# DEVELOPMENT AND EXPANSION OF THE DAFB CARGO RAMP

## EAST DOVER HUNDRED, DOVER, DELAWARE

**DATA COLUMN**

1. COUNTY TAX MAP: (SEE NOTE BELOW)
   ED-05-087.00-01-07.00
   ED-05-087.00-01-07.02
   ED-05-087.00-01-07.03
   ED-05-087.00-01-07.04
   ED-05-087.00-01-08.00
   ED-05-087.00-01-09.00
   ED-05-087.00-01-06.00

2. ZONING: EXISITNG: IPM
   PROPOSED: N/A

3. LOT AREA:
   3.781 ACRES (TP. ED-05-087.00-01-07.00)
   3.037 ACRES (TP. ED-05-087.00-01-07.02)
   3.470 ACRES (T.P. ED-05-087.00-01-07.03)
   2.868 ACRES (T.P. ED-05-087.00-01-07.04)
   17.002 ACRES (T.P. ED-05-087.00-01-08.00)
   2.951 ACRES (T.P. ED-05-087.00-01-09.00)
   TOTAL: 33.109 ACRES

4. SOURCE OF TITLE:
   D.R. O-29-282 (T.P. ED-05-087.00-01-07.00)
   D.R. O-29-282 (T.P. ED-05-087.00-01-07.02)
   D.R. O-29-282 (T.P. ED-05-087.00-01-07.03)
   D.R. O-29-282 (T.P. ED-05-087.00-01-07.04)
   D.R. D-35-65 (T.P. ED-05-087.00-01-08.00)
   D.R. G-27-386 (T.P. ED-05-087.00-01-09.00)

5. SITE ADDRESS:
   STARLIFTER AVENUE, DOVER, DE (T.P. ED-05-087.00-01-07.00)
   STARLIFTER AVENUE, DOVER, DE (TP. ED-05-087.00-01-07.02)
   STARLIFTER AVENUE, DOVER, DE (TP. ED-05-087.00-01-07.03)
   STARLIFTER AVENUE, DOVER, DE (TP. ED-05-087.00-01-07.04)
   HORSEPOND ROAD, DOVER, DE (TP. ED-05-087.00-01-08.00)
   HORSEPOND ROAD, DOVER, DE (TP. ED-05-087.00-01-09.00)

6. EXISTING USE: INDUSTRIAL PARK/CIVL AIR TERMINAL

7. PROPOSED USE: CIVIL AIR TERMINAL/PROPOSED RAMP

8. DATUM:
   VERTICAL - NAVD 88
   HORIZONTAL - NAD 83

9. MONUMENTS EXISTING: 15
   PROPOSED: 0

10. FLOOD PLAIN MAP
    PER FIRM MAP NUMBER 100010188HC, DATED MAY 5, 2003, THIS SITE LIES WITHIN ZONE X, AREAS TO BE DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

11. SITE BREAKDOWN
    T.P. ED-05-087.00-01-07.00
    OPEN SPACE 3.781 ACRES
    T.P. ED-05-087.00-01-07.02
    OPEN SPACE 3.037 ACRES
    T.P. ED-05-087.00-01-07.03
    OPEN SPACE 3.470 ACRES
    T.P. ED-05-087.00-01-07.04
    OPEN SPACE 2.868 ACRES
    T.P. ED-05-087.00-01-08.00
    IMPERVIOUS 5.709 ACRES
    SWM 1.384 ACRES
    OPEN SPACE 9.909 ACRES
    TOTAL 17.002 ACRES
    T.P. ED-05-087.00-01-09.00
    IMPERVIOUS 1.713 ACRES
    OPEN SPACE 1.238 ACRES
    TOTAL 2.951 ACRES

12. TOPOGRAPHY
    BOUNDARY AND TOPOGRAPHIC SURVEY DATA SHOWN HEREON WAS PREPARED BY CENTURY ENGINEERING, INC., DOVER, DE, IN APRIL 2013.

13. TOTAL LAND DISTURBANCE
    THE TOTAL LAND DISTURBANCE PROPOSED BY THIS PLAN IS 40.02 ACRES (1,743,121 S.F.)

14. LIMITS OF CONSTRUCTION
    THE TOTAL LIMITS OF CONSTRUCTION FOR THE SITE IS 48.63 ACRES (2,118,323 S.F.)

15. WETLANDS
    A WETLANDS REPORT WAS PREPARED BY CENTURY ENGINEERING, INC. ON SEPTEMBER 23, 2010. A WETLANDS FIELD INVESTIGATION WAS PERFORMED BY CENTURY ENGINEERING, INC. ON JUNE 30-JULY 2, 2010 AND JULY 29, 2010, WETLANDS WERE FOUND TO EXIST ON THE SUBJECT PARCELS. A REVISED REPORT WAS PREPARED ON MARCH 6, 2013.

    A WETLANDS PERMIT WAS GRANTED ON JULY 8, 2013, SEE PERMIT NO. CENAP-OP-R-2013-652-23 (NWP39).

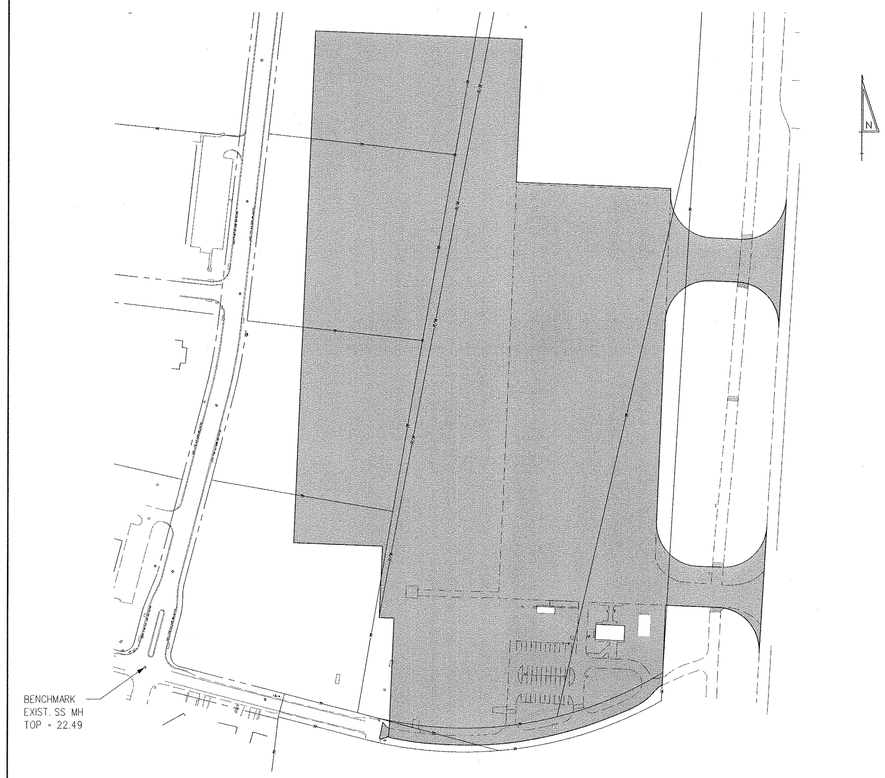
16. DEBRIS DISPOSAL
    NO DEBRIS SHALL BE BURIED ON THE SITE. ANY BURIED DEBRIS ENCOUNTERED SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED FACILITY.

17. PROPERTY OWNER
    T.P. ED-05-087.00-01-07.00, T.P. ED-05-087.00-01-07.02,
    T.P. ED-05-087.00-01-07.03, T.P. ED-05-087.00-01-07.04
    KENT COUNTY
    555 BAY ROAD
    DOVER, DE 19901

    T.P. ED-05-087.01-08.00, T.P. ED-05-087.00-01-09.00
    STATE OF DELAWARE
    P.O. BOX 778
    DOVER, DE 19903

    T.P. ED-05-087.00-01-06.00
    UNITED STATES OF AMERICA
    DOVER AIR FORCE BASE
    DOVER, DE 19901

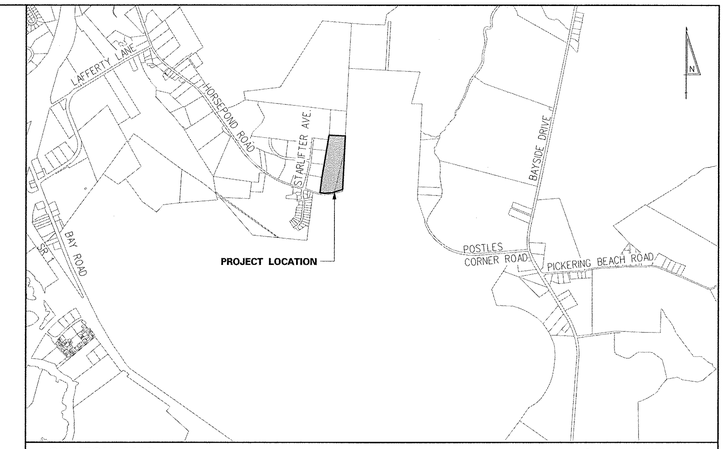
18. CIVIL ENGINEER
    CENTURY ENGINEERING, INC.
    4134 NORTH DUPONT HIGHWAY
    DOVER, DE 19901
    SCOTT L. RATHFON, P.E.
    PHONE: (302)734-9188
    FAX: (302) 734-4589




19. BENCHMARK
    EXISTING SANITARY SEWER MANHOLE
    TOP ELEV. = 22.49

20. EXISTING PARCEL INFORMATION
    PROJECT INCLUDES SIX (6) EXISTING TAX PARCELS. SUCCESSFUL BIDDER SHALL BE RESPONSIBLE FOR CONSOLIDATION OF LOTS PRIOR TO CITY OF DOVER PLAN APPROVAL. PROPOSED CONTOURS IN THIS PLAN REFLECT PROPOSED LOT CONSOLIDATION.

State of Delaware DNREC
Sediment and Stormwater Management Plan
No.: 2013-124 (2 of 2)
By: Randall K. Swan
Title: EA
Approval Date: 4/21/14
Expiration Date: 4/21/17




**LOCATION MAP** 1" = 2,000'

**INDEX OF SHEETS**


| | |
|---|---|
| C-100 | STORMWATER MANAGEMENT PLAN COVER SHEET |
| C-101 | STORMWATER MANAGEMENT PLAN LEGEND & NOTES |
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| C-103 | STORMWATER MANAGEMENT PLAN - EXISTING CONDITIONS PLAN |
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| C-112 | STORMWATER MANAGEMENT PLAN - INFILTRATION FACILITY NO. 2 |
| C-113 | STORMWATER MANAGEMENT DETAIL - INFILTRATION FACILITY NO. 2 |
| C-114 | STORMWATER MANAGEMENT DETAIL - INFILTRATION FACILITY NO. 2 |
| C-115 | STORMWATER MANAGEMENT DETAIL - INFILTRATION FACILITY NO. 2 |
| C-116 | STORMWATER MANAGEMENT PLAN - INFILTRATION FACILITY NO. 3 |
| C-117 | STORMWATER MANAGEMENT DETAIL - INFILTRATION FACILITY NO. 3 |
| C-118 | STORMWATER MANAGEMENT DETAIL - INFILTRATION FACILITY NO. 3 |
| C-119 | STORMWATER MANAGEMENT GENERAL DETAILS |


**GENERAL NOTES**

1. DNREC, SEDIMENT AND STORMWATER MANAGEMENT PROGRAM MUST BE NOTIFIED IN WRITING FIVE (5) DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
2. REVIEW AND APPROVAL OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE REQUIREMENTS OF THE SEDIMENT AND STORMWATER MANAGEMENT REGULATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM ERRORS OR OMISSIONS IN THE APPROVED PLAN.
3. IF THE APPROVED PLAN NEEDS TO BE MODIFIED, ADDITIONAL SEDIMENT AND STORMWATER CONTROL MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY THE DNREC.
4. FOLLOWING THE SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITH 14 CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER SEDIMENT CONTROLS, SOIL STOCKPILES AND ALL OTHER DISTURBED OR GRADED AREAS IN THE PROJECT SITE.
5. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO MAINTAIN AND REPAIR ALL EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PRACTICES DURING UTILITY INSTALLATION.

**OWNER/DEVELOPER CERTIFICATION**

I, THE UNDERSIGNED, CERTIFY THAT ALL LAND CLEARING, CONSTRUCTION AND DEVELOPMENT SHALL BE DONE PURSUANT TO THE APPROVED PLAN.

DREW BOYCE, P.E. — DATE 4/7/14
DIRECTOR, PLANNING
DELAWARE DEPARTMENT OF TRANPORTATION
800 BAY ROAD
DOVER, DE 19903
(302) 760-2276

**CERTIFICATION OF PLAN ACCURACY**

I, ALEXANDER E. SCHMIDT, HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL ENGINEER WITH A BACKGROUND IN CIVIL ENGINEERING IN THE STATE OF DELAWARE AND THAT ALL OF THE INFORMATION ON THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY ACCEPTED ENGINEERING STANDARDS AND PRACTICES.

ALEXANDER E. SCHMIDT LICENSE No. 16139 DELAWARE PROFESSIONAL ENGINEER

ALEXANDER E. SCHMIDT, P.E. NO. 16139 — DATE 14-APR-2014
CENTURY ENGINEERING, INC.
4134 NORTH DUPONT HIGHWAY
DOVER, DELAWARE 19901
(302) 734-9188

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

NOT TO SCALE

DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP

STORMWATER MANAGEMENT PLAN COVER SHEET

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-100
TOTAL SHTS. 20

4/3/2014
G:\PROJECTS\115013.00 (DelDOT Agrmt 1583 DOTS Open-End)\115013.08 (Task 8, Civil Air Terminal Expansion)\CADD FILES\Sheets\Stormwater Management Plans\sw_C-100_Cover Sheet.dgn

## DRAINAGE

| | |
|---|---|
| | DITCH OR STREAM CENTERLINE |
| | DIRECTIONAL STREAM FLOW ARROW |
| C.B. | DRAINAGE CATCH BASIN |
| J.B. | DRAINAGE JUNCTION BOX |
| D | DRAINAGE MANHOLE |
| SIZE/TYPE LABEL | DRAINAGE PIPE AND FLOW ARROW |
| | DRAINAGE PIPE HEADWALL |
| | RIPRAP - AREA FEATURE |
| | RIPRAP - LINEAR FEATURE |

## MANMADE ROADSIDE FEATURES

| | |
|---|---|
| (TYPE LABEL) | CURB |
| (TYPE LABEL) | CURB AND GUTTER |
| | FENCE - CHAINLINK OR STRANDED |
| | FENCE - STOCKADE OR SPLIT RAIL |
| F.P. | FLAG POLE |
| | GUARDRAIL - STEEL BEAM |
| | GUARDRAIL - WIRE ROPE |
| LAMP | LAMP AND POST - RESIDENTIAL |
| MB | MAILBOX |
| P.M. | PARKING METER AND POST |
| | PAVEMENT |
| | TRAFFIC SIGN AND POST |
| | WALL - BRICK OR BLOCK |
| | WALL - STONE |

## NATURAL ROADSIDE FEATURES

| | |
|---|---|
| | GRASS LAWN |
| | HEDGEROW OR THICKET |
| | MARSH BOUNDARY LINE |
| | TREE - CONIFEROUS |
| | TREE - DECIDUOUS |
| | TREE STUMP |
| | SHRUBBERY |
| WL | DELINEATED WETLAND BOUNDARY LINE |
| | WOODS LINE BOUNDARY |

## SURVEY CONTROL & MONUMENTATION

| | |
|---|---|
| B.M. | SURVEY BENCHMARK LOCATION |
| T.P. | SURVEY TIE POINT LOCATION |
| | SURVEY TRAVERSE POINT |
| | POINT OF CURVATURE OR TANGENCY |
| | POINT OF INTERSECTING TANGENTS |
| C.M. | PROPERTY MARKER - CONCRETE MON. |
| I.P. | PROPERTY MARKER - IRON PIPE |

## BOUNDARY/ADJOINER PROPERTY

| | |
|---|---|
| | RIGHT OF WAY LINE |
| | PROPERTY LINE |

## UTILITY

| | |
|---|---|
| | SOIL BORING LOCATION |
| | UTILITY TEST HOLE LOCATION |
| TV | CABLE TV DISTRIBUTION BOX |
| E | ELECTRIC MANHOLE |
| E | ELECTRIC TRANSFORMER |
| | POLE MOUNTED LUMINAIRE |
| G | GAS MANHOLE |
| G.M. | GAS METER |
| G.V. | GAS VALVE |
| G.P. | GAS PUMP - SERVICE STATION |
| | RAILROAD TRACKS |
| S | SANITARY SEWER MANHOLE |
| S.V. | SANITARY SEWER VALVE |
| VENT | SANITARY SEWER VENT OR CLEANOUT |
| S.D.F. | SEPTIC DRAIN FIELD |
| B | TELEPHONE BOOTH |
| T | TELEPHONE MANHOLE |
| T | TELEPHONE TEST POINT |
| J.W. | TRAFFIC - CONDUIT JUNCTION WELL |
| | TRAFFIC - LIGHT POLE AND BASE |
| | TRAFFIC - PEDESTRIAN POLE & BASE |
| | TRAFFIC - SIGNAL CABINET & BASE |
| | TRAFFIC - SIGNAL POLE AND BASE |
| U | UTILITY BOX |
| | UTILITY POLE GUY WIRE ANCHOR |
| | UTILITY POLE |
| F.H. | WATER - FIRE HYDRANT |
| W.M. | WATER METER |
| W.V. | WATER VALVE |
| WELL | WELL HEAD |

## UTILITY COMPANY FACILITIES

| | |
|---|---|
| CU-G | CHESAPEAKE UTILITY - GAS |
| CD-S | CITY OF DOVER - SEWER |
| VER-C | VERIZON COMMUNICATIONS |
| DEC-E-UG | DELAWARE ELECTRIC COOPERATIVE |
| DP-E-UG | DELMARVA POWER - ELECTRIC |
| COM-UG | COMCAST |
| SHARP-P | SHARP - PROPANE |
| CD-W | CITY OF DOVER - WATER |
| UG-E | UNDERGROUND ELECTRIC |
| UG-T | UNDERGROUND TELEPHONE |

## CONSTRUCTION

| | |
|---|---|
| | CONCRETE SAFETY BARRIER - PERMANENT |
| BFS | BIOFILTRATION SWALE |
| | BUTT JOINT |
| 100+00 | CONSTRUCTION BASELINE |
| | CURB, TYPE 1 & TYPE 3 |
| | CURB, TYPE 2 |
| | CURB & GUTTER, TYPE 1 |
| | CURB & GUTTER, TYPE 2 |
| | CURB & GUTTER, TYPE 3 |
| | CURB & GUTTER, TYPE 4 |
| CZ | CLEAR ZONE |
| | DRAINAGE INLET |
| | DITCH & DIRECTIONAL FLOW ARROW |
| | FENCE - METAL |
| | FENCE - WOOD |
| | FLARED END SECTION |
| | GUARDRAIL, TYPES 1 & 3 |
| | GUARDRAIL, TYPE 2 |
| | GUARDRAIL END TREATMENT - PARALLEL |
| | GUARDRAIL END TREATMENT - PARABOLIC |
| HC | HORIZONTAL CLEARANCE |
| | JUNCTION BOX - DRAINAGE |
| LOD | LIMIT OF DISTURBANCE |
| | MANHOLE |
| | PIPE & DIRECTIONAL FLOW ARROW |
| | RIPRAP |
| | P.C.C. SIDEWALK @ 4" |
| | P.C.C. SIDEWALK @ 8" |
| | UNDERDRAIN & DIRECTIONAL FLOW ARROW |
| | UNDERDRAIN OUTLET |
| | RIP RAP |
| | STONE INFILTRATION TRENCH |

## PAVEMENT SECTION(S)

| | |
|---|---|
| | PROPOSED PAVEMENT/IMPERVIOUS AREA |
| | PROPOSED PAVEMENT PATCH |

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

NOT TO SCALE

DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP

STORMWATER MANAGEMENT LEGEND AND NOTES

DESIGNED BY: CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-101
TOTAL SHTS. 20

4/15/2014
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## BENCHMARK TABLE

| DESCRIPTION | NORTHING | EASTING | ELEVATION |
|---|---|---|---|
| SS MH | 415053.337 | 640891.335 | 22.49 |

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 50 100 150
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – EXISTING CONDITIONS**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-102
TOTAL SHTS. 20

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**MATCH LINE SEE SHEET C–102**

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

| ADDENDUMS / REVISIONS | |
|---|---|
| | |
| | |
| | |

SCALE
0 50 100 150
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – EXISTING CONDITIONS**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

| SHEET NO. |
|---|
| C-103 |
| TOTAL SHTS. |
| 20 |

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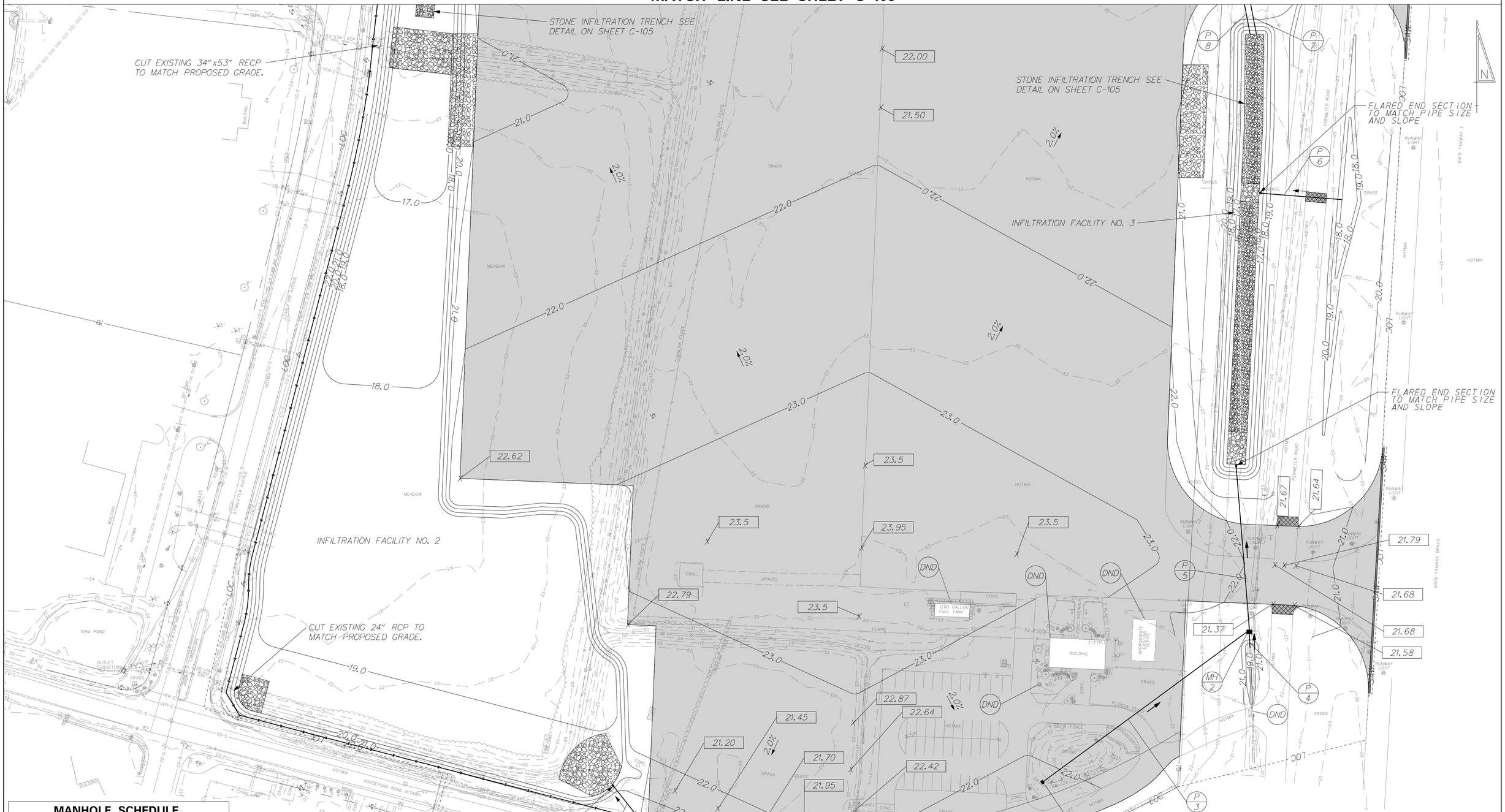
MATCH LINE SEE SHEET C-105




## MANHOLE SCHEDULE

| NO. | TYPE/SIZE | T.G. EL. | INV. EL. |
|---|---|---|---|
| 1 | BOX 48"x30" | 23.00 | 20.64 |
| 2 | BOX 66"x48" | 21.15 | 16.50 |

## DRAINAGE INLET SCHEDULE

| NO. | BOX SIZE | GRATE | T.G. EL. | INV. EL. |
|---|---|---|---|---|
| 1 | 48" x 30" | 1 | 21.90' | 17.70' |

## DRAINAGE PIPE SCHEDULE

| NO. | SIZE / TYPE | CLASS | LENGTH | SLOPE | INT. EL. | DIS. EL. |
|---|---|---|---|---|---|---|
| 1 | 15" RCP | IV | 51' | 0.0160 | 21.55 | 20.73 |
| 2 | 15" RCP | IV | 40' | 0.0160 | 20.64 | 20.00 |
| 3 | 24" RCP | V | 276' | 0.0040 | 17.70 | 16.60 |
| 4 | 26"X45" RECP | IV | 14' | 0.1000 | 18.00 | 16.60 |
| 5 | 26"X45" RECP | V | 175' | 0.0029 | 16.50 | 16.00 |
| 6 | 21" RCP | IV | 88' | 0.0114 | 17.00 | 16.00 |

NOTE: PIPE LENGTH INCLUDES FLARED END SECTION.

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 50 100 150
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – PROPOSED CONDITIONS**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-104
TOTAL SHTS. 20

4/15/2014
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## DRAINAGE PIPE SCHEDULE

| NO. | SIZE / TYPE | CLASS | LENGTH | SLOPE | INT. EL. | DIS. EL. |
|---|---|---|---|---|---|---|
| 7 | 34"x53" RECP | V | 320' | 0.0000 | 16.00 | 16.00 |
| 8 | 34"x53" RECP | V | 320' | 0.0000 | 16.00 | 16.00 |
| 9 | 29"x45" RECP | V | 390' | 0.0000 | 16.00 | 16.00 |
| 10 | 29"x45" RECP | V | 398' | 0.0000 | 16.00 | 16.00 |
| 11 | 29"x45" RECP | V | 35' | 0.0000 | 16.00 | 16.00 |
| 12 | 29"x45" RECP | V | 30' | 0.0000 | 16.00 | 16.00 |

NOTE: PIPE LENGTH INCLUDES FLARED END SECTION.

## DRAINAGE INLET SCHEDULE

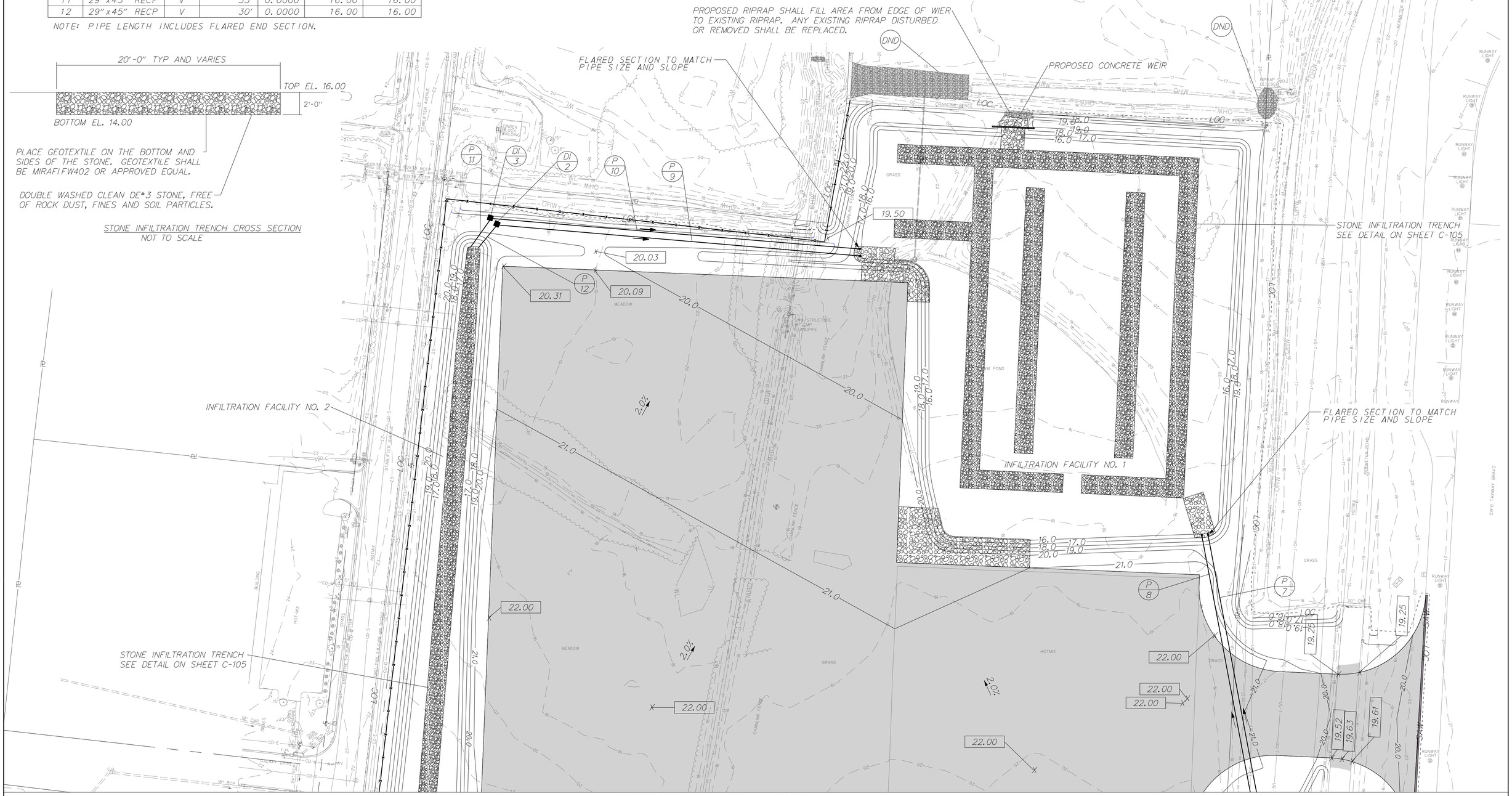
| NO. | BOX SIZE | GRATE | T.G. EL. | INV. EL. |
|---|---|---|---|---|
| 2 | 66"x66" | 1 | 20.50 | 16.00' |
| 3 | 66"x66" | 1 | 20.25 | 16.00' |




PLACE GEOTEXTILE ON THE BOTTOM AND SIDES OF THE STONE. GEOTEXTILE SHALL BE MIRAFI FW402 OR APPROVED EQUAL.

DOUBLE WASHED CLEAN DE#3 STONE, FREE OF ROCK DUST, FINES AND SOIL PARTICLES.

STONE INFILTRATION TRENCH CROSS SECTION
NOT TO SCALE




**MATCH LINE SEE SHEET C-104**

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 50 100 150
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – PROPOSED CONDITIONS**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-105
TOTAL SHTS. 20

4/15/2014
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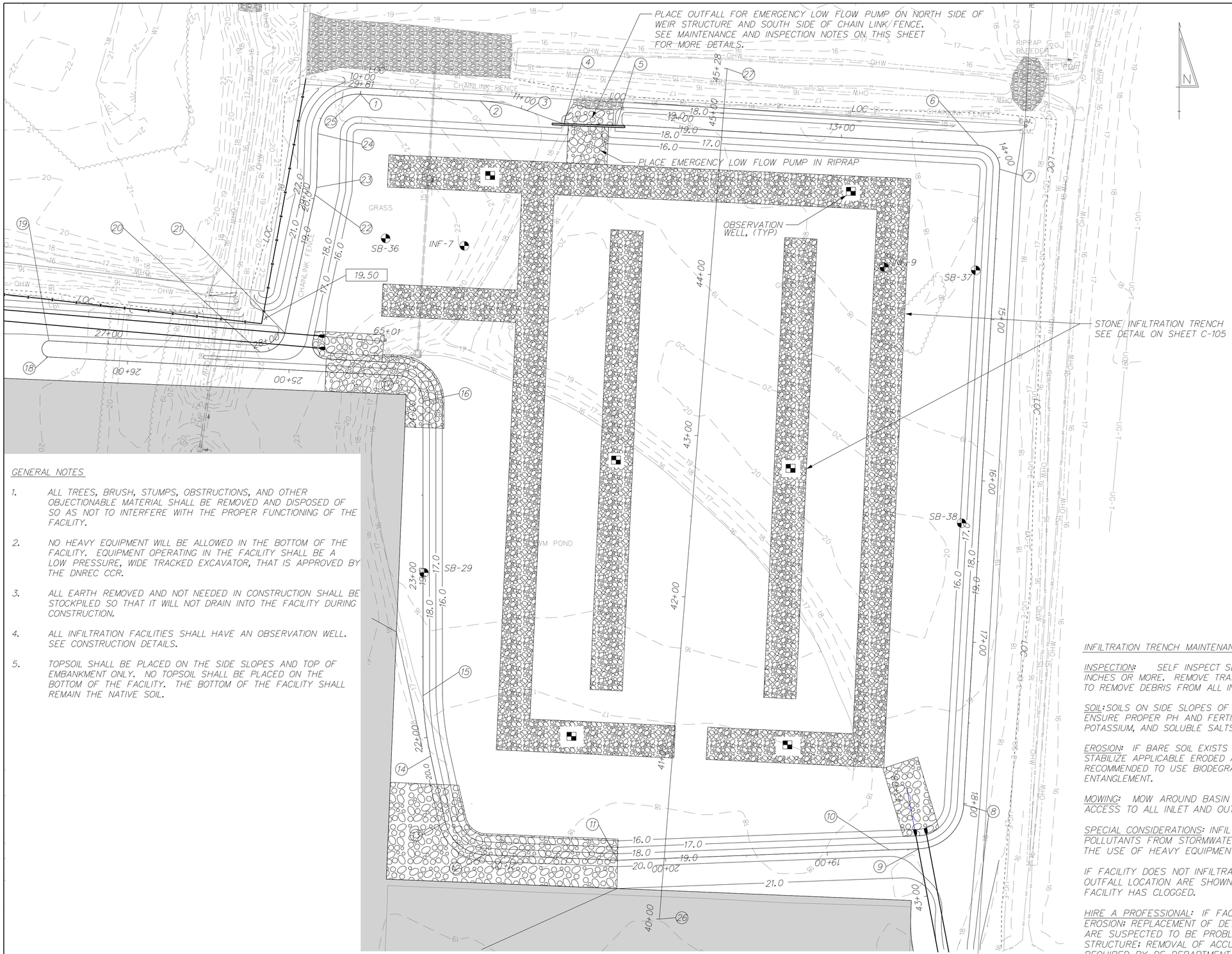



PLAN VIEW - INFILTRATION BASIN NO. 1

SCALE: 1" = 30'

## ℄ EMBANKMENT

| | STATION | NORTHING | EASTING | RADIUS |
|---|---|---|---|---|
| 1 | POB 10+00.00 | 416556.7143 | 641652.2578 | |
| 2 | PC 10+74.43 | 416552.5179 | 641726.5699 | |
| | PI 10+89.29 | 416551.6803 | 641741.4035 | 100' |
| 3 | PT 11+03.93 | 416546.5662 | 641755.3529 | |
| 4 | PI 11+28.18 | 416538.2177 | 641778.1248 | 122' |
| 5 | PI 11+60.80 | 416537.7491 | 641810.7359 | |
| 6 | PC 13+84.87 | 416525.1162 | 642034.4469 | |
| | PI 13+98.86 | 416524.3269 | 642048.4245 | 14' |
| 7 | PT 14+06.86 | 416510.3492 | 642047.6353 | |
| 8 | PC 18+00.59 | 416117.2382 | 642025.4392 | |
| | PI 18+26.99 | 416090.8882 | 642023.9514 | 29' |
| 9 | PT 18+43.42 | 416089.8936 | 641997.5782 | |
| 10 | PI 18+61.83 | 416089.1996 | 641979.1757 | |
| 11 | PI 20+29.79 | 416082.8700 | 641811.3351 | |
| 12 | PC 21+12.44 | 416086.2249 | 641729.0688 | |
| | PI 21+32.44 | 416087.0369 | 641709.0851 | 26' |
| 13 | PT 21+46.54 | 416106.5604 | 641704.7442 | |
| 14 | PC 21+88.29 | 416147.3162 | 641695.3824 | |
| | PI 22+07.18 | 416165.7570 | 641691.5822 | 200' |
| 15 | PT 22+25.96 | 416184.6393 | 641691.0073 | |
| 16 | PC 24+07.98 | 416366.6657 | 641690.8884 | |
| | PI 24+23.15 | 416381.8266 | 641690.8785 | 16' |
| 17 | PT 24+32.26 | 416382.6326 | 641675.7391 | |
| 18 | PC 26+49.33 | 416394.7132 | 641458.9773 | |
| | PI 26+73.46 | 416400.4215 | 641435.6636 | 5.11' |
| 19 | PT 26+63.25 | 416404.1590 | 641459.5090 | |
| 20 | PC 27+93.92 | 416404.1590 | 641459.5090 | |
| | PI 28+06.67 | 416396.5338 | 641602.7303 | 15' |
| 21 | PT 28+15.06 | 416408.9889 | 641605.4513 | |
| 22 | PI 29+02.54 | 416494.4525 | 641624.1225 | |
| 22 | PI 29+02.54 | 416494.4525 | 641624.1225 | |
| 23 | PI 29+07.21 | 416498.9993 | 641625.1818 | |
| 24 | PC 29+40.47 | 416532.2592 | 641625.8540 | |
| | PI 29+66.39 | 416558.1758 | 641625.8540 | 25' |
| 25 | PT 29+80.65 | 416556.7143 | 641652.2584 | |

NOTE: ALIGNMENT LOCATED AT ELEVATION 19.00.

## ℄ CROSS SECTION

| | STATION | NORTHING | EASTING | RADIUS |
|---|---|---|---|---|
| 26 | POB 40+00.00 | 416046.3785 | 641837.1740 | |
| 27 | POE 45+27.76 | 416572.4756 | 641879.0670 | |

GENERAL NOTES

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE FACILITY.

2. NO HEAVY EQUIPMENT WILL BE ALLOWED IN THE BOTTOM OF THE FACILITY. EQUIPMENT OPERATING IN THE FACILITY SHALL BE A LOW PRESSURE, WIDE TRACKED EXCAVATOR, THAT IS APPROVED BY THE DNREC CCR.

3. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE STOCKPILED SO THAT IT WILL NOT DRAIN INTO THE FACILITY DURING CONSTRUCTION.

4. ALL INFILTRATION FACILITIES SHALL HAVE AN OBSERVATION WELL. SEE CONSTRUCTION DETAILS.

5. TOPSOIL SHALL BE PLACED ON THE SIDE SLOPES AND TOP OF EMBANKMENT ONLY. NO TOPSOIL SHALL BE PLACED ON THE BOTTOM OF THE FACILITY. THE BOTTOM OF THE FACILITY SHALL REMAIN THE NATIVE SOIL.

INFILTRATION TRENCH MAINTENANCE AND INSPECTION

INSPECTION: SELF INSPECT SEMI-ANNUALLY (SPRING AND FALL) AND AFTER STORM EVENTS OF 2 INCHES OR MORE. REMOVE TRASH AND DEBRIS ON A REGULAR BASIS. IT IS ESPECIALLY IMPORTANT TO REMOVE DEBRIS FROM ALL INLETS AND OUTFALL STRUCTURES.

SOIL: SOILS ON SIDE SLOPES OF POND SHOULD BE TESTED ANNUALLY TO ENSURE PROPER PH AND FERTILITY INCLUDING: ORGANIC MATTER, MAGNESIUM, PHOSPHORUS, NITROGEN, POTASSIUM, AND SOLUBLE SALTS. IF REQUIRED, FERTILIZERS SHOULD ONLY BE APPLIED IN THE FALL.

EROSION: IF BARE SOIL EXISTS ON POND SIDE SLOPES OR EMBANKMENT, RESEED AND/OR REPLANT. STABILIZE APPLICABLE ERODED AREAS WITH REINFORCING EROSION CONTROL MATTING. IT IS RECOMMENDED TO USE BIODEGRADABLE PRODUCTS TO AID IN MOWING AND DETER WILDLIFE ENTANGLEMENT.

MOWING: MOW AROUND BASIN WEEKLY DURING PEAK GROWING SEASON. MOW 10-FOOT WIDE ACCESS TO ALL INLET AND OUTLET STRUCTURES.

SPECIAL CONSIDERATIONS: INFILTRATION BASINS ARE DESIGNED TO INFILTRATE WATER AND REMOVE POLLUTANTS FROM STORMWATER. DO NOT COMPACT THE FACILITY IN ANY WAY. THIS INCLUDES THE USE OF HEAVY EQUIPMENT OR MACHINERY. COMPACTION MAY LEAD TO SYSTEM FAILURE.

IF FACILITY DOES NOT INFILTRATE WITHIN 48 HOURS A LOCATION FOR A LOW FLOW PUMP AND OUTFALL LOCATION ARE SHOWN ON THE PLANS. THE PUMP SHALL ONLY BE INSTALLED IF THE FACILITY HAS CLOGGED.

HIRE A PROFESSIONAL: IF FACILITY DOES NOT DRAIN WITHIN 48 HOURS; REPAIR OF SEVERE EROSION; REPLACEMENT OF DETERIORATING PIPES OR STRUCTURAL COMPONENTS; IF MOSQUITOES ARE SUSPECTED TO BE PROBLEMATIC; RECONSTRUCTION OF EMBANKMENT AND OUTLET STRUCTURE; REMOVAL OF ACCUMULATED SEDIMENT; AQUATIC VEGETATION CONTROL IF LICENSING REQUIRED BY DE DEPARTMENT OF AGRICULTURE; IF DREDGING IS REQUIRED.

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

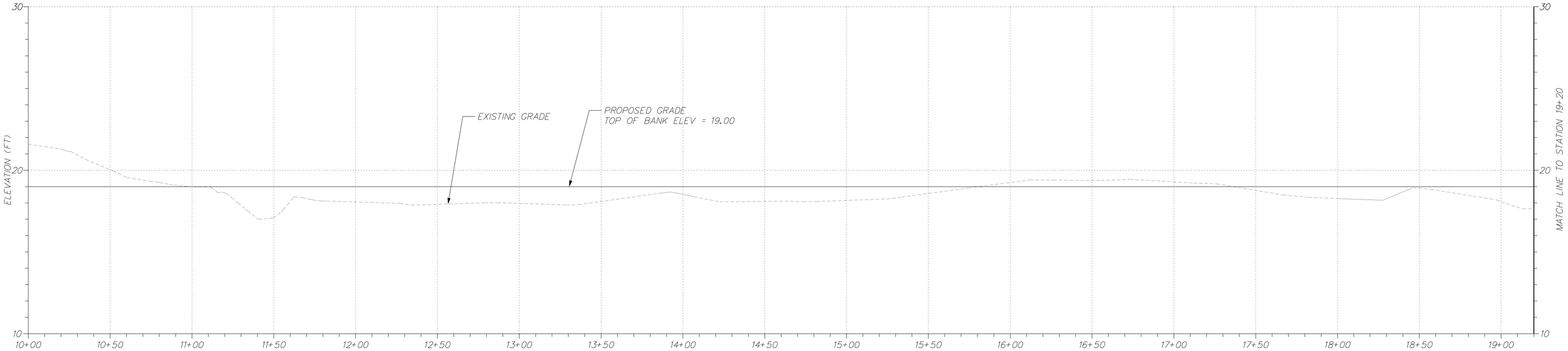
**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – INFILTRATION FACILITY NO. 1**

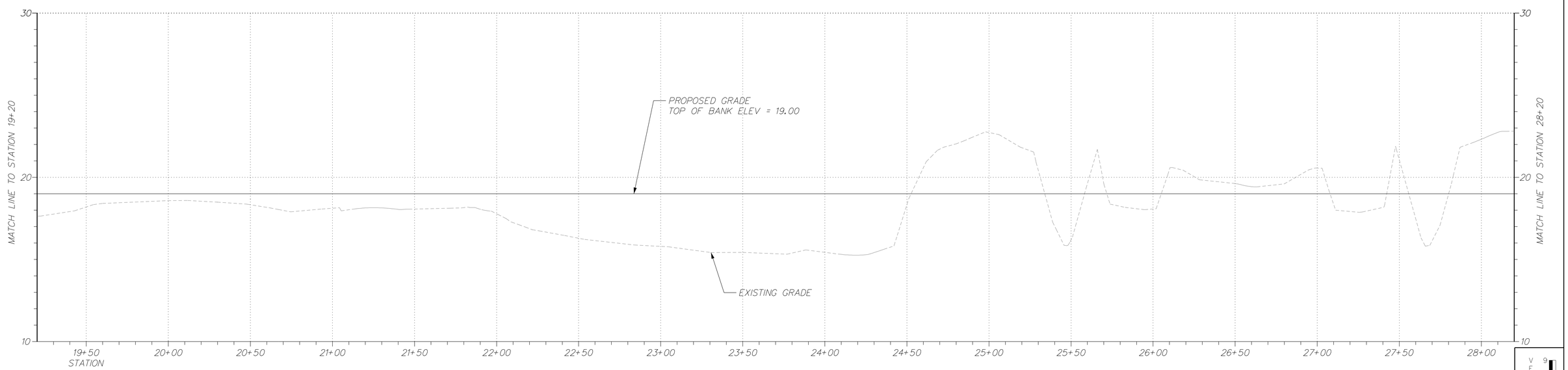
DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-106
TOTAL SHTS. 20

4/15/2014
G:\PROJECTS\115013.00 (DelDOT Agrmt 1583 DOTS Open-End)\115013.08 (Task 8, Civil Air Terminal Expansion)\CADD FILES\Sheets\Stormwater Management Plans\sw_C-106_Stormwater Management Detail.dgn




**INFILTRATION FACILITY NO. 1 EMBANKMENT**




**INFILTRATION FACILITY NO. 1 EMBANKMENT**

VERTICAL SCALE FEET 9 6 3 0

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 1**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-107
TOTAL SHTS. 20

4/15/2014
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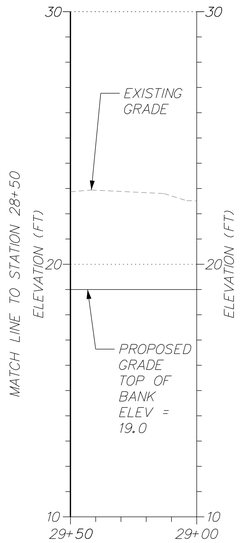


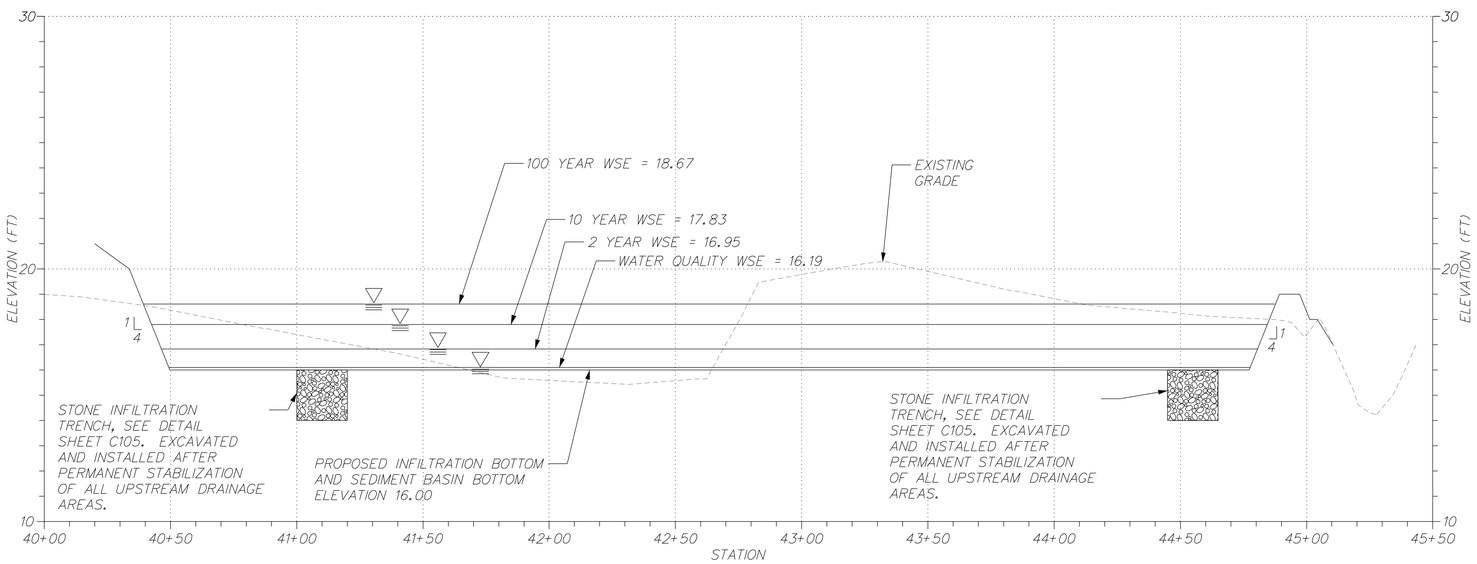

**INFILTRATION FACILITY NO. 1 EMBANKMENT**

| INFILTRATION FACILITY NO.1 SUMMARY | | | | |
|---|---|---|---|---|
| DESIGN STORM | FACILITY INFLOW | FACILITY DISCHARGE | WATER SURFACE ELEVATION | STORAGE VOLUME (AC.FT) |
| QUALITY STORM (2.0") | 12.55 | 0.00 | 16.19 | 0.635 |
| 2 - YEAR | 46.18 | 0.00 | 16.95 | 3.217 |
| 10 - YEAR | 104.62 | 13.72 | 17.80 | 6.233 |
| 100 - YEAR | 205.30 | 104.71 | 18.68 | 9.431 |

HAZARD CLASSIFICATION: CLASS A AS PER POND CODE 378

DRAINAGE AREA TO FACILITY: 11.44 ACRES

MANAGEMENT PROVIDED BY FACILITY: WATER QUALITY BY EXTENDED DETENTION OF FIRST 2.0" OF RUNOFF. WATER QUANTITY FOR 2 AND 10 YEAR STORMS.




**INFILTRATION FACILITY NO. 1 SECTION**

VERTICAL SCALE FEET 9 6 3 0

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 1**

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-108
TOTAL SHTS. 20

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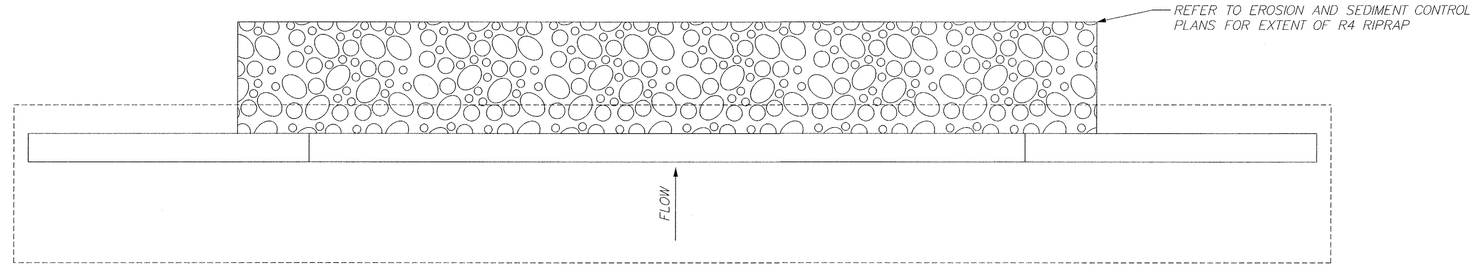
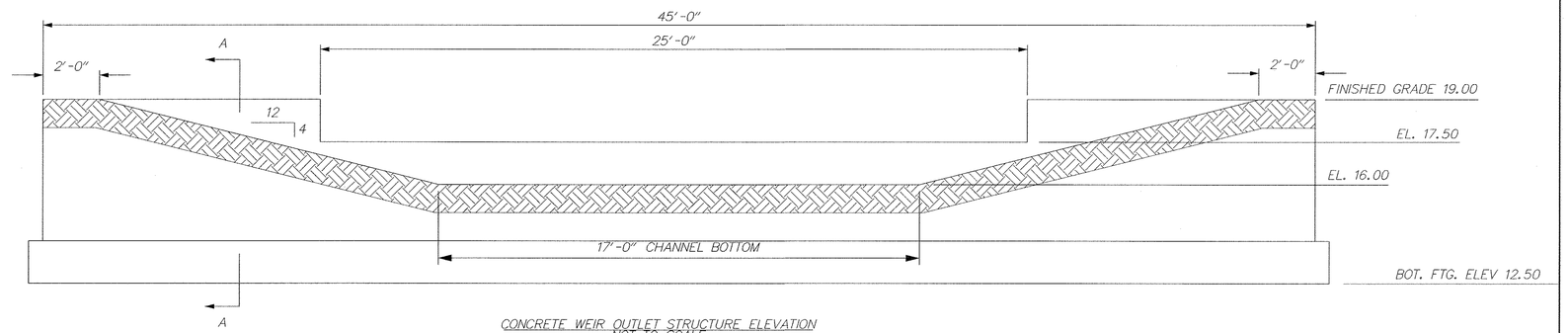


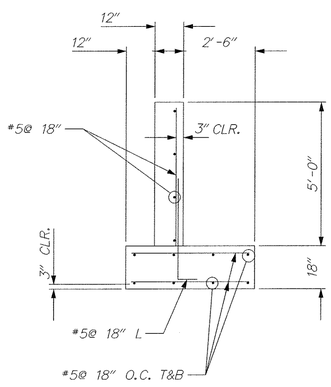

CONCRETE WEIR OUTLET STRUCTURE PLAN
NOT TO SCALE




CONCRETE WEIR OUTLET STRUCTURE ELEVATION
NOT TO SCALE

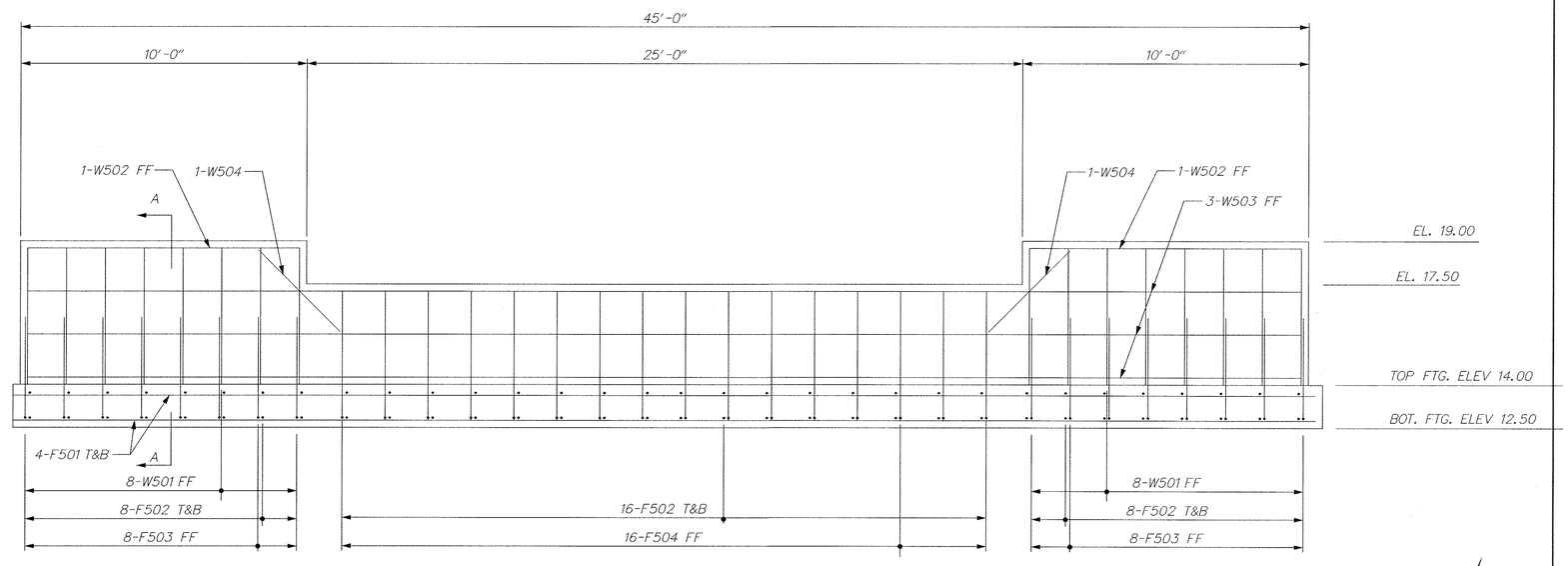
REBAR SCHEDULE

| MARK | SIZE | NO. | LENGTH | TYPE | A | B |
|---|---|---|---|---|---|---|
| F501 | 5 | 8 | 44'-6" | STR | | |
| F502 | 5 | 64 | 4'-0" | STR | | |
| F503 | 5 | 16 | 4'-3" | 1 | 8" | 3'-7" |
| F504 | 5 | 16 | 5'-2" | 1 | 8" | 4'-6" |
| | | | | | | |
| W501 | 5 | 16 | 4'-9" | STR | | |
| W502 | 5 | 4 | 9'-6" | STR | | |
| W503 | 5 | 3 | 44'-6" | STR | | |
| W504 | 5 | 2 | 4'-3" | STR | | |




WEIR OUTLET SECTION A-A
NOT TO SCALE

TYPE 1 BAR BEND




CONCRETE WEIR OUTLET REBAR LAYOUT
NOT TO SCALE

GENERAL NOTES:

1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR WEIR REINFORCING FOR APPROVAL.
2. PROVIDE ¾" CHAMFER ON ALL EXPOSED CORNERS.
3. PROVIDE 3" CLEARANCE BETWEEN REBAR AND FACE OF CONCRETE.
4. CONTRACTOR MAY SUBSTITUTE LAPPED BARS WITH SINGLE BAR.
5. CONTRACTOR MAY SUBSTITUTE SINGLE BARS WITH LAPPED BARS (28" MIN. LAP.)

LEGEND:

FF FAR FACE
T&B TOP & BOTTOM
O.C. ON CENTER

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

NOT TO SCALE

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 1**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-109
TOTAL SHTS. 20

4/15/2014
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STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 1 OF 1

## BORING CAT-SB-29

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 416260 **Easting:** 641691
**Boring Surface Elev.:** 15.48 **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

Wt. of Sample Hammer: 140 Lbs. Average Fall: 30 IN.
Type of: D-Sampler: Split-Barrel O.D. O.D. of Sampler: 2 IN.
S-Sampler: O.D. O.D. of Samp. Tube: IN.
U-Sampler: O.D. O.D. of Samp. Tube: IN.
Core Bit: O.D. O.D. of Rock Core: IN.

Hollow Stem Auger Diameter: 3 1/4" Inches From Depth of: 0.0' To: 8.0'
Mud Rotary: From Depth of: To:

| Water Level Readings Date | Depth to Water (ft) | Caved Depth (ft) |
|---|---|---|
| 8/4/2010 | Dry | 2.9' |

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** ATV CME 55
**Driller:** Dave Burt **Logged By:** R. Munyan

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| 2.35 | | 1 | 0.5' – 2.0' | [illegible] | Wet stiff brownish gray silt w/some fine sand, trace fine gravel and coarse sand. 18" RECOVERY | A-4(0) | Topsoil - 4". |
| 4.7 | | 2 | 2.0' – 4.0' | [illegible] | Wet very stiff grayish brown silt w/some fine sand, trace coarse sand and fine gravel. 20" RECOVERY | A-4(0) | |
| 7.05 | | 3 | 4.0' – 6.0' | [illegible] | Wet stiff gray fine to coarse sandy silt w/trace fine gravel and clay. 19" RECOVERY | A-4(0) | |
| 9.4 | | 4 | 6.0' – 8.0' | [illegible] | Wet very stiff grayish brown clayey coarse to fine sandy silt w/trace fine gravel. 19" RECOVERY | A-4(0) | |
| 11.75 | | 5 | 8.0' – 10.0' | [illegible] | Wet medium dense gray coarse to fine sand w/ some fine gravel, trace silt. 22" RECOVERY | A-1-b | |
| | | | | | End of Boring | | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 1 OF 1

## BORING CAT-SB-36

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 416467 **Easting:** 641667
**Boring Surface Elev.:** 22.67 **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

Wt. of Sample Hammer: 140 Lbs. Average Fall: 30 IN.
Type of: D-Sampler: Split-Barrel O.D. O.D. of Sampler: 2 IN.
S-Sampler: O.D. O.D. of Samp. Tube: IN.
U-Sampler: O.D. O.D. of Samp. Tube: IN.
Core Bit: O.D. O.D. of Rock Core: IN.

Hollow Stem Auger Diameter: 3 1/4" Inches From Depth of: 0.0' To: 8.0'
Mud Rotary: From Depth of: To:

| Water Level Readings Date | Depth to Water (ft) | Caved Depth (ft) |
|---|---|---|
| 8/4/2010 | Dry | 3.0' |

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** ATV CME 55
**Driller:** Dave Burt **Logged By:** John

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| 2.35 | | 1 | 0.5' – 2.0' | [illegible] | Moist very stiff brown silt w/trace fine to coarse sand and fine gravel. 16" RECOVERY | A-4(0) | Topsoil - 7". |
| 4.7 | | 2 | 2.0' – 4.0' | [illegible] | Moist very stiff brown fine sandy silt w/trace coarse sand. 16" RECOVERY | A-4(0) | |
| 7.05 | | 3 | 4.0' – 6.0' | [illegible] | Moist stiff brown fine sandy silt w/trace coarse sand. 22" RECOVERY | A-4(0) | |
| 9.4 | | 4 | 6.0' – 8.0' | [illegible] | Wet very stiff brown fine sandy silt w/trace coarse sand. 20" RECOVERY | A-4(0) | |
| 11.75 | | 5 | 8.0' – 10.0' | [illegible] | Wet firm brown silt w/some fine sand, trace coarse sand. 21" RECOVERY | A-4(0) | |
| | | | | | End of Boring | | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 1 OF 1

## BORING CAT-SB-37

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 416447 **Easting:** 642032
**Boring Surface Elev.:** **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

Wt. of Sample Hammer: 140 Lbs. Average Fall: 30 IN.
Type of: D-Sampler: Split-Barrel O.D. O.D. of Sampler: 2 IN.
S-Sampler: O.D. O.D. of Samp. Tube: IN.
U-Sampler: O.D. O.D. of Samp. Tube: IN.
Core Bit: O.D. O.D. of Rock Core: IN.

Hollow Stem Auger Diameter: 3 1/4" Inches From Depth of: 0.0' To: 8.0'
Mud Rotary: From Depth of: To:

Water Level Readings Date / Depth to Water (ft) / Caved Depth (ft)

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** Truck CME 55
**Driller:** Jason **Logged By:** Billy

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| 2.53 | | 1 | 0.0' – 2.0' | [illegible] | No Sieve Analysis. 20" RECOVERY | | Sample Missing |
| 5.06 | | 2 | 2.0' – 4.0' | [illegible] | No Sieve Analysis. 21" RECOVERY | | Sample Missing |
| 7.59 | | 3 | 4.0' – 6.0' | [illegible] | No Sieve Analysis. 18" RECOVERY | | Sample Missing |
| 10.12 | | 4 | 6.0' – 8.0' | [illegible] | Moist medium dense light brown clayey fine gravelly fine to coarse sand w/some silt. 20" RECOVERY | A-2-4(0) | |
| 12.65 | | 5 | 8.0' – 10.0' | [illegible] | Moist medium dense light brown fine gravelly coarse sand w/some fine sand and silt. 20" RECOVERY | A-1-b | |
| | | | | | End of Boring | | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 1 OF 1

## BORING CAT-SB-38

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 416291 **Easting:** 642024
**Boring Surface Elev.:** 19.59 **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

Wt. of Sample Hammer: 140 Lbs. Average Fall: 30 IN.
Type of: D-Sampler: Split-Barrel O.D. O.D. of Sampler: 2 IN.
S-Sampler: O.D. O.D. of Samp. Tube: IN.
U-Sampler: O.D. O.D. of Samp. Tube: IN.
Core Bit: O.D. O.D. of Rock Core: IN.

Hollow Stem Auger Diameter: 3 1/4" Inches From Depth of: 0.0' To: 8.0'
Mud Rotary: From Depth of: To:

Water Level Readings Date / Depth to Water (ft) / Caved Depth (ft)

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** Truck CME 55
**Driller:** Jason **Logged By:** Billy

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| 2.53 | | 1 | 1.0' – 2.0' | [illegible] | Wet stiff brown silt w/some clay, trace fine to coarse sand. 10" RECOVERY | A-4(4) | Topsoil - 10". |
| 5.06 | | 2 | 2.0' – 4.0' | [illegible] | Wet very stiff orange silt w/some clay, trace fine to coarse sand. 18" RECOVERY | A-4(3) | |
| 7.59 | | 3 | 4.0' – 6.0' | [illegible] | No Sieve Analysis. 19" RECOVERY | | Sample Missing |
| 10.12 | | 4 | 6.0' – 8.0' | [illegible] | Wet stiff orange silt w/trace fine to coarse sand. 20" RECOVERY | A-4(0) | |
| 12.65 | | 5 | 8.0' – 10.0' | [illegible] | Wet stiff orange coarse sandy fine gravelly silt w/some fine sand. 20" RECOVERY | A-4(0) | |
| | | | | | End of Boring | | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

Borehole Infiltration Test Calculations

Single Ring Infiltration Test Calculations

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP

STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 1

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-110
TOTAL SHTS. 20

4/15/2014
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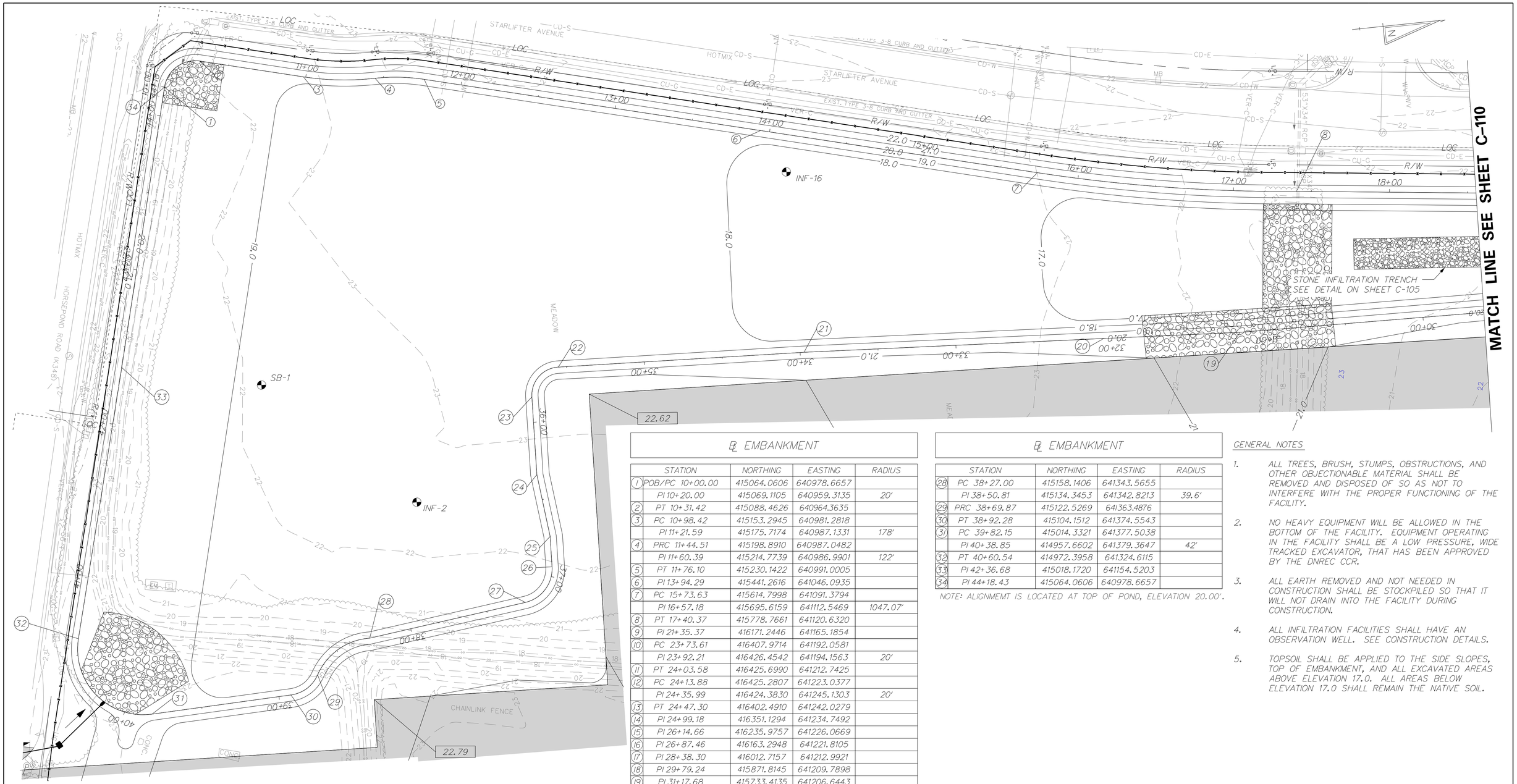


PLAN VIEW - INFILTRATION BASIN NO. 2

SCALE: 1" = 30'

| ℄ EMBANKMENT | | | | |
|---|---|---|---|---|
| | STATION | NORTHING | EASTING | RADIUS |
| 1 | POB/PC 10+00.00 | 415064.0606 | 640978.6657 | |
| | PI 10+20.00 | 415069.1105 | 640959.3135 | 20' |
| 2 | PT 10+31.42 | 415088.4626 | 640964.3635 | |
| 3 | PC 10+98.42 | 415153.2945 | 640981.2818 | |
| | PI 11+21.59 | 415175.7174 | 640987.1331 | 178' |
| 4 | PRC 11+44.51 | 415198.8910 | 640987.0482 | |
| | PI 11+60.39 | 415214.7739 | 640986.9901 | 122' |
| 5 | PT 11+76.10 | 415230.1422 | 640991.0005 | |
| 6 | PI 13+94.29 | 415441.2616 | 641046.0935 | |
| 7 | PC 15+73.63 | 415614.7998 | 641091.3794 | |
| | PI 16+57.18 | 415695.6159 | 641112.5469 | 1047.07' |
| 8 | PT 17+40.37 | 415778.7661 | 641120.6320 | |
| 9 | PI 21+35.37 | 416171.2446 | 641165.1854 | |
| 10 | PC 23+73.61 | 416407.9714 | 641192.0581 | |
| | PI 23+92.21 | 416426.4542 | 641194.1563 | 20' |
| 11 | PT 24+03.58 | 416425.6990 | 641212.7425 | |
| 12 | PC 24+13.88 | 416425.2807 | 641223.0377 | |
| | PI 24+35.99 | 416424.3830 | 641245.1303 | 20' |
| 13 | PT 24+47.30 | 416402.4910 | 641242.0279 | |
| 14 | PI 24+99.18 | 416351.1294 | 641234.7492 | |
| 15 | PI 26+14.66 | 416235.9757 | 641226.0669 | |
| 16 | PI 26+87.46 | 416163.2948 | 641221.8105 | |
| 17 | PI 28+38.30 | 416012.7157 | 641212.9921 | |
| 18 | PI 29+79.24 | 415871.8145 | 641209.7898 | |
| 19 | PI 31+17.68 | 415733.4135 | 641206.6443 | |
| 20 | PI 32+05.16 | 415646.0752 | 641201.5359 | |
| 21 | PI 33+97.41 | 415454.1596 | 641190.2966 | |
| 22 | PC 35+55.33 | 415296.3917 | 641183.3411 | |
| | PI 35+73.39 | 415278.3471 | 641182.5455 | 18' |
| 23 | PT 35+83.66 | 415277.6138 | 641200.5928 | |
| 24 | PI 36+33.65 | 415275.5843 | 641250.5402 | |
| 25 | PI 36+74.09 | 415279.9344 | 641290.7410 | |
| 26 | PC 36+93.67 | 415279.0956 | 641310.3015 | |
| | PI 37+12.34 | 415278.2957 | 641328.9522 | 22' |
| 27 | PT 37+24.63 | 415259.7635 | 641331.1989 | |

| ℄ EMBANKMENT | | | | |
|---|---|---|---|---|
| | STATION | NORTHING | EASTING | RADIUS |
| 28 | PC 38+27.00 | 415158.1406 | 641343.5655 | |
| | PI 38+50.81 | 415134.3453 | 641342.8213 | 39.6' |
| 29 | PRC 38+69.87 | 415122.5269 | 641363.4876 | |
| 30 | PT 38+92.28 | 415104.1512 | 641374.5543 | |
| 31 | PC 39+82.15 | 415014.3321 | 641377.5038 | |
| | PI 40+38.85 | 414957.6602 | 641379.3647 | 42' |
| 32 | PT 40+60.54 | 414972.3958 | 641324.6115 | |
| 33 | PI 42+36.68 | 415018.1720 | 641154.5203 | |
| 34 | PI 44+18.43 | 415064.0606 | 640978.6657 | |

NOTE: ALIGNMEMT IS LOCATED AT TOP OF POND, ELEVATION 20.00'.

GENERAL NOTES

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE FACILITY.
2. NO HEAVY EQUIPMENT WILL BE ALLOWED IN THE BOTTOM OF THE FACILITY. EQUIPMENT OPERATING IN THE FACILITY SHALL BE A LOW PRESSURE, WIDE TRACKED EXCAVATOR, THAT HAS BEEN APPROVED BY THE DNREC CCR.
3. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE STOCKPILED SO THAT IT WILL NOT DRAIN INTO THE FACILITY DURING CONSTRUCTION.
4. ALL INFILTRATION FACILITIES SHALL HAVE AN OBSERVATION WELL. SEE CONSTRUCTION DETAILS.
5. TOPSOIL SHALL BE APPLIED TO THE SIDE SLOPES, TOP OF EMBANKMENT, AND ALL EXCAVATED AREAS ABOVE ELEVATION 17.0. ALL AREAS BELOW ELEVATION 17.0 SHALL REMAIN THE NATIVE SOIL.

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN– INFILTRATION FACILITY NO. 2**

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-111
TOTAL SHTS. 20

4/15/2014
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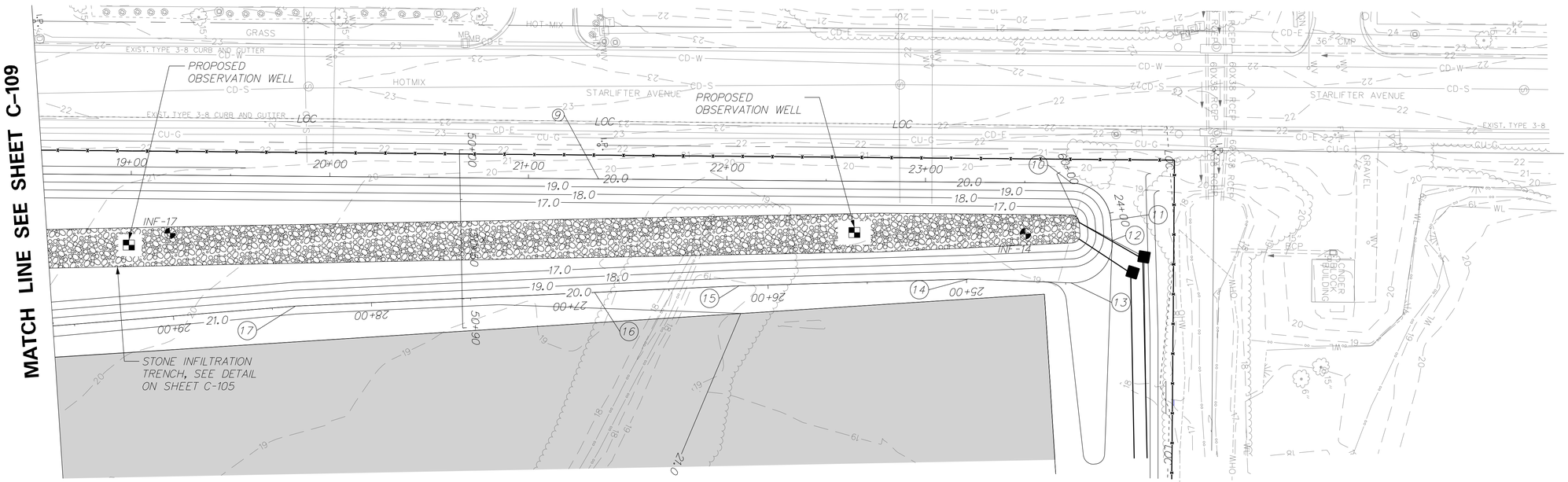


## INFILTRATION TRENCH MAINTENANCE AND INSPECTION

**INSPECTION:** SELF INSPECT SEMI-ANNUALLY (SPRING AND FALL) AND AFTER STORM EVENTS OF 2 INCHES OR MORE. REMOVE TRASH AND DEBRIS ON A REGULAR BASIS. IT IS ESPECIALLY IMPORTANT TO REMOVE DEBRIS FROM ALL INLETS AND OUTFALL STRUCTURES.

**SOIL:** SOILS ON SIDE SLOPES OF POND SHOULD BE TESTED ANNUALLY TO ENSURE PROPER PH AND FERTILITY INCLUDING: ORGANIC MATTER, MAGNESIUM, PHOSPHORUS, NITROGEN, POTASSIUM, AND SOLUBLE SALTS. IF REQUIRED, FERTILIZERS SHOULD ONLY BE APPLIED IN THE FALL.

**EROSION:** IF BARE SOIL EXISTS ON POND SIDE SLOPES OR EMBANKMENT, RESEED AND/OR REPLANT. STABILIZE APPLICABLE ERODED AREAS WITH REINFORCING EROSION CONTROL MATTING. IT IS RECOMMENDED TO USE BIODEGRADABLE PRODUCTS TO AID IN MOWING AND DETER WILDLIFE ENTANGLEMENT.

**MOWING:** MOW AROUND BASIN WEEKLY DURING PEAK GROWING SEASON. MOW 10-FOOT WIDE ACCESS TO ALL INLET AND OUTLET STRUCTURES.

**SPECIAL CONSIDERATIONS:**
INFILTRATION BASINS ARE DESIGNED TO INFILTRATE WATER AND REMOVE POLLUTANTS FROM STORMWATER. DO NOT COMPACT THE FACILITY IN ANY WAY. THIS INCLUDES THE USE OF HEAVY EQUIPMENT OR MACHINERY. COMPACTION MAY LEAD TO SYSTEM FAILURE.

**HIRE A PROFESSIONAL:**
IF FACILITY DOES NOT DRAIN WITHIN 48 HOURS; REPAIR OF SEVERE EROSION; REPLACEMENT OF DETERIORATING PIPES OR STRUCTURAL COMPONENTS; IF MOSQUITOES ARE SUSPECTED TO BE PROBLEMATIC; RECONSTRUCTION OF EMBANKMENT AND OUTLET STRUCTURE; REMOVAL OF ACCUMULATED SEDIMENT; AQUATIC VEGETATION CONTROL IF LICENSING REQUIRED BY DE DEPARTMENT OF AGRICULTURE; IF DREDGING IS REQUIRED.

| INFILTRATION FACILITY NO.2 SUMMARY | | | | |
|---|---|---|---|---|
| DESIGN STORM | FACILITY INFLOW | FACILITY DISCHARGE | WATER SURFACE ELEVATION | STORAGE VOLUME (AC.FT) |
| QUALITY STORM (2.0") | 23.23 | 4.71 | 17.10 | 0.605 |
| 2 - YEAR | 53.35 | 14.79 | 17.84 | 1.429 |
| 10 - YEAR | 101.76 | 28.70 | 18.55 | 2.787 |
| 100 - YEAR | 196.49 | 47.08 | 19.50 | 6.153 |

HAZARD CLASSIFICATION: CLASS A AS PER POND CODE 378
DRAINAGE AREA TO FACILITY: 24.34 ACRES
MANAGEMENT PROVIDED BY FACILITY: WATER QUALITY BY EXTENDED DETENTION OF FIRST 2.0" OF RUNOFF, WATER QUANTITY FOR 2 AND 10 YEAR STORMS.

### ℄ EMBANKMENT

| | STATION | NORTHING | EASTING | RADIUS |
|---|---|---|---|---|
| 1 | POB/PC 10+00.00 | 415064.0606 | 640978.6657 | |
| | PI 10+20.00 | 415069.1105 | 640959.3135 | 20' |
| 2 | PT 10+31.42 | 415088.4626 | 640964.3635 | |
| 3 | PC 10+98.42 | 415153.2945 | 640981.2818 | |
| | PI 11+21.59 | 415175.7174 | 640987.1331 | 178' |
| 4 | PRC 11+44.51 | 415198.8910 | 640987.0482 | |
| | PI 11+60.39 | 415214.7739 | 640986.9901 | 122' |
| 5 | PT 11+76.10 | 415230.1422 | 640991.0005 | |
| 6 | PI 13+94.29 | 415441.2616 | 641046.0935 | |
| 7 | PC 15+73.63 | 415614.7998 | 641091.3794 | |
| | PI 16+57.18 | 415695.6159 | 641112.5469 | 1047.07' |
| 8 | PT 17+40.37 | 415778.7661 | 641120.6320 | |
| 9 | PI 21+35.37 | 416171.2446 | 641165.1854 | |
| 10 | PC 23+73.61 | 416407.9714 | 641192.0581 | |
| | PI 23+92.21 | 416426.4542 | 641194.1563 | 20' |
| 11 | PT 24+03.58 | 416425.6990 | 641212.7425 | |
| 12 | PC 24+13.88 | 416425.2807 | 641223.0377 | |
| | PI 24+35.99 | 416424.3830 | 641245.1303 | 20' |
| 13 | PT 24+47.30 | 416402.4910 | 641242.0279 | |
| 14 | PI 24+99.18 | 416351.1294 | 641234.7492 | |
| 15 | PI 26+14.66 | 416235.9757 | 641226.0669 | |
| 16 | PI 26+87.46 | 416163.2948 | 641221.8105 | |
| 17 | PI 28+38.30 | 416012.7157 | 641212.9921 | |
| 18 | PI 29+79.24 | 415871.8145 | 641209.7898 | |
| 19 | PI 31+17.68 | 415733.4135 | 641206.6443 | |
| 20 | PI 32+05.16 | 415646.0752 | 641201.5359 | |
| 21 | PI 33+97.41 | 415454.1596 | 641190.2966 | |
| 22 | PC 35+55.33 | 415296.3917 | 641183.3411 | |
| | PI 35+73.39 | 415278.3471 | 641182.5455 | 18' |
| 23 | PT 35+83.66 | 415277.6138 | 641200.5928 | |
| 24 | PI 36+33.65 | 415275.5843 | 641250.5402 | |
| 25 | PI 36+74.09 | 415279.9344 | 641290.7410 | |
| 26 | PC 36+93.67 | 415279.0956 | 641310.3015 | |
| | PI 37+12.34 | 415278.2957 | 641328.9522 | 22' |
| 27 | PT 37+24.63 | 415259.7635 | 641331.1989 | |

### ℄ EMBANKMENT

| | STATION | NORTHING | EASTING | RADIUS |
|---|---|---|---|---|
| 28 | PC 38+27.00 | 415158.1406 | 641343.5655 | |
| | PI 38+50.81 | 415134.3453 | 641342.8213 | 39.6' |
| 29 | PRC 38+69.87 | 415122.5269 | 641363.4876 | |
| 30 | PT 38+92.28 | 415104.1512 | 641374.5543 | |
| 31 | PC 39+82.15 | 415014.3321 | 641377.5038 | |
| | PI 40+38.85 | 414957.6602 | 641379.3647 | 42' |
| 32 | PT 40+60.54 | 414972.3958 | 641324.6115 | |
| 33 | PI 42+36.68 | 415018.1720 | 641154.5203 | |
| 34 | PI 44+18.43 | 415064.0606 | 640978.6657 | |

NOTE: ALIGNMEMT IS LOCATED AT TOP OF POND, ELEVATION 20.00'.

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN– INFILTRATION FACILITY NO. 2**

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-112
TOTAL SHTS. 20

4/15/2014
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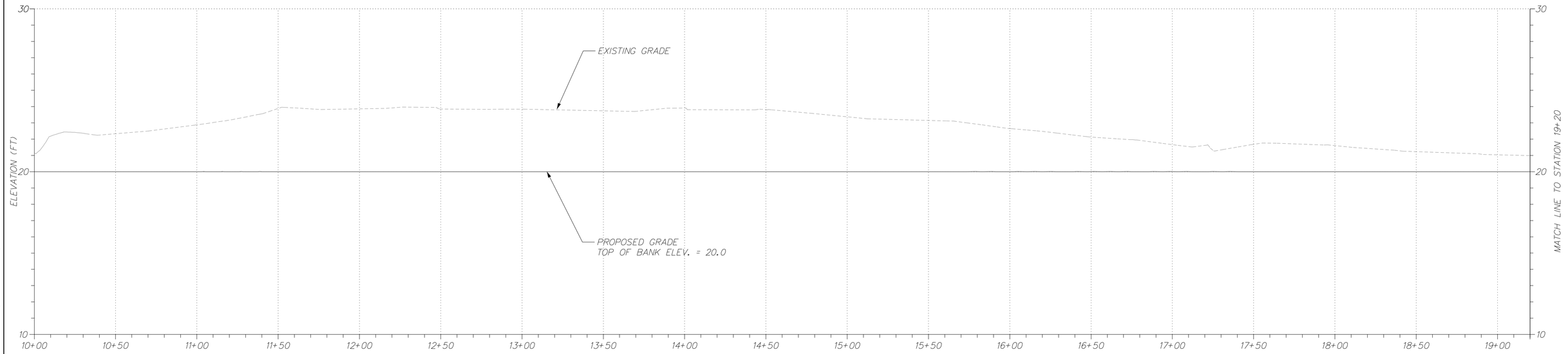
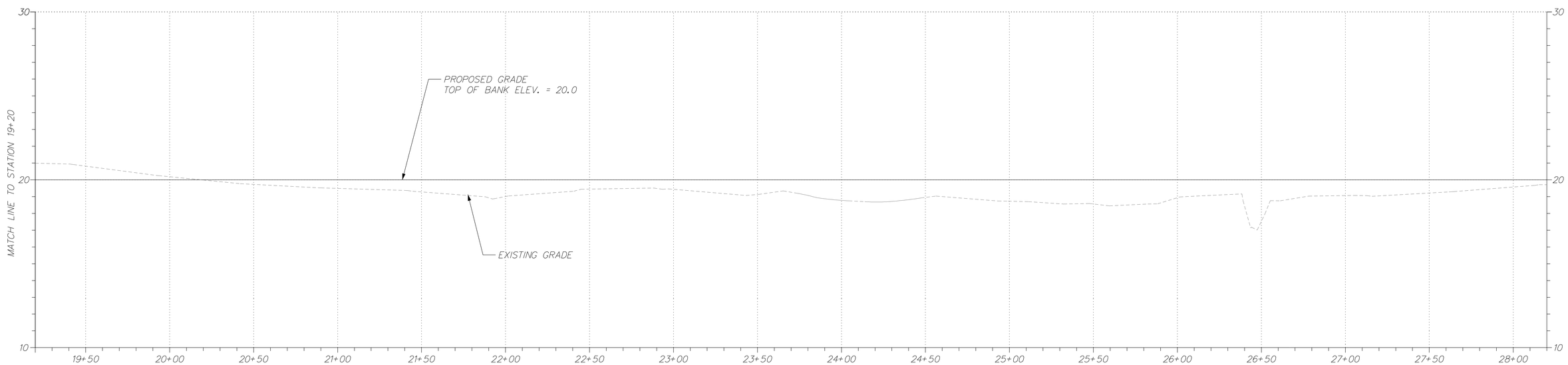



**INFILTRATION FACILITY NO. 2 EMBANKMENT**




**INFILTRATION FACILITY NO. 2 EMBANKMENT**

VERTICAL SCALE FEET 9 6 3 0

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

| ADDENDUMS / REVISIONS | |
|---|---|
| | |
| | |
| | |

SCALE
0 30 60 90
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 2**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-113
TOTAL SHTS. 20

4/15/2014
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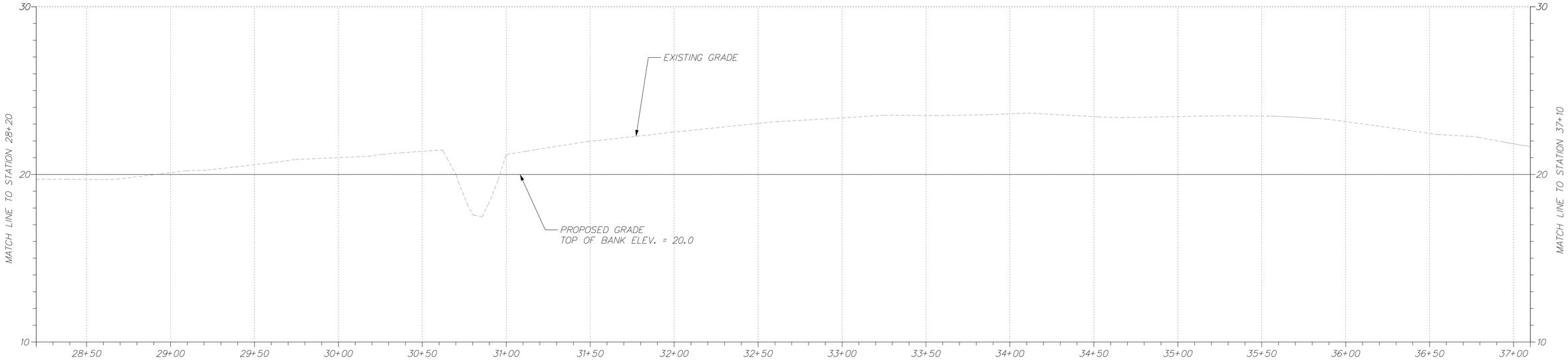
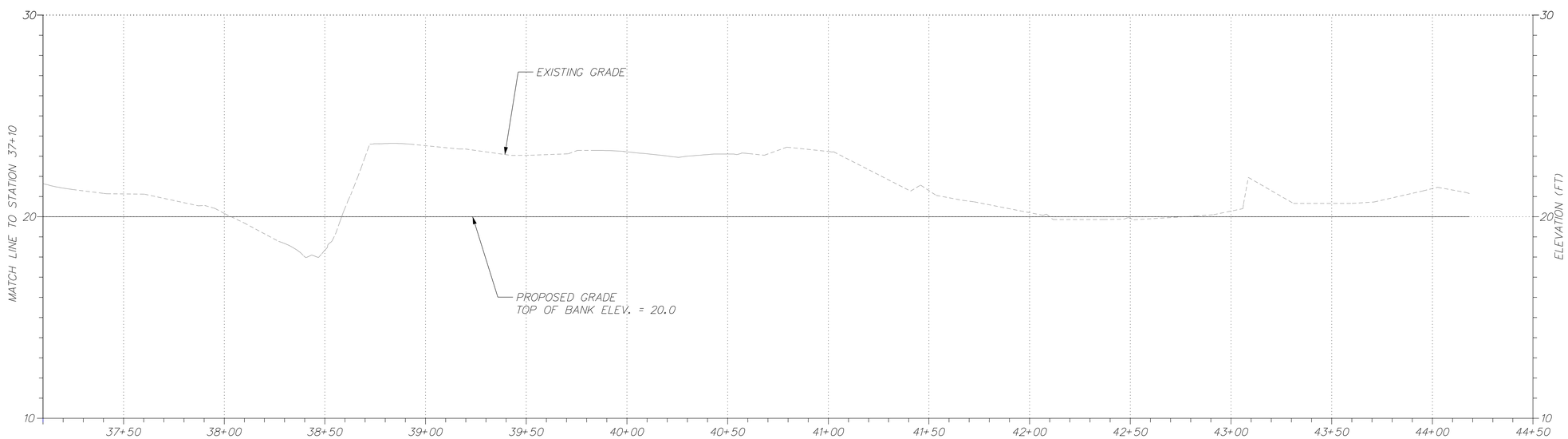



**INFILTRATION FACILITY NO. 2 EMBANKMENT**




**INFILTRATION FACILITY NO. 2 EMBANKMENT**

VERTICAL SCALE FEET 9 6 3 0

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 2**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-114
TOTAL SHTS. 20

4/15/2014
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PAGE 1 OF 1

**STATE OF DELAWARE**
**DEPARTMENT OF TRANSPORTATION**
**MATERIALS AND RESEARCH**

## BORING CAT-SB-1

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 415106 **Easting:** 641175
**Boring Surface Elev.:** 21.85 **Reference:**
**Date Started:** 8/2/2010 **Date Completed:** 8/2/2010

**Wt. of Sample Hammer:** 140 Lbs. **Average Fall:** 30 IN.
**Type of:** D-Sampler: Split-Barrel O.D. O.D. Sampler: 2 IN.
S-Sampler: O.D. O.D. of Samp. Tube: IN.
U-Sampler: O.D. O.D. of Samp. Tube: IN.
Core Bit: O.D. O.D. of Rock Core: IN.

**Hollow Stem Auger Diameter:** 3 1/4" Inches **From Depth of:** 0.0' To: 8.0'
**Mud Rotary:** **From Depth of:** To:

**Water Level Readings**

| Date | Depth to Water (ft) | Cased Depth (ft) |
|---|---|---|
| 8/2/2010 | Dry | |
| 8/2/2010 | Dry | 6.8' |

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** ATV CME 458
**Driller:** Dave Burt **Logged By:** GTA - M. Derr

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| | | 1 | 1.0' 2.0' | 1 1 1 1 | Moist medium dense orangish brown silty fine sand w/some coarse sand, trace fine gravel and clay. 10" RECOVERY | A-2-4(0) | Topsoil - 10". |
| 2.53 | | 2 | 2.0' 4.0' | 5 6 8 8 | Wet stiff orangish gray silt w/some fine sand and clay, trace coarse sand and fine gravel. 20" RECOVERY | A-4(3) | |
| 5.06 | | 3 | 4.0' 6.0' | 3 3 3 3 | Wet stiff grayish orange silt w/some fine sand, trace fine gravel, coarse sand and clay. 18" RECOVERY | A-4(1) | |
| 7.59 | | 4 | 6.0' 8.0' | 1 1 1 1 | Wet stiff gray silt w/some fine gravel, trace fine to coarse sand and clay. 19" RECOVERY | A-4(0) | |
| | | 5 | 8.0' 9.5' | 2 1 1 1 | Wet soft gray silt w/some fine sand, trace fine gravel, coarse sand and clay. 14" RECOVERY | A-4(0) | |
| 10.12 | | 5A | 9.5' 10.0' | 2 | Wet soft brown silt w/some fine gravel, trace fine to coarse sand and clay. 6" RECOVERY | A-4(1) | |
| 12.65 | | | | | End of Boring | | |

**Remarks:**

**Reviewed By:** Harry Fekry **Soils Supervisor:** Randy Ferguson

Single Ring Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 2
Test Depth: 3.5 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 12.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 15 | | 11.00 | | | | |
| 0 | 0.25 | 11.00 | 0.75 | 0.00 | 0.50 | 0.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 1.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 1.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 2.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 2.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 3.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 3.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 4.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 4.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 5.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 5.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 6.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 6.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 7.00 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 7.50 |
| 15 | | 10.25 | | | | |
| 0 | 0.50 | 10.25 | 0.00 | 0.00 | 0.25 | 8.00 |
| 15 | | 10.25 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.0 inch

Sheet 2 of 20

Single Ring Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 1
Test Depth: 5.0 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 10.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 1.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 1.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 2.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 2.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 3.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 3.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 4.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 4.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 5.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 5.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 6.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 6.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 7.00 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 7.50 |
| 15 | | 9.75 | | | | |
| 0 | 0.50 | 9.75 | 0.00 | 0.00 | 0.25 | 8.00 |
| 15 | | 9.75 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.0 inch

Sheet 4 of 20

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 16
Test Depth: 6.0 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 24.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 23.75 | | | | |
| 0 | 0.50 | 23.75 | 0.15 | 0.00 | 0.33 | 0.50 |
| 15 | | 23.60 | | | | |
| 0 | 0.50 | 23.60 | 0.15 | 0.00 | 0.33 | 1.00 |
| 15 | | 23.45 | | | | |
| 0 | 0.50 | 23.45 | 0.15 | 0.00 | 0.33 | 1.50 |
| 15 | | 23.30 | | | | |
| 0 | 0.50 | 23.30 | 0.15 | 0.00 | 0.33 | 2.00 |
| 15 | | 23.15 | | | | |
| 0 | 0.50 | 23.15 | 0.15 | 0.00 | 0.33 | 2.50 |
| 15 | | 23.00 | | | | |
| 0 | 0.50 | 23.00 | 0.15 | 0.00 | 0.33 | 3.00 |
| 15 | | 22.85 | | | | |
| 0 | 0.50 | 22.85 | 0.15 | 0.00 | 0.33 | 3.50 |
| 15 | | 22.70 | | | | |
| 0 | 0.50 | 22.70 | 0.15 | 0.00 | 0.33 | 4.00 |
| 15 | | 22.55 | | | | |
| 0 | 0.50 | 22.55 | 0.15 | 0.00 | 0.33 | 4.50 |
| 15 | | 22.40 | | | | |
| 0 | 0.50 | 22.40 | 0.15 | 0.00 | 0.33 | 5.00 |
| 15 | | 22.25 | | | | |
| 0 | 0.50 | 22.25 | 0.15 | 0.00 | 0.33 | 5.50 |
| 15 | | 22.10 | | | | |
| 0 | 0.50 | 22.10 | 0.15 | 0.00 | 0.33 | 6.00 |
| 15 | | 21.95 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.2 inch

Sheet 10 of 20

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 15
Test Depth: 5.0 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 24.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 23.75 | | | | |
| 0 | 0.50 | 23.75 | 0.15 | 0.00 | 0.33 | 0.50 |
| 15 | | 23.60 | | | | |
| 0 | 0.50 | 23.60 | 0.15 | 0.00 | 0.33 | 1.00 |
| 15 | | 23.45 | | | | |
| 0 | 0.50 | 23.45 | 0.15 | 0.00 | 0.33 | 1.50 |
| 15 | | 23.30 | | | | |
| 0 | 0.50 | 23.30 | 0.15 | 0.00 | 0.33 | 2.00 |
| 15 | | 23.15 | | | | |
| 0 | 0.50 | 23.15 | 0.15 | 0.00 | 0.33 | 2.50 |
| 15 | | 23.00 | | | | |
| 0 | 0.50 | 23.00 | 0.15 | 0.00 | 0.33 | 3.00 |
| 15 | | 22.85 | | | | |
| 0 | 0.50 | 22.85 | 0.15 | 0.00 | 0.33 | 3.50 |
| 15 | | 22.70 | | | | |
| 0 | 0.50 | 22.70 | 0.15 | 0.00 | 0.33 | 4.00 |
| 15 | | 22.55 | | | | |
| 0 | 0.50 | 22.55 | 0.15 | 0.00 | 0.33 | 4.50 |
| 15 | | 22.40 | | | | |
| 0 | 0.50 | 22.40 | 0.15 | 0.00 | 0.33 | 5.00 |
| 15 | | 22.25 | | | | |
| 0 | 0.50 | 22.25 | 0.15 | 0.00 | 0.33 | 5.50 |
| 15 | | 22.10 | | | | |
| 0 | 0.50 | 22.10 | 0.15 | 0.00 | 0.33 | 6.00 |
| 15 | | 21.95 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.2 inch

Sheet 10 of 20

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 14
Test Depth: 5.0 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 24.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 23.75 | | | | |
| 0 | 0.50 | 23.75 | 0.15 | 0.00 | 0.33 | 0.50 |
| 15 | | 23.60 | | | | |
| 0 | 0.50 | 23.60 | 0.15 | 0.00 | 0.33 | 1.00 |
| 15 | | 23.45 | | | | |
| 0 | 0.50 | 23.45 | 0.15 | 0.00 | 0.33 | 1.50 |
| 15 | | 23.30 | | | | |
| 0 | 0.50 | 23.30 | 0.15 | 0.00 | 0.33 | 2.00 |
| 15 | | 23.15 | | | | |
| 0 | 0.50 | 23.15 | 0.15 | 0.00 | 0.33 | 2.50 |
| 15 | | 23.00 | | | | |
| 0 | 0.50 | 23.00 | 0.15 | 0.00 | 0.33 | 3.00 |
| 15 | | 22.85 | | | | |
| 0 | 0.50 | 22.85 | 0.15 | 0.00 | 0.33 | 3.50 |
| 15 | | 22.70 | | | | |
| 0 | 0.50 | 22.70 | 0.15 | 0.00 | 0.33 | 4.00 |
| 15 | | 22.55 | | | | |
| 0 | 0.50 | 22.55 | 0.15 | 0.00 | 0.33 | 4.50 |
| 15 | | 22.40 | | | | |
| 0 | 0.50 | 22.40 | 0.15 | 0.00 | 0.33 | 5.00 |
| 15 | | 22.25 | | | | |
| 0 | 0.50 | 22.25 | 0.15 | 0.00 | 0.33 | 5.50 |
| 15 | | 22.10 | | | | |
| 0 | 0.50 | 22.10 | 0.15 | 0.00 | 0.33 | 6.00 |
| 15 | | 21.95 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.2 inch

Sheet 10 of 20

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 13
Test Depth: 5.0 Feet

Test Results

| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 24.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 23.75 | | | | |
| 0 | 0.50 | 23.75 | 0.15 | 0.00 | 0.33 | 0.50 |
| 15 | | 23.60 | | | | |
| 0 | 0.50 | 23.60 | 0.15 | 0.00 | 0.33 | 1.00 |
| 15 | | 23.45 | | | | |
| 0 | 0.50 | 23.45 | 0.15 | 0.00 | 0.33 | 1.50 |
| 15 | | 23.30 | | | | |
| 0 | 0.50 | 23.30 | 0.15 | 0.00 | 0.33 | 2.00 |
| 15 | | 23.15 | | | | |
| 0 | 0.50 | 23.15 | 0.15 | 0.00 | 0.33 | 2.50 |
| 15 | | 23.00 | | | | |
| 0 | 0.50 | 23.00 | 0.15 | 0.00 | 0.33 | 3.00 |
| 15 | | 22.85 | | | | |
| 0 | 0.50 | 22.85 | 0.15 | 0.00 | 0.33 | 3.50 |
| 15 | | 22.70 | | | | |
| 0 | 0.50 | 22.70 | 0.15 | 0.00 | 0.33 | 4.00 |
| 15 | | 22.55 | | | | |
| 0 | 0.50 | 22.55 | 0.15 | 0.00 | 0.33 | 4.50 |
| 15 | | 22.40 | | | | |
| 0 | 0.50 | 22.40 | 0.15 | 0.00 | 0.33 | 5.00 |
| 15 | | 22.25 | | | | |
| 0 | 0.50 | 22.25 | 0.15 | 0.00 | 0.33 | 5.50 |
| 15 | | 22.10 | | | | |
| 0 | 0.50 | 22.10 | 0.15 | 0.00 | 0.33 | 6.00 |
| 15 | | 21.95 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.2 inch

Sheet 10 of 20

Borehole Infiltration Test Calculations

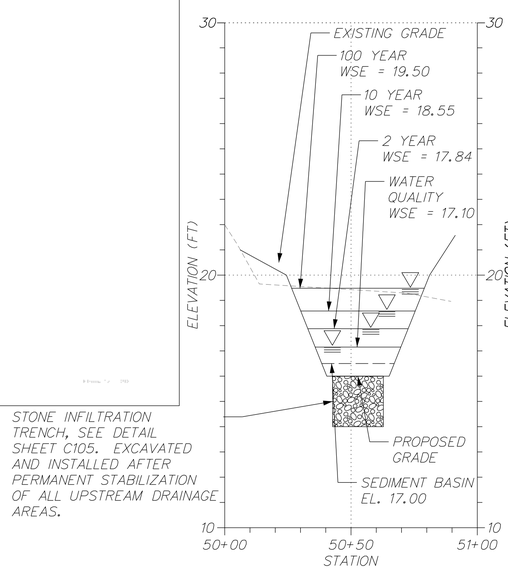
Project Name: Civil Air Terminal Expansion
Project Number: 2010-2-0008
Date Tested: 2-Aug-10
Boring: CAT INF 12
Test Depth: 5.0 Feet

Test Results

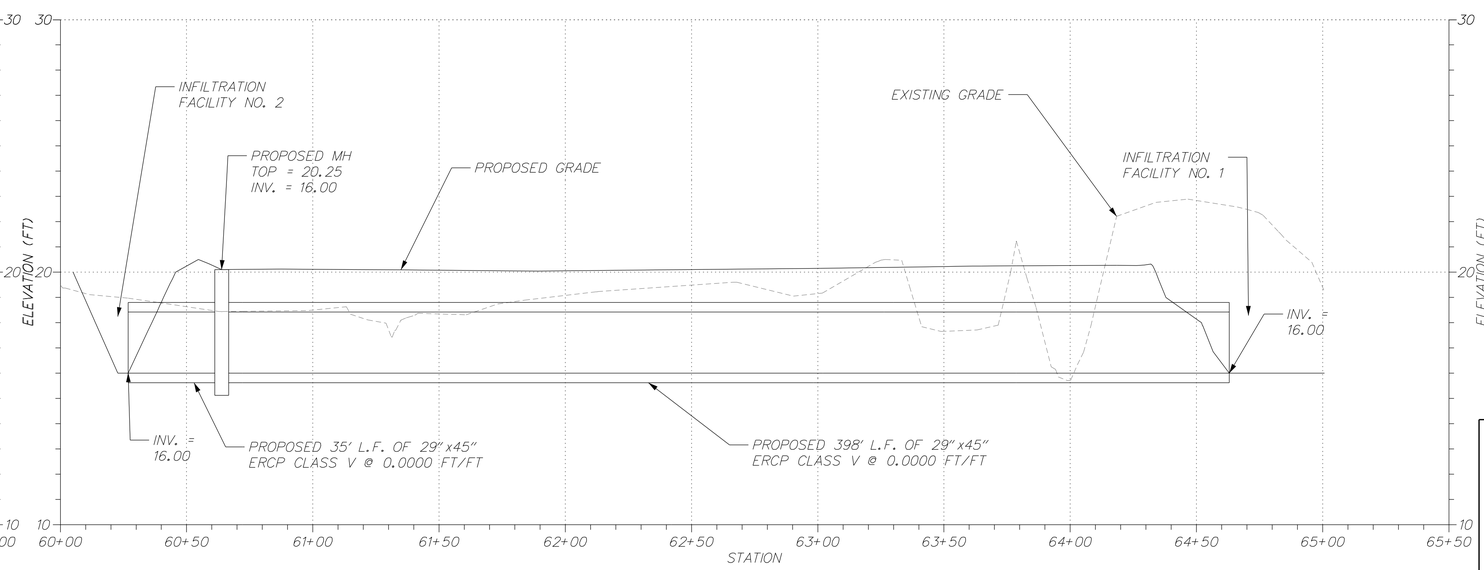
| Clock times (min) | Delta T (hours) | Readings (in) | Incremental Drop (in) | Incremental Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.00 | 24.00 | 0.25 | 0.00 | 0.00 | 0.00 |
| 15 | | 23.75 | | | | |
| 0 | 0.50 | 23.75 | 0.15 | 0.00 | 0.33 | 0.50 |
| 15 | | 23.60 | | | | |
| 0 | 0.50 | 23.60 | 0.15 | 0.00 | 0.33 | 1.00 |
| 15 | | 23.45 | | | | |
| 0 | 0.50 | 23.45 | 0.15 | 0.00 | 0.33 | 1.50 |
| 15 | | 23.30 | | | | |
| 0 | 0.50 | 23.30 | 0.15 | 0.00 | 0.33 | 2.00 |
| 15 | | 23.15 | | | | |
| 0 | 0.50 | 23.15 | 0.15 | 0.00 | 0.33 | 2.50 |
| 15 | | 23.00 | | | | |
| 0 | 0.50 | 23.00 | 0.15 | 0.00 | 0.33 | 3.00 |
| 15 | | 22.85 | | | | |
| 0 | 0.50 | 22.85 | 0.15 | 0.00 | 0.33 | 3.50 |
| 15 | | 22.70 | | | | |
| 0 | 0.50 | 22.70 | 0.15 | 0.00 | 0.33 | 4.00 |
| 15 | | 22.55 | | | | |
| 0 | 0.50 | 22.55 | 0.15 | 0.00 | 0.33 | 4.50 |
| 15 | | 22.40 | | | | |
| 0 | 0.50 | 22.40 | 0.15 | 0.00 | 0.33 | 5.00 |
| 15 | | 22.25 | | | | |
| 0 | 0.50 | 22.25 | 0.15 | 0.00 | 0.33 | 5.50 |
| 15 | | 22.10 | | | | |
| 0 | 0.50 | 22.10 | 0.15 | 0.00 | 0.33 | 6.00 |
| 15 | | 21.95 | | | | |

average final infiltration rate: 0.0 inch
maximum infiltration rate to use for design: 0.2 inch

Sheet 10 of 20




**INFILTRATION FACILITY NO. 2 SECTION**




**CONNECTOR PIPES – INFILTRATION FACILITY NO. 1 TO INFILTRATION FACILITY NO. 2**

VERTICAL SCALE FEET 0 3 6 9

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 2**

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-115
TOTAL SHTS. 20

4/15/2014
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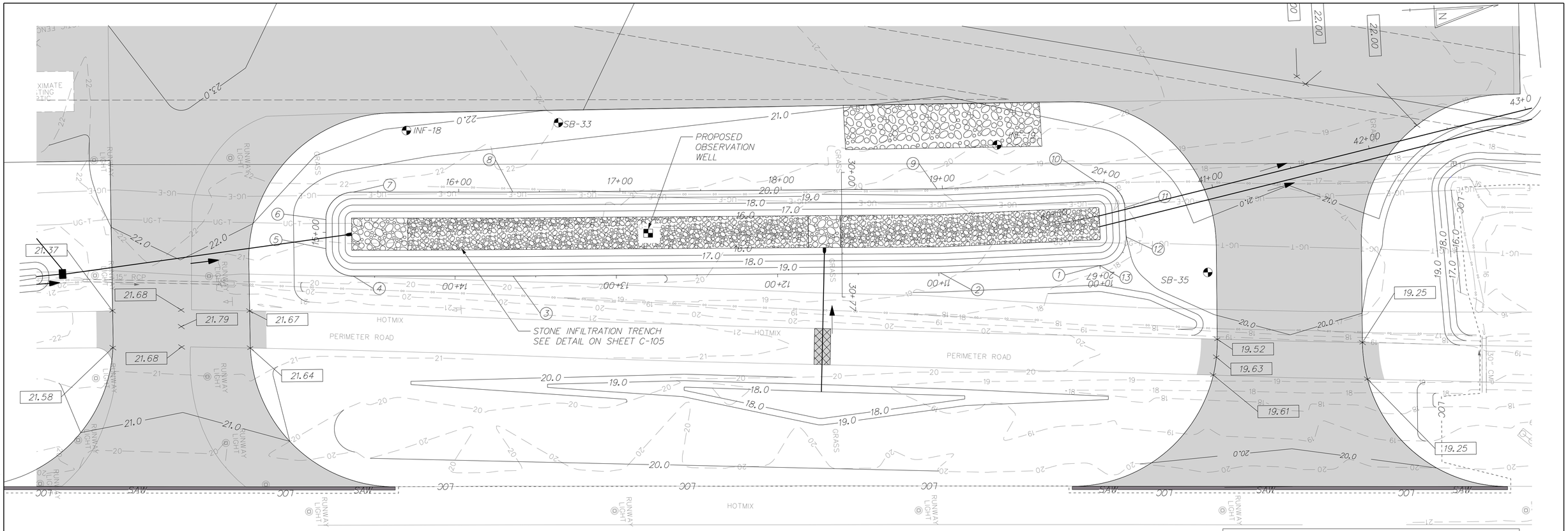


## PLAN VIEW - INFILTRATION BASIN NO. 3

SCALE: 1" = 30'

### ℄ EMBANKMENT

| | STATION | NORTHING | EASTING | RADIUS |
|---|---|---|---|---|
| 1 | POB 10+00.00 | 415791.6679 | 642084.2173 | |
| 2 | PI 10+99.23 | 415692.4480 | 642083.0377 | |
| 3 | PI 13+64.14 | 415427.8589 | 642069.8774 | |
| 4 | PC 14+63.18 | 415328.9761 | 642064.2793 | |
| | PI 14+80.18 | 415312.0033 | 642063.3184 | 17' |
| 5 | PT 14+89.89 | 415312.9642 | 642046.3456 | |
| 6 | PC 15+07.89 | 415313.9816 | 642028.3744 | |
| | PI 15+24.89 | 415314.9425 | 642011.4016 | 17' |
| 7 | PT 15+34.59 | 415331.9153 | 642012.3625 | |
| 8 | PI 16+33.55 | 415430.7164 | 642017.9559 | |
| 9 | PI 18+96.68 | 415693.5203 | 642031.0468 | |
| 10 | PC 19+95.45 | 415792.2860 | 642032.2210 | |
| | PI 20+12.45 | 415809.2848 | 642032.4231 | 17' |
| 11 | PT 20+22.16 | 415809.0827 | 642049.4219 | |
| 12 | PC 20+40.16 | 415808.8688 | 642067.4206 | |
| | PI 20+57.16 | 415808.6667 | 642084.4194 | 17' |
| 13 | PT 20+66.86 | 415791.6679 | 642084.2173 | |

NOTE: ALIGNMEMT IS LOCATED AT TOP OF POND, ELEVATION 20.00'.

### GENERAL NOTES

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE FACILITY.
2. NO HEAVY EQUIPMENT WILL BE ALLOWED IN THE BOTTOM OF THE FACILITY. EQUIPMENT OPERATING IN THE FACILITY SHALL BE A LOW PRESSURE, WIDE TRACKED EXCAVATOR, THAT HAS BEEN APPROVED BY THE DNREC CCR.
3. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE STOCKPILED SO THAT IT WILL NOT DRAIN INTO THE FACILITY DURING CONSTRUCTION.
4. ALL INFILTRATION FACILITIES SHALL HAVE AN OBSERVATION WELL. SEE CONSTRUCTION DETAILS.
5. TOPSOIL SHALL BE APPLIED TO THE SIDE SLOPES AND EMBANKMENT ONLY. ANY EXPOSED SOIL ON THE BOTTOM SHALL REMAIN THE NATIVE SOIL.

### INFILTRATION TRENCH MAINTENANCE AND INSPECTION

INSPECTION: SELF INSPECT SEMI-ANNUALLY (SPRING AND FALL) AND AFTER STORM EVENTS OF 2 INCHES OR MORE. REMOVE TRASH AND DEBRIS ON A REGULAR BASIS. IT IS ESPECIALLY IMPORTANT TO REMOVE DEBRIS FROM ALL INLETS AND OUTFALL STRUCTURES.

SOIL: SOILS ON SIDE SLOPES OF POND SHOULD BE TESTED ANNUALLY TO ENSURE PROPER PH AND FERTILITY INCLUDING: ORGANIC MATTER, MAGNESIUM, PHOSPHORUS, NITROGEN, POTASSIUM, AND SOLUBLE SALTS. IF REQUIRED, FERTILIZERS SHOULD ONLY BE APPLIED IN THE FALL.

EROSION: IF BARE SOUL EXISTS ON POND SIDE SLOPES OR EMBANKMENT, RESEED AND/OR REPLANT. STABILIZE APPLICABLE ERODED AREAS WITH REINFORCING EROSION CONTROL MATTING. IT IS RECOMMENDED TO USE BIODEGRADABLE PRODUCTS TO AID IN MOWING AND DETER WILDLIFE ENTANGLEMENT.

MOWING: MOW AROUND BASIN WEEKLY DURING PEAK GROWING SEASON. MOW 10-FOOT WIDE ACCESS TO ALL INLET AND OUTLET STRUCTURES.

SPECIAL CONSIDERATIONS:
INFILTRATION BASINS ARE DESIGNED TO INFILTRATE WATER AND REMOVE POLLUTANTS FROM STORMWATER. DO NOT COMPACT THE FACILITY IN ANY WAY. THIS INCLUDES THE USE OF HEAVY EQUIPMENT OR MACHINERY. COMPACTION MAY LEAD TO SYSTEM FAILURE.

HIRE A PROFESSIONAL:
IF FACILITY DOES NOT DRAIN WITHIN 48 HOURS; REPAIR OF SEVER EROSION; REPLACEMENT OF DETERIORATING PIPES OR STRUCTURAL COMPONENTS; IF MOSQUITOES ARE SUSPECTED TO BE PROBLEMATIC; RECONSTRUCTION OF EMBANKMENT AND OUTLET STRUCTURE; REMOVAL OF ACCUMULATED SEDIMENT; AQUATIC VEGETATION CONTROL IF LICENSING REQUIRED BY DE DEPARTMENT OF AGRICULTURE; IF DREDGING IS REQUIRED.

### INFILTRATION FACILITY NO.3 SUMMARY

| DESIGN STORM | FACILITY INFLOW | FACILITY DISCHARGE | WATER SURFACE ELEVATION | STORAGE VOLUME (AC.FT) |
|---|---|---|---|---|
| QUALITY STORM (2.0") | 14.57 | 4.63 | 16.85 | 0.211 |
| 2 - YEAR | 35.75 | 20.77 | 17.62 | 0.460 |
| 10 - YEAR | 69.43 | 48.21 | 18.46 | 0.797 |
| 100 - YEAR | 136.23 | 88.23 | 19.94 | 1.549 |

HAZARD CLASSIFICATION: CLASS A AS PER POND CODE 378

DRAINAGE AREA TO FACILITY: 18.09 ACRES

MANAGEMENT PROVIDED BY FACILITY: WATER QUALITY BY EXTENDED DETENTION OF FIRST 2.0" OF RUNOFF. WATER QUANTITY FOR 2 AND 10 YEAR STORMS.

DELAWARE ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE 0 30 60 90 FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT PLAN – INFILTRATION FACILITY NO. 3**

DESIGNED BY: CENTURY ENGINEERING CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-116
TOTAL SHTS. 20

4/15/2014
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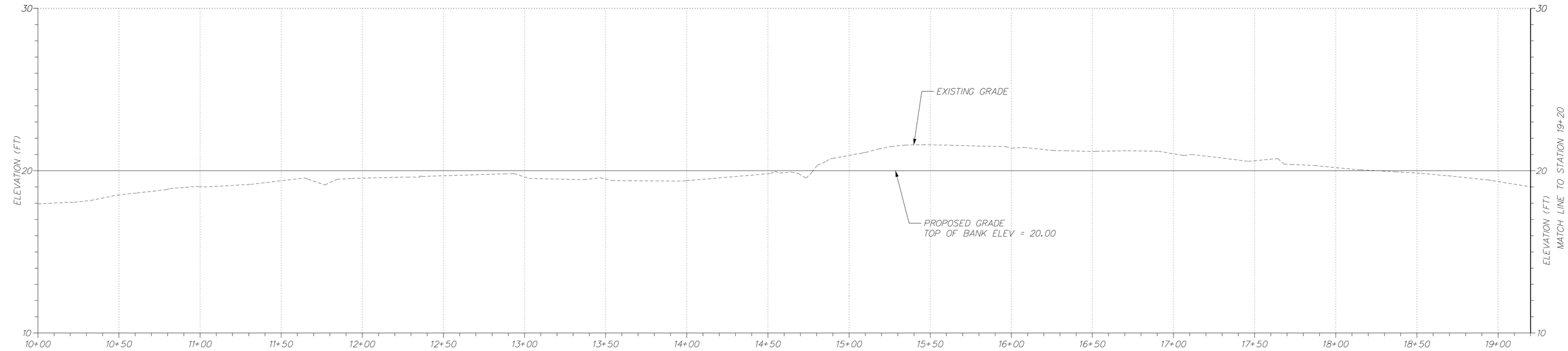
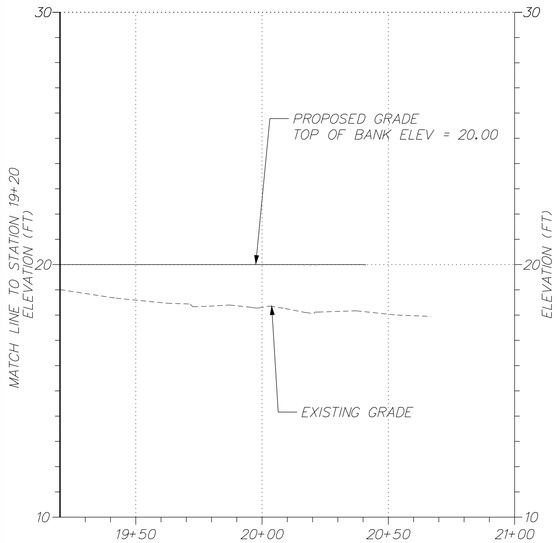
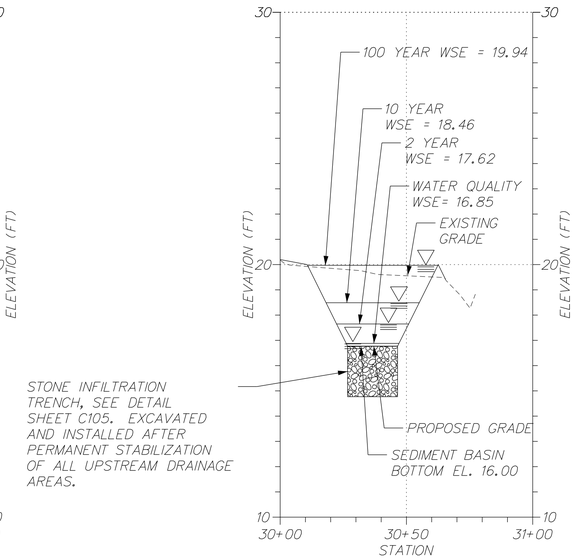


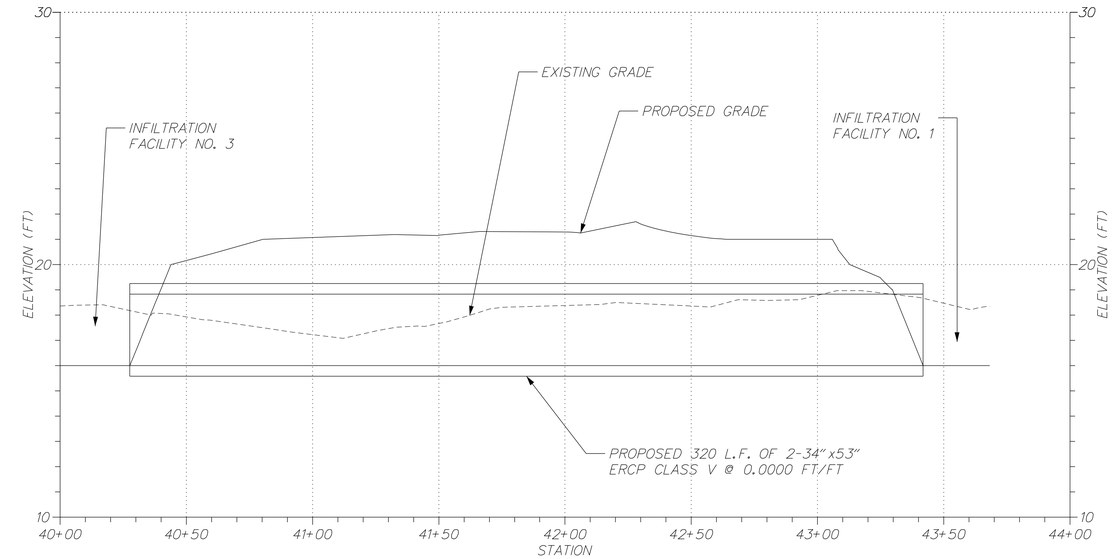

**INFILTRATION FACILITY NO. 3 EMBANKMENT**




**INFILTRATION FACILITY NO. 3 EMBANKMENT**




**INFILTRATION FACILITY NO. 3 SECTION**




**CONNECTOR PIPES – INFILTRATION FACILITY NO. 1 TO INFILTRATION FACILITY NO. 3**

VERTICAL SCALE FEET 9 6 3 0

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 3**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-117
TOTAL SHTS. 20

4/15/2014
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STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 1 OF 2

## BORING CAT-SB-33

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 415461 **Easting:** 641976
**Boring Surface Elev.:** 22.09 **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

**Wt. of Sample Hammer:** 140 Lbs. **Average Fall:** 30 IN.
**Type of:** D-Sampler: Split-Barrel O.D. **O.D. of Sampler:** 2 IN.
S-Sampler: O.D. **O.D. of Samp. Tube:** IN.
U-Sampler: O.D. **O.D. of Samp. Tube:** IN.
Core Bit: O.D. **O.D. of Rock Core:** IN.

**Hollow Stem Auger Diameter:** 3 1/4" Inches **From Depth of:** 0.0 To: 18.0
**Mud Rotary:** **From Depth of:** To:

**Water Level Readings**

| Date | Depth to Water (ft) | Cased Depth (ft) |
|---|---|---|
| 8/4/2010 | 13.8' | |
| 8/4/2010 | Dry | 9.9' |

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** Truck CME 55
**Driller:** Jason **Logged By:** Billy

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| | | 1 | 1.0' | | Moist very stiff brown silt w/some fine sand, trace coarse sand. 12" RECOVERY | A-4(0) | Topsoil - 12". |
| 2.35 | | 2 | 2.0' | | Wet very stiff light brown silt w/some fine sand, trace coarse sand and clay. 21" RECOVERY | A-4(0) | |
| 4.7 | | 3 | 4.0' | | Wet very stiff light brown fine sandy silt w/ trace coarse sand. 20" RECOVERY | A-4(0) | |
| 7.05 | | 4 | 6.0' 8.0' | | Wet stiff light gray silt w/trace fine sand. 21" RECOVERY | A-4(1) | |
| 9.4 | | 5 | 8.0' | | Wet firm light gray clayey silt w/some coarse to fine sand, trace fine gravel. 20" RECOVERY | A-4(1) | |
| 11.75 | | 6 | 10.0' | | Wet medium dense grayish white silty fine gravelly coarse sand w/some fine sand. 21" RECOVERY | A-1-b | |
| 14.1 | ▽ | 7 | 12.0' 14.0' | | Wet medium dense gray coarse sand w/some fine gravel, fine sand and silt. 18" RECOVERY | A-1-b | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 2 OF 2

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Boring No.:** CAT-SB-33
**State Contract:**

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| | | 8 | 14.0' 16.0' | | Wet medium dense gray coarse sandy fine gravel w/some fine sand, trace silt. 19" RECOVERY | A-1-b | |
| 18.45 | | 9 | 16.0' 18.0' | | Wet medium dense gray fine gravel and coarse sand w/some silt and fine sand. 15" RECOVERY | A-1-b | |
| 18.8 | | 10 | 18.0' 20.0' | | Wet medium dense grayish brown fine gravelly coarse sand w/some fine sand, trace silt. 20" RECOVERY | A-1-b | |
| 21.15 | | | | | End of Boring. | | |
| 23.5 | | | | | | | |
| 25.85 | | | | | | | |
| 28.2 | | | | | | | |
| 30.55 | | | | | | | |
| 32.9 | | | | | | | |
| 35.25 | | | | | | | |

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Layout Schemes
Project Number: T201069009
Date Tested: 4 Aug 10
Boring: CAT INF 3
Test Depth: 4.0 - 6.0

Test Results

| Elapsed Time (min) | Delta T (min) | Readings (in) | Increment Drop (in) | Increment Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.33 | 29.00 | 12.50 | 37.50 | 37.50 | 0.33 |
| 20 | | 7.50 | | | | |
| 0 | 0.33 | 28.00 | 16.50 | 49.50 | 40.00 | 0.33 |
| 20 | | 4.50 | | | | |
| 0 | 0.33 | 29.00 | 12.50 | 37.50 | 37.50 | 0.33 |
| 20 | | 7.50 | | | | |
| 0 | 0.33 | 29.00 | 12.50 | 37.50 | 37.50 | 0.33 |
| 20 | | 7.50 | | | | |
| 0 | 0.33 | 29.00 | 12.50 | 37.50 | 37.50 | 0.33 |
| 20 | | 7.50 | | | | |
| 0 | 0.33 | 29.00 | 11.25 | 33.75 | 36.00 | 0.33 |
| 20 | | 8.75 | | | | |
| 0 | 0.33 | 29.00 | 11.25 | 33.75 | 36.00 | 0.33 |
| 20 | | 8.75 | | | | |

average infiltration rate: 38.1 rate
minimum infiltration rate to use for design: 18.0 in/hr

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STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

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## BORING CAT-SB-35

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Location:**
**State Contract #:** T201069009 **Federal Contract #:**
**Station/Offset:** **Northing:** 415858 **Easting:** 642092
**Boring Surface Elev.:** 17.26 **Reference:**
**Date Started:** 8/4/2010 **Date Completed:** 8/4/2010

**Wt. of Sample Hammer:** 140 Lbs. **Average Fall:** 30 IN.
**Type of:** D-Sampler: Split-Barrel O.D. **O.D. of Sampler:** 2 IN.
S-Sampler: O.D. **O.D. of Samp. Tube:** IN.
U-Sampler: O.D. **O.D. of Samp. Tube:** IN.
Core Bit: O.D. **O.D. of Rock Core:** IN.

**Hollow Stem Auger Diameter:** 3 1/4" Inches **From Depth of:** 0.0 To: 18.0
**Mud Rotary:** **From Depth of:** To:

**Water Level Readings**

| Date | Depth to Water (ft) | Cased Depth (ft) |
|---|---|---|
| 8/4/2010 | 11.9' | |
| 8/4/2010 | Dry | 3.2' |

**Boring Contractor:** Welton Corporation **Equipment/Rig Type:** Truck CME 55
**Driller:** Jason **Logged By:** Billy

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| | | 1 | 1.0' | | Moist stiff light brown fine sandy silt w/trace coarse sand, fine gravel and clay. 15" RECOVERY | A-4(0) | Topsoil - 10". |
| 2.35 | | 2 | 2.0' | | Wet very stiff light gray silt w/ trace fine to coarse sand, fine gravel and clay. 21" RECOVERY | A-4(2) | |
| 4.7 | | 3 | 4.0' | | Wet stiff light gray silt w/some fine sand, trace coarse sand and fine gravel. 20" RECOVERY | A-4(0) | |
| 7.05 | | 4 | 6.0' 8.0' | | Wet stiff light gray silt w/some fine sand, trace fine gravel, coarse sand and clay. 19" RECOVERY | A-4(1) | |
| 9.4 | | 5 | 8.0' | | Wet stiff light gray silt w/trace fine to coarse sand and fine gravel. 20" RECOVERY | A-4(0) | |
| 11.75 | ▽ | 6 | 10.0' | | Wet medium dense light gray silty fine gravel w/some fine to coarse sand. 20" RECOVERY | A-1-b | |
| 14.1 | | 7 | 12.0' 14.0' | | Wet medium dense light gray fine gravelly coarse sand w/trace fine sand and silt. 18" RECOVERY | A-1-b | |

**Remarks:**

**Reviewed By:** Hany Fekry **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
MATERIALS AND RESEARCH

PAGE 2 OF 2

**Project Name:** Civil Air Terminal Layout Schemes for D.A.F.B. **Boring No.:** CAT-SB-35
**State Contract:**

| Depth (ft.) | Water Level | No. | Sample Depth | Blows/6" | Sample Description | AASHTO Class. | Remarks |
|---|---|---|---|---|---|---|---|
| | | 8 | 14.0' 16.0' | | Wet medium dense light gray silty coarse to fine sand. 16" RECOVERY | A-2-4(0) | |
| 18.45 | | 9 | 16.0' 18.0' | | Wet medium dense light gray fine gravel w/ some coarse sand, trace silt and fine sand. 20" RECOVERY | A-1-a | |
| 18.8 | | 10 | 18.0' 20.0' | | Wet medium dense light gray coarse sand and fine gravel w/trace fine sand and silt. 13" RECOVERY | A-1-b | |
| 21.15 | | | | | End of Boring. | | |
| 23.5 | | | | | | | |
| 25.85 | | | | | | | |
| 28.2 | | | | | | | |
| 30.55 | | | | | | | |
| 32.9 | | | | | | | |
| 35.25 | | | | | | | |

Borehole Infiltration Test Calculations

Project Name: Civil Air Terminal Expansion
Project Number: T201069009
Date Tested: 4 Aug 10
Boring: CAT INF 10
Test Depth: 4.0 - 6.0

Test Results

| Elapsed Time (min) | Delta T (min) | Readings (in) | Increment Drop (in) | Increment Infiltration Rate (in/min) | Average Infiltration Rate (in/min) | Total Elapsed Time (hr) |
|---|---|---|---|---|---|---|
| 0 | 0.33 | 20.00 | 11.75 | 35.25 | 35.25 | 0.33 |
| 20 | | 8.25 | | | | |
| 0 | 0.33 | 24.00 | 14.75 | 44.25 | 37.75 | 0.67 |
| 20 | | 9.25 | | | | |
| 0 | 0.33 | 30.00 | 18.00 | 54.00 | 41.50 | 1.00 |
| 20 | | 12.00 | | | | |
| 0 | 0.33 | 30.00 | 10.00 | 30.00 | 51.88 | 1.33 |
| 20 | | 15.00 | | | | |
| 0 | 0.33 | 27.00 | 7.50 | 22.50 | 37.50 | 1.67 |
| 20 | | 19.50 | | | | |
| 0 | 0.33 | 27.00 | 10.50 | 31.50 | 33.75 | 2.00 |
| 20 | | 16.50 | | | | |
| 0 | 0.33 | 30.00 | 8.25 | 24.75 | 30.00 | 2.33 |
| 20 | | 11.75 | | | | |
| 0 | 0.33 | 27.00 | 9.00 | 27.00 | 27.63 | 2.67 |
| 20 | | 18.00 | | | | |

average infiltration rate: 32.5 rate
minimum infiltration rate to use for design: 18.0 in/hr

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DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 30 60 90
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT DETAIL – INFILTRATION FACILITY NO. 3**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-118
TOTAL SHTS. 20

4/15/2014
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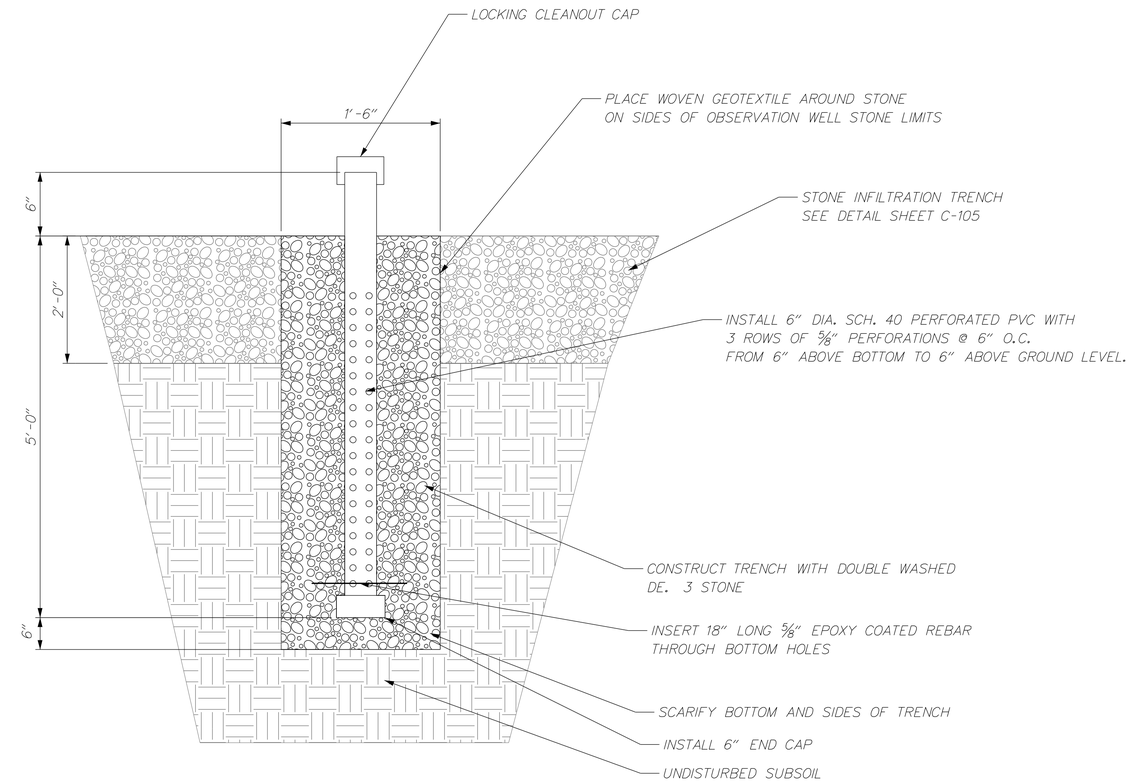


OBSERVATION WELL DETAIL

NOT TO SCALE

DELAWARE
ECONOMIC DEVELOPMENT OFFICE
Right Place. Right Size.

ADDENDUMS / REVISIONS

SCALE
0 50 100 150
FEET

**DEVELOPMENT AND EXPANSION OF THE DOVER AFB CARGO RAMP**

**STORMWATER MANAGEMENT GENERAL DETAILS**

DESIGNED BY:
CENTURY ENGINEERING
CONSULTING ENGINEERS SURVEYORS

SHEET NO. C-119
TOTAL SHTS. 20

4/15/2014
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