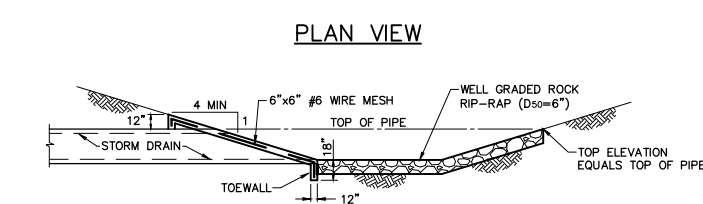
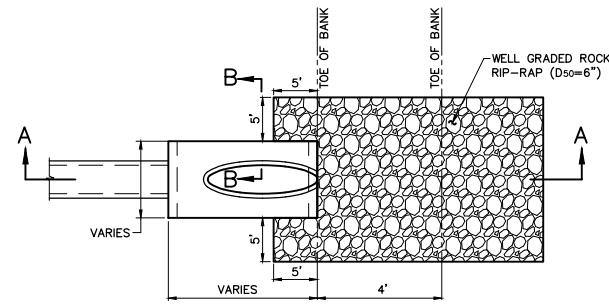


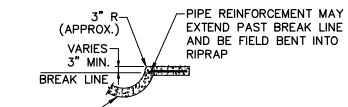
NELSON
6/14/2017 11:56 AM
M:\VWC-37\3782-16.05A\DWG\CIVIL C-3D 2015\3782-16.054STRM.DWG

| RIP-RAP GRADATIONS | |
|-------------------------|-----------------|
| 8" THICKNESS OF RIP-RAP | |
| SIEVE SIZE SQUARE MESH | PERCENT PASSING |
| 10 INCH | 100 |
| 8 INCH | 70 - 100 |
| 6 INCH | 50 - 75 |
| 3 INCH | 20 - 40 |
| 1-1/2 INCH | 0 - 15 |

| BEDDING GRADATIONS | |
|-------------------------|-----------------|
| 6" THICKNESS OF BEDDING | |
| SIEVE SIZE SQUARE MESH | PERCENT PASSING |
| 3 INCH | 100 |
| 1-1/2 INCH | 55 - 100 |
| 3/4 INCH | 25 - 60 |
| 3/8 INCH | 5 - 30 |
| No. 4 | 0 - 10 |



SECTION A-A



SECTION B-B

STA 0+00 LINE "ST-14"
REINFORCED CONCRETE SLOPING HEADWALL

1

NOT TO SCALE

RIP-RAP GRADATION CALCULATIONS

$$1) D_{50} = \frac{V_w \cdot V_{100}^2}{2G(\delta_s - \delta_w)C^2} \quad D_{50} = \frac{62.4 \times 11.42}{64.4 \times 92.6 \times 0.86^2}$$

$$D_{50} = \frac{712.61}{4410.56} = 0.16'$$

$$V_{100} = 3.38 \text{ fps} \quad Q_{100} = 85.98 \text{ cfs} \quad D_{50} = 1.94'$$

$$C = 0.86 \text{ (HIGH TURBULENCE)}, 1.2 \text{ (LOW TURBULENCE)}$$

$$\delta_w = 62.4 \text{ lb/cf}$$

$$\delta_s = 155 \text{ lb/cf}$$

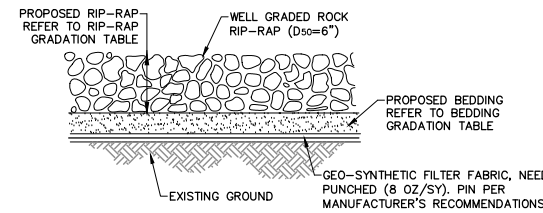
$$G = 32.2 \text{ ft/s}^2$$

RESULTS
D₅₀ = 2" ≤ 6"

$$2) D_{50} = \frac{C}{T_w} \left(\frac{Q}{D_o} \right)^{1/3} \quad D_{50} = \frac{0.0082}{2'} \left(\frac{94.00}{2'} \right)^{1/3} = 0.695'$$

D_o = DIAMETER OR WIDTH OF STORM DRAIN
Q = STORM DRAIN DISCHARGE CFS = 94.00 cfs
T_w = TAILWATER DEPTH ABOVE DRAIN INVERT FT
C = 0.0125 FOR 0.50'-DEEP PREFORMED SCOUR HOLE
= 0.0082 FOR 1.00'-DEEP PREFORMED SCOUR HOLE

RESULTS
D₅₀ = 8"



DRY STONE RIP-RAP SPECIFICATIONS & GRADING
THE FOLLOWING SPECIFICATIONS AND GRADATIONS ARE MINIMUMS TO BE USED IN CONSTRUCTION.

- USE FIELD OR QUARRY DRY STONE RIP-RAP.
- ALL STONES SHALL HAVE A MINIMUM UNIT WEIGHT OF 155 lb/cf. QUARRY DATA SHEETS FOR RIP-RAP TO BE APPROVED PRIOR TO INSTALLATION.
- MINIMUM BED DEPTH OF RIP-RAP SHALL BE 6".
- STONES SHALL BE PLACED IN A SINGLE LAYER WITH CLOSED JOINTS. THE UPRIGHT AXIS OF THE STONES SHALL BE NEARLY PERPENDICULAR TO THE EMBANKMENT SLOPE. THE COURSES SHALL BE PLACED FROM THE BOTTOM OF THE EMBANKMENT UPWARDLY, WITH LARGER STONES BEING PLACED IN THE LOWER COURSES. OPEN JOINTS SHALL BE FILLED WITH SPALLS. STONES THAT PROJECT MORE THAN THE ALLOWABLE AMOUNT IN THE FINISHED WORK SHALL BE REPLACED, EMBEDDED DEEPER, OR CHIPPED.
- RIP RAP SHALL BE STOCKPILED AND APPROVED PRIOR TO INSTALLATION.

NOTE:

- EQUATION 1 CAME FROM THE US ARMY ENGINEERS WATERWAYS EXPERIMENT STATION, CE, HYDRAULIC DESIGN CRITERIA, SHEET 712-1, 1970
- EQUATION 2 CAME FROM THE US ARMY ENGINEERS WATERWAYS EXPERIMENT STATION, CE, HYDRAULIC DESIGN CRITERIA, SHEET 722-7, 1970

RECORD DRAWING

THE SIGNED AND SEALED CONSTRUCTION DOCUMENT HAS BEEN REVISED TO REFLECT CONSTRUCTION RECORDS MAINTAINED AND PROVIDED BY THE CONTRACTOR FOR THIS PROJECT. THE INFORMATION SHOWN ON THIS RECORD DRAWING, WHICH WAS PROVIDED BY THE CONTRACTOR, OR OTHERS NOT ASSOCIATED WITH THE DESIGN ENGINEER, CANNOT BE VERIFIED FOR ACCURACY OR COMPLETENESS. PACHECO KOCH SHALL ASSUME NO LIABILITY FOR ANY CHANGES MADE DURING CONSTRUCTION THAT WERE NOT SPECIFICALLY APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE SEALED CONSTRUCTION DRAWINGS ARE ON FILE AT THE OFFICES OF PACHECO KOCH.

ATTESTED BY:
ENGINEER OF RECORD: CHET LEUGERS, P.E.
CONTRACTOR: MILLER-VALENTINE CONSTRUCTION
DATE REVISED: 06/08/2017

| NO. | DATE | REVISION |
|------------|-----------------|----------|
| 06/09/2017 | RECORD DRAWINGS | |
| 09/19/2016 | REVISED DETAIL | |

7557 RAMBLER ROAD, SUITE 1400
DALLAS, TX 75231 972.235.3031
TX REG. ENGINEERING FIRM F-14439
TX REG. SURVEYING FIRM LS-10193805

| RIP-RAP DETAILS | | | | | | |
|------------------------------------------|-------|-----------|--------|-------|------|-------------|
| ROCKWALL MANUFACTURING FACILITY | | | | | | |
| LOT 1, BLOCK A, ROCKWALL | | | | | | |
| TECHNOLOGY PARK, PHASE IV | | | | | | |
| CITY OF ROCKWALL, ROCKWALL COUNTY, TEXAS | | | | | | |
| DESIGN | DRAWN | DATE | SCALE | NOTES | FILE | NO. |
| CTL | RHB | JULY 2016 | N.T.S. | | | C4.9 |