTAL ALIGNMENT DATA TABLE

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<th>Point Type</th>
<th>Station</th>
<th>Northing</th>
<th>Easting</th>
<th>Bearing</th>
<th>Distance</th>
<th>Radius</th>
<th>Length</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC 5000400.00</td>
<td>261403.91</td>
<td>37550.25</td>
<td>259860.37</td>
<td>259863.15</td>
<td>23° 34' 12&quot;</td>
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</tr>
<tr>
<td>N-6 Pj</td>
<td>261403.91</td>
<td>37550.25</td>
<td>159.25</td>
<td>106.65</td>
<td>23° 35' 24&quot;</td>
<td></td>
<td>38627.98</td>
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<td>PBE</td>
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<td>261567.78</td>
<td>261523.55</td>
<td>38284.88</td>
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## WALL N-7 HORIZONTAL ALIGNMENT DATA TABLE

<table>
<thead>
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<th>Curve Number</th>
<th>Point Type</th>
<th>Station</th>
<th>Northing</th>
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<th>Bearing</th>
<th>Distance</th>
<th>Radius</th>
<th>Length</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC 7000400.00</td>
<td>261507.78</td>
<td>36866.57</td>
<td>259997.25</td>
<td>259963.53</td>
<td>23° 34' 12&quot;</td>
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<td>7000400.00</td>
<td>261507.78</td>
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<td>123.01</td>
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<td>261621.5</td>
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<td>N=7+</td>
<td>7000400.00</td>
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<td>38142.43</td>
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**Note:**

- **Survey Method:** Horizontal Alignment
- **Date:** 03/04/2018
- **Prepared by:** 106-005-001
- **Reviewed by:** 106-005-001
- **Checked by:** 106-005-001
- **Call Center:** Call Utility Notification Center of Colorado
- **Advance Before You Dig:** Grade, Data of Underground Member
- **Data Source:** Call 2-Business Days in Advance Before You Dig, Grade, Data of Underground Member

**Alignment Details:**

- **Project No:**
- **Sheet No:** 164
- **Boulder County Transportation Department Engineering Division**
- **Fourmile Canyon Dr. (North) Geometric Layout (2 of 2)**

---

**Call Center Information:**

- **NO. 164**
- **Sheet 164**
- **Project No:**
- **Date:** 03/04/2018
- **Prepared by:** 106-005-001
- **Reviewed by:** 106-005-001
- **Checked by:** 106-005-001
- **Call Center:** Call Utility Notification Center of Colorado
- **Advance Before You Dig:** Grade, Data of Underground Member
- **Data Source:** Call 2-Business Days in Advance Before You Dig, Grade, Data of Underground Member

**Alignment Details:**

- **Project No:**
- **Sheet No:** 164
- **Boulder County Transportation Department Engineering Division**
- **Fourmile Canyon Dr. (North) Geometric Layout (2 of 2)**
NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND GUARDRAIL INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRICS, REFER TO ROADWAY PLANS.
4. FOR WALL TYPICAL SECTION, SEE TYPICAL SECTIONS SHEET.
5. FOR WALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
6. EXPANSION JOINT LOCATIONS AND WEEP HOLES ARE TO BE APPROVED AS PART OF SHOP DRAWINGS. SEE CUT STONE VENEER DETAILS FOR ADDITIONAL INFORMATION.
**TOP OF WALL DATA TABLE**

<table>
<thead>
<tr>
<th>ROADWAY HCL</th>
<th>ROADWAY HCL</th>
<th>ROADWAY HCL</th>
<th>WALL HCL</th>
<th>TOP OF WALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATION</td>
<td>OFFSET</td>
<td>ORG-AGP.</td>
<td>STATION</td>
<td>ELEVATION</td>
</tr>
<tr>
<td>54482.42</td>
<td>25.60' LT.</td>
<td>0.00</td>
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<td>54476.73</td>
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<td>100042.00</td>
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<td>54462.69</td>
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<tr>
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<tr>
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<tr>
<td>53459.78</td>
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<tr>
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**FOOTING DATA TABLE**

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<th>STATION</th>
<th>BOTTOM OF FOOTING</th>
<th>ELEVATION</th>
<th>STEP HEIGHT (FT.)</th>
<th>SLOPE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000+00.00</td>
<td>5869.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>1000+13.09</td>
<td>5869.50</td>
<td>0.00</td>
<td>0.00</td>
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<td>0.00</td>
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**DESIGN DATA TABLE**

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<th>SEGMENT</th>
<th>STATION STATION RANGE</th>
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<th>DESIGN SLOPE</th>
<th>FOOTING WIDTH</th>
<th>FOOTING LENGTH</th>
<th>SLOPE CO</th>
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<tbody>
<tr>
<td>1</td>
<td>1000+00.00-1000+01.00</td>
<td>7 ft</td>
<td>0°</td>
<td>4.25'</td>
<td>15.83'</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>1000+01.00-1000+02.00</td>
<td>7 ft</td>
<td>0°</td>
<td>4.75'</td>
<td>19.99'</td>
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</tr>
<tr>
<td>3</td>
<td>1000+02.00-1000+03.00</td>
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<td>5.25'</td>
<td>24.14'</td>
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</tr>
<tr>
<td>4</td>
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<td>7 ft</td>
<td>0°</td>
<td>5.75'</td>
<td>28.29'</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>1000+04.00-1000+05.00</td>
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<td>0°</td>
<td>6.25'</td>
<td>32.44'</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
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<td>36.58'</td>
<td>0.00</td>
</tr>
<tr>
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<td>40.73'</td>
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<tr>
<td>8</td>
<td>1000+07.00-1000+08.00</td>
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<td>0°</td>
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<td>44.88'</td>
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<tr>
<td>9</td>
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<td>49.03'</td>
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<tr>
<td>10</td>
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<td>7 ft</td>
<td>0°</td>
<td>8.75'</td>
<td>53.18'</td>
<td>0.00</td>
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**KEYNOTES:**

1. SEE ROADWAY PLANS
2. FINISHED GRADE TO TIE IN TO STREAM RESTORATION WORK BY OTHERS (STREAM RESTORATION WORK NOT SHOWN)
3. SEE DRAINAGE DETAILS FOR RIPRAP WALL PROTECTION
NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND REFERENCE INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRIES, REFER TO ROADWAY PLANS.
4. FOR ALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
5. PILE SPACING SHOWN ON SOLIDER PILE LAYOUT SHEET. SEE SOLIDER PILE WALL DETAILS FOR LOCATION.
6. FOR BOTTOM OF WALL INFORMATION, SEE BOTTOM OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
7. FOR TOP OF WALL INFORMATION, SEE TOP OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
8. DEEP HOLES NOT SHOWN. SEE SOLIDER PILE WALL DETAILS (3 OF 3)
9. FOR MORE INFORMATION.

SCALE: 1"=10'

NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND REFERENCE INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRIES, REFER TO ROADWAY PLANS.
4. FOR ALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
5. PILE SPACING SHOWN ON SOLIDER PILE LAYOUT SHEET. SEE SOLIDER PILE WALL DETAILS FOR LOCATION.
6. FOR BOTTOM OF WALL INFORMATION, SEE BOTTOM OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
7. FOR TOP OF WALL INFORMATION, SEE TOP OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
8. DEEP HOLES NOT SHOWN. SEE SOLIDER PILE WALL DETAILS (3 OF 3)
9. FOR MORE INFORMATION.

SCALE: 1"=10'

NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND REFERENCE INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRIES, REFER TO ROADWAY PLANS.
4. FOR ALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
5. PILE SPACING SHOWN ON SOLIDER PILE LAYOUT SHEET. SEE SOLIDER PILE WALL DETAILS FOR LOCATION.
6. FOR BOTTOM OF WALL INFORMATION, SEE BOTTOM OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
7. FOR TOP OF WALL INFORMATION, SEE TOP OF WALL DATA TABLE ON RETAINING WALL N-1 GENERAL LAYOUT (3 OF 3)
8. DEEP HOLES NOT SHOWN. SEE SOLIDER PILE WALL DETAILS (3 OF 3)
9. FOR MORE INFORMATION.

SCALE: 1"=10'
NOTES:
1. FOR OUT STONE VENEER DETAILS, REFER TO ARCHITECTURAL DETAILS SHEET.
2. THE CONTRACTOR SHALL NOT DISTURB THE EXISTING GROUND CONDITIONS
   EXCEPT AS NECESSARY TO INSTALL THE WALL FOUNDATION AND COMPLETE
   FINISHED GRADING.

KEYNOTES:
1. STRUCTURAL CONCRETE SHALL BE PAINTED BROWN, EQUIVALENT TO
   FEDERAL STANDARD 595C COLOR 10059.
2. SEE DRAINAGE DETAILS FOR RIPRAP WALL PROTECTION

TYPICAL SECTION
LOOKING AHEAD STATION
TAKEN AT C SOLIDER PILE
SCALE 1/4" = 1'-0"
NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND GUARDRAIL INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRIES, REFER TO ROADWAY PLANS.
4. FOR WALL TYPICAL SECTION, SEE TYPICAL SECTIONS SHEET.
5. FOR WALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
6. EXPANDING JOINT LOCATIONS AND WEEP HOLES ARE TO BE APPROVED AS PART OF SHOP DRAWINGS. SEE CUT STONE VENER DETAILS FOR ADDITIONAL INFORMATION.
NOTES:
1. FOR FINISHED GRADING REFER TO DRAINAGE PLANS.
2. FOR REMOVALS, UTILITY, AND GUARDRAIL INFORMATION REFER TO ROADWAY PLANS.
3. FOR ROADWAY GEOMETRIES, REFER TO ROADWAY PLANS.
4. FOR WALL TYPICAL SECTION, SEE TYPICAL SECTIONS SHEET.
5. FOR WALL HCL DATA, SEE GEOMETRIC LAYOUT SHEET.
6. EXPANSION JOINT LOCATIONS AND WEEP HOLES ARE TO BE APPROVED AS PART OF SHOP DRAWINGS. SEE CUT STONE VENEER DETAILS FOR ADDITIONAL INFORMATION.
7. VERY HARD GRANODIORITE BEDROCK MAY BE ENCOUNTERED WITHIN THE LIMITS OF THE PROPOSED WALL. THE WALL FOOTING AND DEPTH MAY BE ADJUSTED BASED ON FIELD CONDITIONS. ANY ADJUSTMENTS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF WORK.

PLAN

ELEVATION
TAKEN AT HCL WALL S-7 / F.F. WALL
STATION 7000+00.00 TO 7001+23.00
### Typical Borehole Log

<table>
<thead>
<tr>
<th>Borehole No.</th>
<th>Sample Type</th>
<th>Penetration Resistance (Blows per foot - OR - inches of penetration)</th>
<th>Material Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>50/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* e.g. A value of 50/3 or 50:3 indicates that 50 blows were applied to the sampler, with a penetration of 3 inches.

### Summary of Laboratory Test Results

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Test Description</th>
<th>Test Value</th>
<th>Sample Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

* Please refer to the full document for detailed laboratory test results.
EXISTING TOP OF SLOPE (THR)

HCL WALL N-1 / F.F. WALL

EXISTING TOP

FINISHED GRADE

GROUND EXISTING

STA. 1000+00 = HCL WALL N-1 BEGIN WALL

FINISHED GRADE BOTT. OF WALL

ENGINEERING DIVISION BOULDER COUNTY TRANSPORTATION DEPARTMENT DESIGNED:

PROJECT NO:

DATE:

CAD:

CHECKED:

REVISION DESCRIPTION:

UTILITIES OF UNDERGROUND MEMBER OR EXCAVATE FOR THE MARKING ADVANCE BEFORE YOU DIG, GRADE, CALL 2-BUSINESS DAYS IN

CALL UTILITY NOTIFICATION CENTER OF COLORADO

REVISIONS:

NO.

SHEET NO:

Kelsey, Dempsey 11:24:15 AM 5/4/2018 pw:\DCPW\APP1.bkrcorp.com:pw\Projects\Transportation\2018\Foursmile\Sheet Files\1_Geotech\DG\138067_GeoWall_N1a.dgn

4043.SEPT12C36

RETAINING WALL N-1 MATCH LINE STA 1001+00

CONSULTING ENGINEERS & SCIENTISTS

Yeh and Associates, Inc.

ENGINEERING GEOLOGY (1/2)

CONSULTING ENGINEERS & SCIENTISTS

Yeh and Associates, Inc.

ENGINEERING GEOLOGY (1/2)

CONSULTING ENGINEERS & SCIENTISTS

Yeh and Associates, Inc.

ENGINEERING GEOLOGY (1/2)

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ENGINEERING GEOLOGY (1/2)

CONSULTING ENGINEERS & SCIENTISTS

Yeh and Associates, Inc.

ENGINEERING GEOLOGY (1/2)

CONSULTING ENGINEERS & SCIENTISTS

Yeh and Associates, Inc.
EXISTING DITCH

ENGINEERING GEOLOGY

BORING LOCATION

PLAN

ELEVATION

TAKEN ALONG HCl WALL N-3 / F.F. WALL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

RETAINING WALL N-3
ENGINEERING GEOLOGY

AD SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
CALL BUSINESS DAYS &
AFTER HOURS, WEEKEND, HOLIDAY OR EMERGENCY FOR THE NUMBER
OF UTILITY SYSTEMS IN COLORADO

Yeh and Associates, Inc.
Consulting Engineers & Scientists

REVISION DESCRIPTION:

UTILITY OF UNDERGROUND MEMBER
OR EXCAVATE FOR THE MARKING
ADVANCE BEFORE YOU DIG, GRADE,
CALL 2-BUSINESS DAYS IN
CALL UTILITY NOTIFICATION CENTER OF COLORADO

LIMITS OF RETAINING WALL N-3

BOTT. OF WALL

FINISHED GRADE (F.F. WALL)

FINISHED GRADE (F.F. WALL)

TOP OF WALL

EXISTING GROUND

BOTT. OF KEY

224+00

223+00

ENGINEERING DIVISION
BOULDER COUNTY TRANSPORTATION DEPARTMENT
DESIGNED:
PROJECT NO:
DATE:
CAD:
CHECKED:
REVISION DESCRIPTION:
DATE

F.F. WALL
HCl WALL N-3

410-18", LIMITS OF RETAINING WALL N-3

STA. 3000+00.00  =
HCl WALL N-3
BEGIN WALL

STA. 3002+11.98  =
HCl WALL N-3
END WALL

F.F. WALL
HCl WALL N-3

STA. 224+06.30
15.25' LT.

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

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4043.SEPT12C36

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FOURMILE CREEK

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4043.SEPT12C36

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FOURMILE CREEK

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NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
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4043.SEPT12C36

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4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'

FOURMILE CREEK

REVISIONS:
NO.

4043.SEPT12C36

10 FT

SCALE: 1"=20'
CHECKED:

THE DOVETAIL ANCHORS SHALL BE 303 SV - SEISMIC-NOTCH AS CUT STONE VENEER SHALL BE ANCHORED TO THE WALL BMT REINFORCING STEEL IN STRUCTURAL CONCRETE NOT SHOWN.

MORTAR JOINTS SHALL BE 2" MAXIMUM THICKNESS UNLESS VENEER PATTERN SHALL NOT BE BROKEN WITH A VERTICAL FIELD BEND WIRE SO THAT TAILS ARE EMBEDDED IN THE MIDDLE WIRE SHALL BE 9 GAUGE PLAIN COLD-DRAWN STEEL WIRE

DOVETAIL SLOTS SHALL BE TYPE 305 AS MANUFACTURED CONCRETE SURFACES SHALL BE PREPARED IN ACCORDANCE WITH ALL WORK NECESSARY FOR THE INSTALLATION OF CUT STONE TOOL SEALANT TO A ROUNDED SURFACE AND THE REQUIRED NO. CUT STONE VENEER SHALL BE DAKOTA TOP ROCK AS SUPPLIED VENEER LIMITS EXTEND TO 1'-6" MINIMUM BELOW FINISHED GRADE

NOTES:

1. CUT STONE VENEER SHALL BE DAKOTA TOP ROCK AS SUPPLIED BY ELDORADO STONE OR APPROVED EQUAL AND PLACED A RANDOM PATTERN.

2. DOVETAIL SLOTS SHALL BE TYPE 305 AS MANUFACTURED BY HEMANN & BARNARD, INC. OR APPROVED EQUAL, THEY SHALL BE 22 GAUGE HOT-DIPPED GALVANIZED STEEL.

3. THE DOVETAIL ANCHORS SHALL BE 303 SV - SEISMIC-NOTCH AS MANUFACTURED BY HEMANN & BARNARD, INC. OR AN APPROVED EQUAL MATERIAL FOR DOVETAIL ANCHORS SHALL BE 12 GAUGE HOT-DIPPED GALVANIZED STEEL.

4. WIRE SHALL BE 9 GAUGE PLAIN COLD-DRAWN STEEL WIRE CONFORMING TO ASTM A522, WIRE SHALL BE 9 GALVANIZED CONFORMING TO ASTM A522.

5. CONCRETE SURFACES SHALL BE PREPARED IN ACCORDANCE WITH SUPPLIER'S RECOMMENDATION PRIOR TO INSTALLATION OF CUT STONE VENEER.

6. MORTAR JOINTS SHALL BE 2" MAXIMUM THICKNESS UNLESS SHOWN OTHERWISE

7. ALL WORK NEEDED FOR THE INSTALLATION OF CUT STONE VENEER, INCLUDING SURFACE PREPARATION, DOVETAIL SLOTS, WIRE TIES, STONE CAP STONE, MORTAR AND MISC. HARDWARE, SHALL BE INCLUDED IN ITEM 601 CUT STONE VENEER.

8. CUT STONE VENEER SHALL BE ANCHORED TO THE WALL CONCRETE BY MEANS OF WIRE TIES PLACED IN DOVETAIL SLOTS AS SHOWN. ALTERNATIVE METHODS OF ANCHORING THE STONE VENEER MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

9. REINFORCING STEEL IN STRUCTURAL CONCRETE NOT SHOWN.

10. VENEER LIMITS EXTEND TO 1'-6" MINIMUM BELOW FINISHED GRADE ON ALL EXPOSED CONCRETE SURFACES.

KEYNOTES:

1. TOOL SEALANT TO A ROUNDED SURFACE AND THE REQUIRED WORKING LINE SHOWN. COLOR TO MATCH MORTAR JOINTS.

2. VENEER PATTERN SHALL NOT BE BROKEN WITH A VERTICAL JOINT AT WALL EXPANSION JOINT. PROVIDE EXPANSION JOINT IN VENEER FOLLOWING WORKING LINE AS SHOWN.

3. FIELD BEND WIRE SO THAT TAILS ARE EMBEDDED IN THE MIDDLE OF MORTAR BED 1" MINIMUM FROM STRUCTURAL CONCRETE.
NOTES

2. Temporary casing may be required to prevent caving of granular soils and/or to reduce intrusion of ground water. Temporary casing and dewatering shall be incidental to Item 503 Drilled Caisson.

3. Drilled caisson concrete shall be concrete class BZ.

KEYNOTES

1. 2" CLEAR PER PLAN.

2. 3" CLEAR PER PLAN.
### WALL N-1 SOLDIER PILE DATA TABLE

<table>
<thead>
<tr>
<th>STATION</th>
<th>EASTING</th>
<th>AS-BUILT</th>
<th>TOP OF ELEVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>209</td>
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<td>6405.70</td>
</tr>
<tr>
<td>209</td>
<td>6401.75</td>
<td>19.00 FT</td>
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</tr>
<tr>
<td>209</td>
<td>6401.75</td>
<td>19.00 FT</td>
<td>6405.70</td>
</tr>
</tbody>
</table>

### WALL N-2 SOLDIER PILE DATA TABLE

<table>
<thead>
<tr>
<th>STATION</th>
<th>EASTING</th>
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</tr>
</thead>
<tbody>
<tr>
<td>209</td>
<td>6411.36</td>
<td>19.00 FT</td>
<td>6405.70</td>
</tr>
<tr>
<td>209</td>
<td>6401.75</td>
<td>19.00 FT</td>
<td>6405.70</td>
</tr>
<tr>
<td>209</td>
<td>6401.75</td>
<td>19.00 FT</td>
<td>6405.70</td>
</tr>
</tbody>
</table>

### NOTES
1. Estimated deflections are approximate and may vary depending on soil conditions and driving procedures.

### AD SET
- CHALLENGE INSTRUCTION CENTER OF COLORADO
- CHALLENGE INSTRUCTION CENTER OF COLORADO
- CHALLENGE INSTRUCTION CENTER OF COLORADO
- CHALLENGE INSTRUCTION CENTER OF COLORADO

### BIBLIOGRAPHY
- BOULDER COUNTY TRANSPORTATION DEPARTMENT
- SOLDIER PILE WALL DETAILS
(2 OF 3)
NOTES:
1. FACING CONCRETE SHALL BE CONCRETE CLASS D (WALL).
2. WEEP HOLES SHALL BE 3 INCH DIAMETER SCHEDULE 40 PVC PIPE POSITIONED 6 INCHES CLEAR ABOVE FINISHED GRADE (F.F. WALL). PROVIDE 1 INCH CLEAR TO REINFORCING.
3. GEOCOMPOSITE DRAIN SHALL BE SECURED TO PREVENT MOVEMENT DURING OPERATIONS.
4. ALL ELEMENTS ASSOCIATED WITH LAGGING, GEOCOMPOSITE DRAIN, AND WEEP HOLES SHALL BE INCLUDED IN ITEM 601 CONCRETE CLASS D (WALL).
5. THE CONTRACTOR SHALL DESIGN LAGGING TO SPAN BETWEEN SOLDIER PILES. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND WORKING DRAWINGS SEALED BY THE CONTRACTOR'S ENGINEER FOR INFORMATION ONLY 10 DAYS BEFORE THE START OF WORK.
6. FOR ARCHITECTURAL DETAILS AND ASSOCIATED EMBEDDED ELEMENTS, REFER TO CUT STONE VENEER SHEETS.
7. F.F. WALL SHALL BE PLUMB. SEE SOLDIER PILE DETAIL FOR INCIDENTAL CONCRETE QUANTITIES NOT SHOWN.
8. DRILLED CAISSON SHALL BE INSTALLED TO MINIMUM TIP ELEVATION SPECIFIED IN DATA TABLE ON SOLDIER PILE WALL DETAILS (2 OF 3). IF ROCK IS ENCOUNTERED BEFORE HITTING THE SPECIFIED TIP ELEVATION AND VERIFIED BY A GEOTECHNICAL ENGINEER, THE MINIMUM EMBEDMENT REQUIRED SHALL BE 5' INTO THE ROCK LAYER BUT NOT DEEPER THAN THE MINIMUM REQUIRED TIP ELEVATION.

---

FACING CONCRETE SHALL BE CONCRETE CLASS D (WALL).

WEEP HOLES SHALL BE 3 INCH DIAMETER SCHEDULE 40 PVC PIPE POSITIONED 6 INCHES CLEAR ABOVE FINISHED GRADE (F.F. WALL). PROVIDE 1 INCH CLEAR TO REINFORCING.

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FOR ARCHITECTURAL DETAILS AND ASSOCIATED EMBEDDED ELEMENTS, REFER TO CUT STONE VENEER SHEETS.

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NOTES:
1. THIS SHEET GIVES THE MINIMUM EXTENT OF EARTHWORK, THE CONTRACTOR MAY ELECT TO EXTEND THE STRUCTURE EXCAVATION AND STRUCTURE BACKFILL BEYOND THE LIMITS SHOWN. ANY ADDITIONAL EXCAVATION BEYOND THE WALL SHALL BE BACKFILLED WITH STRUCTURE BACKFILL (CLASS I). ANY ADDITIONAL EXCAVATION OR BACKFILL EXTENDING THE LIMITS SHOWN ON THIS SHEET WILL BE BORNE BY THE CONTRACTOR AND WILL NOT BE MEASURED OR PAID FOR.
2. EXCAVATION AND BACKFILL IN THE DRILLED HOLE OF THE CAISSON SHALL NOT BE PAID FOR SEPARATELY BUT INCLUDED IN ITEM 503 DRILLED CAISSON.
3. FOR DRAINAGE DETAILS, SEE SOLDIER PILE WALL DETAILS.

KEYNOTES:
1. DIMENSION SHOWN IS USED FOR QUANTITY PURPOSES ONLY AND APPLIES FROM BEGINNING TO END OF WALL.

LEGEND:
- PAY LIMITS OF STRUCTURE EXCAVATION

TYPICAL SECTION
SCALE: 1" = 1'-0"
NOTES:
1. FOR EXISTING STRUCTURE LOCATIONS, SEE GENERAL LAYOUT SHEETS.
2. THE CONTRACTOR IS RESPONSIBLE FOR STABILITY OF EXISTING STRUCTURES DURING CONSTRUCTION.
3. ALTERNATIVE DETAILS MAY BE PROVIDED FOR APPROVAL.
4. THE CONTRACTOR SHALL BE PREPARED TO ADDRESS UNKNOWNS SUCH AS LIMITS OF EXISTING STRUCTURES AND ADJUSTMENT OF WALL REINFORCEMENT TO ACCOMMODATE FIELD CONDITIONS.

KEYNOTES:
1. LIMITS OF EXISTING BRIDGE SUPERSTRUCTURE, SUBSTRUCTURE AND FOUNDATION TO BE PROTECTED IN PLACE ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR. ALL WORK TO PROTECT THE EXISTING STRUCTURES DURING EXCAVATION SHALL BE INCLUDED IN THE COST OF ITEM 206 STRUCTURE EXCAVATION. THE CONTRACTOR SHALL INSTALL THE PROPOSED WALL FOOTING TO THE LIMITS SHOWN ON THE PLANS. IF THE EXISTING BRIDGE STRUCTURE INTERFERES WITH THE LOCATION OF THE PROPOSED WALL FOOTING, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO COMMENCING WORK ON THE INSTALLATION OF THE WALL FOOTING. AT NO POINT SHALL THE CONTRACTOR BE PERMITTED TO EXCAVATE BEHIND AN EXISTING BRIDGE ELEMENT WITHOUT APPROVAL OF THE ENGINEER.

2. EXISTING STRUCTURES DURING EXCAVATION SHALL BE INCLUDED IN THE COST OF ITEM 206 STRUCTURE EXCAVATION. THE CONTRACTOR SHALL INSTALL THE PROPOSED WALL FOOTING TO THE LIMITS SHOWN ON THE PLANS. IF THE EXISTING BRIDGE STRUCTURE INTERFERES WITH THE LOCATION OF THE PROPOSED WALL FOOTING, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO COMMENCING WORK ON THE INSTALLATION OF THE WALL FOOTING. AT NO POINT SHALL THE CONTRACTOR BE PERMITTED TO EXCAVATE BEHIND AN EXISTING BRIDGE ELEMENT WITHOUT APPROVAL OF THE ENGINEER.

3. THE CONTRACTOR IS RESPONSIBLE FOR STABILITY OF EXISTING STRUCTURES DURING CONSTRUCTION.

4. THE CONTRACTOR SHALL BE PREPARED TO ADDRESS UNKNOWNS SUCH AS LIMITS OF EXISTING STRUCTURES AND ADJUSTMENT OF WALL REINFORCEMENT TO ACCOMMODATE FIELD CONDITIONS.

FIELD FIT DETAIL FOR END OF WALL AT EXISTING BRIDGE
SCALE 1" = 5'-0"
### SPREAD FOOTING WINGWALL DATA TABLE

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<tr>
<th>PARAMETER</th>
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<th>UNIT.</th>
<th>3.00 FT.</th>
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<th>5.00 FT.</th>
<th>6.00 FT.</th>
<th>7.00 FT.</th>
<th>8.00 FT.</th>
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<th>13.00 FT.</th>
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</thead>
<tbody>
<tr>
<td>DESIGN HEIGHT (DH)</td>
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<td>REINFORCING STEEL</td>
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<td>STEMM THICKNESS AT TOP OF FOOTING</td>
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<td>115.7</td>
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<td>220.2</td>
<td>231.8</td>
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</tr>
</tbody>
</table>

### NOTES:
1. Finished grade at the front face of wall shall be 3'-6" min. above bottom of footing.
2. Wall height may exceed design height by up to 6 inches in accordance with COCD standard plan No.W-501-20.
3. All concrete shall be class D (wall).
4. Wall drainage shall be provided. Weep holes not shown, slope 2" to drain. All drainage items shall be included with item 601, Class D (Box Culvert).
5. For veneer details including embedded elements not shown, see cut stone veneer details.
6. Soil top map not shown. For additional details, see drainage plans.

### KEYNOTES:
1. Optional splice.
2. For footing widths, see design data tables on general layout sheets.

### SPREAD FOOTING WINGWALL TYPICAL SECTION

**SCALE: 1" = 1'-0"**
NOTES:
1. THIS SHEET GIVES THE MINIMUM EXTENT OF EARTHWORK. THE CONTRACTOR MAY ELECT TO EXTEND THE STRUCTURE EXCAVATION AND STRUCTURE BACKFILL BEYOND THE LIMITS SHOWN. ANY ADDITIONAL EXCAVATION BEHIND THE WALL SHALL BE BACKFILLED WITH STRUCTURE BACKFILL (CLASS 1). ANY ADDITIONAL EXCAVATION OR BACKFILL BEYOND THE LIMITS SHOWN ON THIS SHEET WILL BE BORNE BY THE CONTRACTOR AND WILL NOT BE MEASURED OR PAID FOR.
2. EXCAVATION AND BACKFILL IN THE DRILLED HOLE OF THE CAISSON SHALL NOT BE PAID FOR SEPARATELY BUT INCLUDED IN ITEM 503 DRILLED CAISSON.
3. FOR DRAINAGE DETAILS, SEE SPREAD FOOTING WALL DETAILS.

LEGEND:
- PAY LIMITS OF STRUCTURE EXCAVATION
- LIMITS OF STRUCTURE BACKFILL (CLASS 1)
NOTES:
1. FOR PIPE BLOCKOUT LOCATIONS, SEE GENERAL LAYOUT SHEETS.
2. BRIDGE RAIL SHOP DRAWINGS SHALL IDENTIFY PIPE BLOCKOUT LOCATIONS.
3. THE FINAL DIMENSIONS, LOCATION, STATION, ELEVATION, AND INTERCEPT
   GRADE ANGLE OF THE PIPE-RUN (TO THE WALL) SHALL BE SUBMITTED BY THE
   CONTRACTOR'S ENGINEER.
4. THE CONTRACTOR IS TO SURVEY AND STAKE THE PIPE-RUN INFORMATION
   IN THE FIELD, PRIOR TO CONSTRUCTION.
5. ALTERNATE THROUGH-PIPE DETAILS MAY BE SUBMITTED FOR ENGINEER
   APPROVAL.

RIGID PIPE BLOCKOUT DETAIL

SECTION
NOTES:


2. POST, ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A36 STEEL, AND NEED NOT BE GALVANIZED.

3. POSTS, POST ANCHORS, BASE PLATES, ANCHOR BOLTS, MISCELLANEOUS BOLTS, NUTS, WASHERS, TUBES, TUBE EXPANSION DEVICES, TUBE SPLICES, END PLATES, W-BEAM, W-BEAM EXPANSION DEVICES, CURB CONCRETE (CLASS D), AND CURB REINFORCING STEEL SHALL BE INCLUDED IN ITEM NO. 606 BRIDGE RAIL TYPE 3.

4. THE TUBING SPLICES SHALL BE SHOP BENT OR FABRICATED TO FIT HORIZONTAL CURVE WHEN THE RADIUS IS LESS THAN 1,500 FEET.

5. TUBES SHALL BE CONTINUOUS OVER NO LESS THAN TWO POSTS. NO HELPED BOLT SPLICES WILL BE ALLOWED IN THE TUBE SECTIONS.

6. POSTS SHALL BE PERPENDICULAR TO THE LONGITUDINAL ROADWAY GRADE.

7. CONTRACTOR SHALL PROVIDE TERMINAL SECTION (FLARED) WHEN NO APPROACH GUARDRAIL IS USED WITH THE COST INCLUDED IN ITEM NO. 606 BRIDGE RAIL TYPE 3.

8. FOR ADDITIONAL DETAILS, SEE STANDARD PLAN NO. M-606-1.

9. PRIOR TO FABRICATION OF THIS ITEM, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.

10. TERMINAL AND TRANSITION INCLUDED WITH ROADWAY QUANTITIES.
POST DETAIL

SECTION

BACKING TUBE DETAIL

VIEW

ANCHOR DETAIL

W-Beam Expansion Device Detail

Splice bolts not shown

TUBE SPlice DETAIL

Tube splices: Slot all tubes, stagger top and bottom splices into different post spacings except at expansion joint, place opposite ends of same post space. (Range of motion = 1'-0" at bridge expansion device.)

Fabricated from A588 steel

Call Utility Notification Center of Colorado three days in advance before digging, marking of underground member or excavating for the purpose of overdrilling.

Call Utility Notification Center of Colorado 2-business days in advance before you dig, grade, or excavate. grade.

National City, Colorado

Boulder County Transportation Department

Engineering Division

Fourmile Canyon Dr

Bridge Rail Type 3

SPO

Designated:

Project No:

Date:

Rev:

Utilities

CAD:

Check:

Revision Description

Sheet No:

AD Set

Engineering Division

Boulder County Transportation Department

Fourmile Canyon Dr

Bridge Rail Type 3

(2 of 2)

5/4/2018

DESIGNED:

PROJECT NO:

DATE:

CAD:

CHECKED:

REVISION DESCRIPTION:

DATE

UTILITIES

OF UNDERGROUND MEMBER

OR EXCAVATE FOR THE MARKING

ADVANCE BEFORE YOU DIG, GRADE,

CALL 2-BUSINESS DAYS IN

CALL UTILITY NOTIFICATION CENTER OF COLORADO

R E V I S I O N S :

NO.

S P O

5/4/2018

AD SET

ENGINEERING DIVISION

BOULDER COUNTY TRANSPORTATION DEPARTMENT

FOURMILE CANYON DR

BRIDGE RAIL TYPE 3

FOURMILE CANYON DR

W-BEAM EXPANSION DEVICE DETAIL

SPLICE BOLTS NOT SHOWN