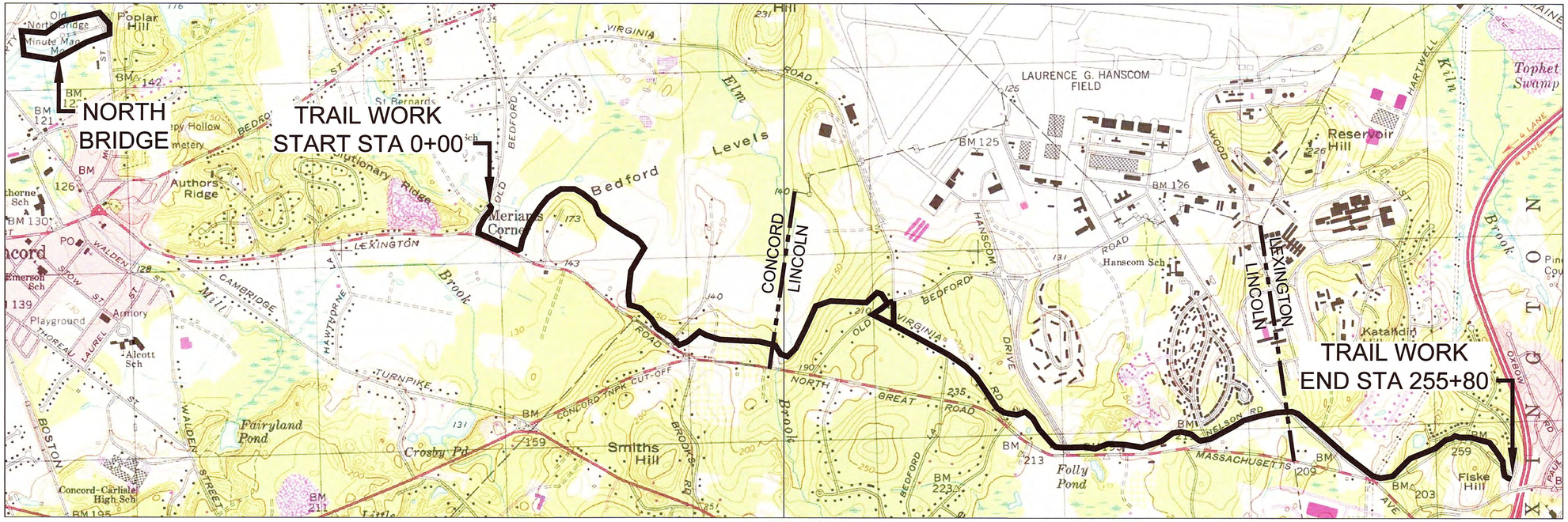
NATIONAL PARK SERVICE DEVELOPMENT

# MINUTE MAN NATIONAL PARK

## CONCORD, LINCOLN, AND LEXINGTON, MA




VICINITY MAP

SCALE: 1" = 1,000'

## GENERAL NOTES

1. LOCATIONS OF EXISTING UNDERGROUND UTILITIES/OBSTRUCTIONS/SYSTEMS SHOWN HEREON ARE APPROXIMATE ONLY. ALL UTILITIES/OBSTRUCTIONS/SYSTEMS MAY NOT BE SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES/OBSTRUCTIONS/SYSTEMS, WHETHER OR NOT SHOWN HEREON.
2. UNLESS OTHERWISE SHOWN, ALL NEW UTILITIES SHALL BE UNDERGROUND.
3. BURIED UTILITIES SHALL BE INSTALLED IN ACCORDANCE WITH THEIR RESPECTIVE COMPANY SPECIFICATIONS.
4. CONSTRUCTION LAYOUT OF BUILDING AND SITE IMPROVEMENTS SHALL BE PERFORMED BY A LICENSED PROFESSIONAL LAND SURVEYOR. LOCATIONS OF EXISTING FEATURES OR PROPOSED IMPROVEMENTS DERIVED BY SCALING DRAWINGS MAY NOT BE ACCURATE. PROPERTY LINES SHOWN HEREON ARE APPROXIMATE. SEE PLAN REFERENCE HEREON.
5. SAFETY MEASURES, CONSTRUCTION METHODS, AND CONTROL OF WORK SHALL BE RESPONSIBILITY OF CONTRACTOR.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ANY EXISTING UTILITY OR STRUCTURE DAMAGED DURING CONSTRUCTION THAT ARE NOT DESIGNATED FOR DEMOLITION AND/OR REMOVAL HEREON. DAMAGED UTILITY OR STRUCTURE SHALL BE REPAIRED TO THE SATISFACTION OF THEIR RESPECTIVE OWNERS.
7. ANY INTENDED REVISION OF THE HORIZONTAL AND/OR VERTICAL LOCATION OF IMPROVEMENTS TO BE CONSTRUCTED AS SHOWN HEREON SHALL BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO IMPLEMENTATION.
8. CONTRACTOR SHALL NOTIFY ENGINEER UPON COMMENCEMENT OF CONSTRUCTION IN ORDER TO ENSURE THAT REQUIRED INSPECTIONS ARE PERFORMED IN A TIMELY AND EFFICIENT MANNER.
9. CONTRACTOR SHALL PROMPTLY NOTIFY ENGINEER UPON DISCOVERY OF ANY UNFORESEEN SURFACE OR SUBSURFACE CONDITIONS THAT MAY IMPACT SITE CONSTRUCTION.
10. FINISH RIM ELEVATIONS SHOULD MATCH PAVEMENT, GRADING OR LANDSCAPING, UNLESS SPECIFICALLY INDICATED OTHERWISE.
11. WHERE EXISTING UTILITY LINES/STRUCTURES ARE TO BE CUT/BROKEN DOWN/ABANDONED, LINES/STRUCTURES SHALL BE PLUGGED/CAPPED/FILLED IN ACCORDANCE WITH UTILITY OWNER REQUIREMENTS.
12. EROSION CONTROL MEASURES, SUCH AS SILT FENCE OR HAY BALES AS MAY BE SHOWN HEREON, SHALL BE INSTALLED BEFORE EARTH DISTURBANCE OCCURS WITHIN BUFFER ZONE, AND SHALL SERVE AS THE LIMIT OF WORK.
13. WHERE THE WORD "INSTALL" IS USED HEREIN, IT IS INTENDED TO DIRECT CONTRACTOR TO "FURNISH, INSTALL, AND PLACE IN OPERATION" THE COMPONENT REFERRED TO.
14. LIMITS OF WORK SHALL BE STAKED IN THE FIELD PRIOR TO COMMENCEMENT OF CONSTRUCTION.
15. ALL STORM DRAIN PIPE TO BE SMOOTH INTERIOR HDPE PIPE, 2.0 PSI GASKETED JOINT, UNLESS OTHERWISE NOTED.
16. WHERE SHOWN, CONSTRUCTION NOTES ARE INTENDED TO SUMMARIZE AND CLARIFY MAJOR ITEMS OF WORK. THESE NOTES SHOULD NOT BE CONSTRUED AS AN EXHAUSTIVE LISTING OF ALL WORK REQUIRED. CONTRACTOR SHOULD CONTACT ENGINEER WHEN FURTHER CLARIFICATION OF DEPICTED WORK IS DESIRED.
17. CONSTRUCTION OF FIRE AND DOMESTIC WATER SUPPLY IMPROVEMENTS SHALL CONFORM TO UTILITY'S OWNER REQUIREMENTS.
18. WHERE DIMENSIONS INVOLVE CURB, DIMENSIONS ARE TO FACE OF CURB. WHERE SLOPED GRANITE CURB OR CAPE COD BERM SPECIFIED, FACE OF CURB IS EDGE OF FINISH PAVEMENT AT TOE OF CURB.
19. NO DEBRIS, JUNK, RUBBISH OR OTHER NON-BIODEGRADABLE MATERIALS, FILL CONTAINING HAZARDOUS MATERIALS OR WASTES, OR STUMPS SHALL BE BURIED ON ANY LAND ON THIS SITE, OR LEFT ON ANY LOT OR ON THE STREET RIGHT OF WAY.

## EXISTING CONDITIONS NOTES:

1. EXISTING CONDITION INFORMATION BASED ON AN ON-THE-GROUND TOPOGRAPHIC AND BOUNDARY SURVEY PERFORMED BY GOLDSMITH, PREST & RINGWALL, INC. DATING FROM MARCH TO OCTOBER 2023.
2. EDGE OF RESOURCE AREAS DELINEATED BY OXBOW ASSOCIATES, INC. DATING FROM MARCH 2022 TO OCTOBER 2023. SEE REFERENCE NO. 2.

## REFERENCES:

1. "REHABILITATE AND REPAIR STRUCTURES AND LANDSCAPES: TRAIL REPAIRS – MINUTE MAN NATIONAL HISTORICAL PARK" AS PREPARED BY NATIONAL PARK SERVICE HACE. DATED 10/31/2022. NPS PMIS #317529. DRAWING NO. 406/184184.
2. "WETLAND RESOURCE AREA EVALUATIONS – MINUTE MAN NATIONAL PARK BOARDWALK REPLACEMENT PROJECT" AS PREPARED BY OXBOW ASSOCIATES, INC. DATED MARCH 10, 2022.
3. "TRAIL REROUTE FOR SAFETY AT INFERRERA FARM" AS PREPARED BY NATIONAL PARK SERVICE. DATED 03/28/2022. PMIS #MIMA-170863. DRAWING NO. 406/178327.
4. "NATIONAL PARK SERVICE DEVELOPMENT – MINUTE MAN NATIONAL PARK – CONCORD, LINCOLN, AND LEXINGTON, MA" CONCORD NOTICE OF INTENT PLAN SET (SHEETS C1.1 – C4.1, & C8.1 – C9.2) PREPARED BY THIS OFFICE. DATED FEBRUARY 2024. REVISED 3/6/24. ORDER OF CONDITIONS ISSUED BY TOWN OF CONCORD ON 3/22/24. DEP FILE #137-1665. RECORDED AT MIDDLESEX SOUTH REGISTRY OF DEEDS ON MARCH 28, 2024. BK 82610, PG 139.
5. "NATIONAL PARK SERVICE DEVELOPMENT – MINUTE MAN NATIONAL PARK – CONCORD, LINCOLN, AND LEXINGTON, MA" LINCOLN NOTICE OF INTENT PLAN SET (SHEETS C1.1, C2.1, C4.1 – C6.1, & C8.1 – C9.2) PREPARED BY THIS OFFICE. DATED FEBRUARY 2024. ORDER OF CONDITIONS ISSUED BY TOWN OF LINCOLN ON 3/20/24. DEP FILE #203-0969. RECORDED AT MIDDLESEX SOUTH REGISTRY OF DEEDS ON APRIL 9, 2024. BK 82649, PG 58.
6. "NATIONAL PARK SERVICE DEVELOPMENT – MINUTE MAN NATIONAL PARK – CONCORD, LINCOLN, AND LEXINGTON, MA" LEXINGTON NOTICE OF INTENT PLAN SET (SHEETS C1.1, C2.1, C6.1 – C9.2) PREPARED BY THIS OFFICE. DATED FEBRUARY 2024. ORDER OF CONDITIONS ISSUED BY TOWN OF LEXINGTON ON 3/18/24. DEP FILE #201-1310. RECORDED AT MIDDLESEX SOUTH REGISTRY OF DEEDS ON APRIL 9, 2024. BK 82649, PG 105.

## REGULATORY NOTES

1. CONTRACTOR SHALL CONTACT DIG-SAFE FOR UNDERGROUND UTILITY MARKING AT 888.344.7233 AT LEAST 72 HOURS PRIOR TO COMMENCEMENT OF ANY WORK. CONTRACTOR SHALL GIVE TWENTY-FOUR (24)-HOUR NOTICE TO PERTINENT TOWN DEPARTMENTS BEFORE COMMENCING ANY WORK IN THE FIELD.
2. CONTRACTOR SHALL COORDINATE AND OBTAIN ALL CONSTRUCTION PERMITS REQUIRED BY REGULATORY AUTHORITIES.
3. CONTRACTOR SHALL BE AWARE OF ALL CONSTRUCTION REQUIREMENTS, CONDITIONS, AND LIMITATIONS IMPOSED BY PERMITS AND APPROVALS ISSUED BY REGULATORY AUTHORITIES PRIOR TO COMMENCEMENT OF ANY WORK.
4. ALL WORK OUTSIDE OF BUILDING THAT IS LESS THAN 10 FEET FROM THE INSIDE FACE OF BUILDING FOUNDATION SHALL CONFORM WITH THE UNIFORM STATE PLUMBING CODE OF MASSACHUSETTS, 248 CMR 2.00.
5. GENERAL COMPLIANCE WITH 28 CFR PART 36 – 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN AND 521 CMR PART C, EXTERIOR OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD REGULATIONS IS INTENDED. CONTRACTOR SHALL VERIFY COMPLIANCE DURING CONSTRUCTION AND SHALL NOTIFY THE OWNER OF ANY NON-COMPLIANCE ISSUES AS SOON AS DISCOVERED.

## SHEET INDEX



## HISTORICAL PRESERVATION NOTES

1. ALL WORK MUST BE IN KEEPING WITH THE SECRETARY OF THE INTERIOR'S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES WITH GUIDELINES FOR PRESERVING, REHABILITATING, RESTORING, & RECONSTRUCTING HISTORIC BUILDINGS (2017) AND THE SECRETARY OF INTERIOR'S GUIDELINES FOR THE TREATMENT OF CULTURAL LANDSCAPES (1996).
2. LANDSCAPES AND STRUCTURES ARE CULTURALLY AND HISTORICALLY SIGNIFICANT. THIS PROPERTY IS MANAGED IN ACCORDANCE WITH DOI AND NPS STANDARDS TO PROTECT RESOURCES FROM DAMAGE OR LOSS OF HISTORIC INTEGRITY.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW BEST PRESERVATION PRINCIPLES AND PRACTICES, NOT ONLY IN IMPLEMENTING WORK IN ACCORDANCE WITH THE HISTORIC PRESERVATION TREATMENT PLAN REQUIRED, BUT IN OCCUPYING THE SITE AND PERFORMING TASKS RELATED TO THE WORK ON THE SITE OR WITHIN THE BUILDING.
4. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER DESIGNATED ARCHEOLOGIST TO IDENTIFY PROTECTION NECESSARY FOR SENSITIVE AREAS.

DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

THIS DRAWING MAY NOT SHOW CONSTRUCTION DETAILS AND SPECIFICATIONS FOR ALL PROPOSED IMPROVEMENTS, AND MAY NOT IDENTIFY ALL CONSTRUCTION WORK ITEMS/AREAS OF CONTRACTOR JURISDICTION.

COMMONWEALTH OF MASSACHUSETTS – NICHOLAS M. PAULING – CIVIL – No. 47114 – REGISTERED PROFESSIONAL ENGINEER – 4/11/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

| NO. | DATE | BY | APP. | REVISION DESCRIPTION |
|---|---|---|---|---|
| 2 | 4/9/24 | DJG | NMP | ISSUED FOR CONSTRUCTION |
| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |


GPR Engineering Solutions for Land & Structures

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www.gpr-inc.com


NATIONAL PARK SERVICE DEVELOPMENT
TRAIL REPAIR

TITLE SHEET

MINUTE MAN NATIONAL PARK
CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY: LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C1.1 |
|---|---|---|---|
| CHK. BY: NMP | | | |



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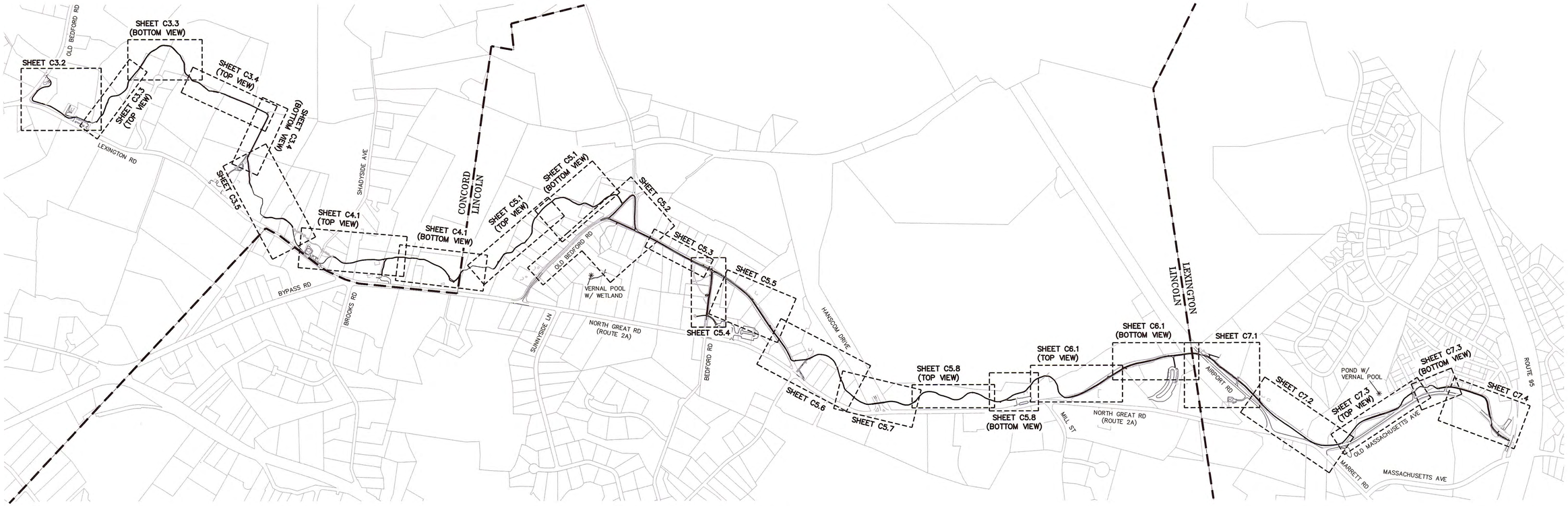
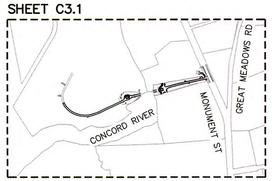



MINUTE MAN TRAIL WORK
NOT TO SCALE


SHEET C3.1




NORTH BRIDGE – CONCORD
NOT TO SCALE

## LEGEND

| EXISTING | | PROPOSED |
|---|---|---|
| -100- | ELEVATION CONTOUR | 100 |
| X100.0 | SPOT GRADE | 100.0 FG |
| | PROPERTY LINE | |
| WC-1 | WETLAND DELINEATION | |
| | WETLAND BUFFER ZONE | |
| | SHORELINE | |
| | 100-YEAR FLOODPLAIN LIMIT | |
| | TREE LINE / EDGE OF VEGETATION | |
| | EDGE OF PAVEMENT | |
| | CAPE COD BERM CURBING | |
| | GRANITE CURBING | |
| | GRAVEL/DIRT ROAD | |
| | STOCKADE FENCE | |
| | STONE WALL | |
| W | WATER MAIN | W |
| WS | WATER SERVICE | WS |
| FS | FIRE SERVICE | FS |
| WV | WATER VALVE | WV |
| | FIRE HYDRANT | |
| FM | FORCE MAIN | FM |
| SS | GRAVITY SEWER LINE | SS |
| S | SEWER MANHOLE | SMH |
| G | GAS LINE | |
| GS | GAS SERVICE | GS |
| GV | GAS VALVE | |
| E | BURIED POWER LINE | E |
| OHW | OVERHEAD POWER LINE | OHW |
| PCL | UTILITY POLE | |
| | GUY WIRE | |
| E | ELECTRIC BOX | |
| SD | STORM DRAIN | SD |
| UD | UNDERDRAIN | UD |
| RD | ROOF DRAIN | RD |
| FD | FOUNDATION DRAIN | FD |
| CB | CATCH BASIN | |
| DMH | DRAIN MANHOLE | |
| | EROSION CONTROL SOCK | |
| 199-1 | DEEP SOIL OBSERVATION HOLE | |
| | SITE LUMINAIRE | |
| | SIGN | |
| | SURFACE RUNOFF DIRECTION | |
| | STONE BOUND | |
| | DRILL HOLE | |
| | IRON ROD | |

## ABBREVIATIONS

| | | | |
|---|---|---|---|
| EL | ELEVATION | HDPE | HIGH DENSITY POLYETHYLENE |
| INV | INVERT | PVC | POLYVINYL CHLORIDE |
| SF | SQUARE FEET | RCP | REINFORCED CONCRETE PIPE |
| AC | ACRES | N/F | NOW OR FORMERLY |
| FT | FEET | VP | VERNAL POOL |
| R | RADIUS | WF | WETLAND FLAG |
| DIA | DIAMETER | TW | TOP OF WALL |
| BIT | BITUMINOUS | BW | BOTTOM OF WALL |
| CONC | CONCRETE | FG | FINISH GRADE |
| L | LENGTH | BSMT | BASEMENT |
| S | SLOPE | FF | FINISH FLOOR |

## DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

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COMMONWEALTH OF MASSACHUSETTS NICHOLAS M. PAULING CIVIL No. 47114 REGISTERED PROFESSIONAL ENGINEER
4/11/2024

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# NATIONAL PARK SERVICE DEVELOPMENT TRAIL REPAIR

## SHEET INDEX

## MINUTE MAN NATIONAL PARK CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY: LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C2.1 |
|---|---|---|---|
| CHK. BY: NMP | | | |

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N

W E

ELEVATIONS SHOWN ARE RELATIVE TO NAVD 1988
B.M. NO. 1
SQ. CUT IN LEDGE
EL. 123.29

REMOVE TRAIL SURFACE AND BASE LAYER FROM APPROX. LIMITS AS SHOWN. INSTALL BX12 BIAXIAL GEOGRID OVER N040 NONWOVEN GEOTEXTILE ON TOP OF EXCAVATED SUBGRADE. INSTALL 6–12" BASE LAYER OF DENSE GRADED CRUSHED STONE OVER GEOGRID. INSTALL 4" SURFACE LAYER OF STONE DUST AGGREGATE WITH SOIL BINDER OVER STONE BASE LAYER TO PROPOSED FINISH GRADE.

ELEVATIONS SHOWN ARE RELATIVE TO NAVD 1988
B.M. NO. 2
S.E. CORN OF POST
EL. 118.98

N/F
USA DEPARTMENT
OF THE INTERIOR
35A MONUMENT ST

N/F
USA DEPARTMENT
OF THE INTERIOR
256 LIBERTY ST

N/F
USA DEPARTMENT
OF THE INTERIOR
33A MONUMENT ST

MONUMENT STREET
(PUBLIC - VARIABLE WIDTH)

ELEVATIONS SHOWN ARE RELATIVE TO NAVD 1988
B.M. NO. 4
MAG–NAIL IN UP
EL. 128.26

127.7 FG
127.47 EX.

127.7 FG
128.05 EX.

127.38± EX.

PROP. 3" I.D. DRYWELL
GRT.=127.50
SUMP=123.50

REPAIR TRAIL SURFACE LEADING TO COMFORT STATION AND WIDEN TO 7' MIN. WIDTH

NEW STONE DUST AGGREGATE PAD FOR SIGN LOCATION. 4' DEPTH X 5' WIDE (MIN. DIMENSIONS)

NEW STONE DUST PAD FOR WAYSIDE LOCATION

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH

PROP. COBBLESTONE EDGE FLUSH TO TRAIL, W/ 3" REVEAL ON CB SIDE

TREE PROTECTION DURING CONSTRUCTION (TYP.)

AREA GRADED TO DRAIN TO EX. CB

129.7 FG
129.87 EX.

PROP. HIGHPOINT
ELEV. 131.7

WASHED OUT TRAIL SURFACE MATERIAL WITHIN GRASS AMPHITHEATER AREA TO BE CLEANED OUT

MONUMENT TO BE PROTECTED DURING CONSTRUCTION

REPLACE BENCH, BENCH SITE TO MEET ABAAS REQUIREMENTS (TYP. OF 5). ALL PROPOSED BENCHES TO MATCH EXISTING ONES IN FRONT OF NORTH BRIDGE VISITOR CENTER.

2' WIDE SUBSURFACE STONE ARMORING FOR COBBLESTONE EDGE (TYP.)

COBBLESTONE EDGE FLUSH TO TRAIL W/ 3" REVEAL ON LANDSCAPE SIDE

REMOVE EX. COBBLE

CONCORD RIVER

NORTH BRIDGE

PROP. 3" I.D. DRYWELL
GRT.=127.50
SUMP=123.50

REDUCE TRAIL WIDTH TO 12' MAX. FOR ENTIRE NORTH BRIDGE PROJECT AREA (UNLESS OTHERWISE NOTED)

127.5 FG
127.89 EX.

127.25± EX.

EXIST. PIGTAIL STEP–IN POSTS W/ ROPE TO BE REPLACED

EX. CB TO BE CLEANED OUT. INSTALL AND MAINTAIN SILT SACK DURING CONSTRUCTION.

PROP. 3" HIGH BERM W/ DIP IN TRAIL TO DIVERT RUNOFF TO SWALES

PROP. COBBLESTONE EDGE FLUSH TO TRAIL AND FINISH GRADE CB SIDE

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH

REMOVE TRAIL WEAR SURFACE TO LIMIT OF HARDENED BASE LAYER FROM MONUMENT STREET ENTRANCE TO WESTERN STATUE. INSTALL 4" SURFACE LAYER OF STONE DUST AGGREGATE WITH SOIL BINDER TO PROPOSED FINISH GRADE.

PROP. 3" HIGH BERM IN TRAIL TO DIVERT RUNOFF TO SIDES

PROP. COBBLESTONE EDGE FLUSH TO TRAIL

EROSION CONTROL SOCK (TYP.)

12' MIN. TRAIL WIDTH AROUND WEST STATUE

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH, S=0.005'/' MIN.

MONUMENT TO BE PROTECTED DURING CONSTRUCTION

114.06± EX.

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH, S=0.005'/' MIN.

TOP OF SWALE (TS)=114.6

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH

116.5 TS
115.4 TS
114.9 TS
114.76± EX.
114.8 TS
116.6 FG
115.5 FG
115.2 FG
114.80± EX.
114.8 TS
114.8 TS
115.1 FG
115.1 FG
114.8 TS
114.8 TS
115.4 FG
115.2 FG
115.1 FG
115.1 FG
115.2 FG
114.8 FG
114.93 EX.
114.6 FG
114.86 EX.
115.1 FG
115.03 EX.

REMOVE TRAIL SURFACE AND BASE LAYER FROM APPROX. LIMITS AS SHOWN. INSTALL BX12 BIAXIAL GEOGRID OVER N040 NONWOVEN GEOTEXTILE ON TOP OF EXCAVATED SUBGRADE. INSTALL 6–12" BASE LAYER OF DENSE GRADED CRUSHED STONE OVER GEOGRID. INSTALL 4" SURFACE LAYER OF STONE DUST AGGREGATE WITH SOIL BINDER OVER STONE BASE LAYER TO PROPOSED FINISH GRADE.

CROSS SLOPE TRAIL AT 2% MIN. TOWARDS SWALES & BIORETENTION

ELEVATIONS SHOWN ARE RELATIVE TO NAVD 1988
B.M. NO. 3
DISK IN RET–WALL
EL. 119.64

COBBLESTONE EDGE FLUSH TO TRAIL W/ 3" REVEAL ON LANDSCAPE SIDE

N/F
TOWN OF CONCORD
27X MONUMENT ST

REPLACE BENCH, BENCH SITE TO MEET ABAAS REQUIREMENTS (TYP. OF 5). ALL PROPOSED BENCHES TO MATCH EXISTING ONES IN FRONT OF NORTH BRIDGE VISITOR CENTER.

MONUMENT AREA TO BE PROTECTED DURING CONSTRUCTION

N/F
TRUSTEES OF
RESERVATIONS
269 MONUMENT ST

N/F
TRUSTEES OF
RESERVATIONS
30A MONUMENT ST

GRAPHIC SCALE
40 0 20 40 80
( IN FEET )
1 INCH = 40 FEET

REPLACE BENCH, BENCH SITE TO MEET ABAAS REQUIREMENTS (TYP. OF 5). ALL PROPOSED BENCHES TO MATCH EXISTING ONES IN FRONT OF NORTH BRIDGE VISITOR CENTER.

EROSION CONTROL SOCK (TYP.)

## PRE–DEVELOPMENT FLOOD STORAGE

SCALE: 1" = 80'

## POST–DEVELOPMENT FLOOD STORAGE

SCALE: 1" = 80'

GRAPHIC SCALE
80 0 40 80 160
( IN FEET )
1 INCH = 80 FEET

## INCREMENTAL FLOOD STORAGE SUMMARY:

| | INCREMENTAL ELEVATION | FLOOD STORAGE GAINED (CF) | FLOOD STORAGE LOST (CF) | NET FLOOD STORAGE PROVIDED (CF) |
|---|---|---|---|---|
| | 114 – 115 | 1,057 | 810 | 247 |
| | 115 – 116 | 479 | 186 | 293 |
| | 116 – 117 | 405 | 115 | 290 |
| | 117 – 118 | 336 | 16 | 320 |
| | 118 – 119 | 492 | 138 | 354 |
| | 119 – 119.7 | 412 | 18 | 394 |
| | TOTAL | 3,181 | 1,283 | 1,898 |

NOTES:
1. INSTALL AND MAINTAIN STRAW WATTLE CHECK DAMS EVERY 50 FT FOR PROPOSED SWALES UNTIL CONSTRUCTION IS COMPLETE.
2. NO WORK SHALL BE PERMITTED WITHIN RESOURCE AREA'S BUFFER LIMITS WITHOUT PRIOR ISSUANCE OF AN ORDER OF CONDITIONS BY THE LOCAL JURISDICTIONAL AUTHORITY.
3. MULCH IS TO BE USED ONLY FOR TEMPORARY TREE PROTECTION AND NOT FOR ANY OTHER PART OF THE NORTH BRIDGE PROJECT AREA.

OA-23-5
OA-23-4
OA-24-4
OA-23-3
OA-24-3

8' WIDE OPENING PATH TO AMPHITHEATER

2' WIDE SUBSURFACE STONE ARMORING FOR COBBLESTONE EDGE (TYP.)

STUMP TO BE REMOVED

PROP. 8' LONG BENCH (TYP. OF 2)

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH

AREA GRADED TO DRAIN TO EX. CB

COBBLESTONE EDGE FLUSH TO TRAIL W/ 3" REVEAL ON LANDSCAPE SIDE

TRAIL WIDENS AT STATUE

GRADE AREA TOWARDS LOW POINTS AT ENDS OF BRIDGE ABUTMENT (1% MIN. SLOPE)

118.7 FG
118.6 FG

PROP. 4' WIDE GRASS SWALE, 6" MAX. DEPTH

PROP. PIGTAIL STEP–IN POSTS W/ ROPE

REMOVE STUMP AND INSTALL 4TH BOLLARD TO MATCH OTHER 3 HISTORIC BOLLARDS, REINSTALL CHAIN, PAINT CHAIN BLACK

4' WIDE OPENING PATH TO OLD MANSE

COBBLESTONE EDGE FLUSH TO TRAIL W/ 3" REVEAL ON LANDSCAPE SIDE

NOTE:
PROPOSED COBBLESTONE EDGE COLOR TO MATCH EXISTING EDGING AT STATUE BASE

## OBELISK MONUMENT AREA DETAIL

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 10 20 40
( IN FEET )
1 INCH = 20 FEET

## DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

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COMMONWEALTH OF MASSACHUSETTS
NICHOLAS M. PAULING
CIVIL
No. 47114
REGISTERED PROFESSIONAL ENGINEER
4/11/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

| NO. | DATE | BY | APP. | REVISION DESCRIPTION |
|---|---|---|---|---|
| 2 | 4/9/24 | DJG | NMP | ISSUED FOR CONSTRUCTION |
| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |


GPR Engineering Solutions for Land & Structures

GOLDSMITH, PREST & RINGWALL, INC.
39 MAIN STREET, SUITE 301. AYER, MA 01432
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
VOICE: 978.772.1590 FAX: 978.772.1591
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# NATIONAL PARK SERVICE DEVELOPMENT TRAIL REPAIR

## SITE PLAN (NORTH BRIDGE) TOWN OF CONCORD

## MINUTE MAN NATIONAL PARK CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY: LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C3.1 |
|---|---|---|---|
| CHK. BY: NMP | | | |



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# EROSION AND SEDIMENT CONTROL REQUIREMENTS

## PART 1 – GENERAL

1.01 SUMMARY

A. FURNISH, INSTALL, AND MAINTAIN TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL MEASURES, SUCH AS, BUT NOT NECESSARILY LIMITED TO, STRAW WATTLES, RIPRAP, DIVERSION CHANNELS AND BERMS, CHECK DAMS, STRATEGICALLY LOCATED STOCKPILES, SEDIMENT BASINS, MULCH, AND SEED MIX (HEREINAFTER "CONTROL MEASURES") ADEQUATE TO PREVENT THE CONVEYANCE OF EROSION PRODUCTS (E.G. SOIL, MULCH, SOD) OFF SITE, OR INTO ENVIRONMENTALLY SENSITIVE AREAS, OR INTO AREAS WHERE WORK WILL BE ADVERSELY IMPACTED. ENVIRONMENTALLY SENSITIVE AREAS INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO, WETLANDS, TRIBUTARIES TO WETLANDS, WETLAND BUFFER ZONES, INTERMITTENT AND PERENNIAL STREAMS / RIVERS, AND THEIR ATTENDANT BUFFER ZONES.
   1. REFER TO DRAWINGS FOR LOCATION AND DETAILS OF CONTROL MEASURES REQUIRED TO COMMENCE WORK. THESE CONTROL MEASURES WILL BE ADEQUATE ONLY FOR VEGETATION CLEARING. THE DRAWINGS ARE NOT INTENDED TO GRAPHICALLY DEPICT ALL CONTROL MEASURES THAT WILL BE REQUIRED TO MEET THE REQUIREMENTS DESCRIBED IN 1.01.A.
   2. DEVISE AND EMPLOY CONTROL MEASURES THROUGHOUT THE DURATION OF PROJECT, OVER ALL AREAS DISTURBED OR UNDISTURBED BY CONSTRUCTION, AS NECESSARY TO MEET THE REQUIREMENTS DESCRIBED IN 1.01.A.
   3. DEVISE AND EMPLOY TEMPORARY CONTROL MEASURES AS NECESSARY TO MEET THE REQUIREMENTS DESCRIBED IN 1.01.A, WHILE ALLOWING WORK TO PROCEED IN AN EFFICIENT, COST EFFECTIVE MANNER.
   4. DEVISE, EMPLOY AND MAINTAIN CONTROL MEASURES UNTIL SUCH TIME AS THE ENTIRE SITE IS PERMANENTLY STABILIZED BY ESTABLISHED VEGETATION, FINISH LANDSCAPE MATERIALS, PAVED SURFACES, AND/OR ROOF AREA.
   5. ONCE THE SITE IS PERMANENTLY STABILIZED AND CERTIFIED AS SUCH BY ENGINEER, REMOVE TEMPORARY CONTROL MEASURES WHILE PROTECTING STABILIZED SURFACES.

1.02 SUBMITTALS

A. SUBMIT PRODUCT DATA, WARRANTY, AND TEST REPORTS AS INDICATED ON THE DRAWINGS.

1.03 QUALITY ASSURANCE

A. COMPLY WITH GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS FROM ACCEPTABLE MANUFACTURERS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. CONFORM TO CONDITIONS OF APPROVAL ISSUED BY REGULATORY AGENCIES INCLUDING, BUT NOT NECESSARILY LIMITED TO, LOCAL PLANNING BOARD, CONSERVATION COMMISSION, BOARD OF SELECTMEN, BOARD OF HEALTH, PUBLIC WORKS / HIGHWAY DEPARTMENT, STATE ENVIRONMENTAL PROTECTION DEPARTMENT, AND U.S. GOVERNMENT, ENVIRONMENTAL PROTECTION AGENCY. WHERE CONDITIONS OF REGULATORY APPROVAL DIFFER FROM REQUIREMENTS CONTAINED HEREIN OR ON THE DRAWINGS, COMPLY WITH THE MORE STRINGENT REQUIREMENT.

## PART 2 – PRODUCTS

2.01 MATERIALS

A. STRAW WATTLES: 100% WHEAT STRAW WITH NATURAL BIO–DEGRADEABLE JUTE NETTING. MINIMUM 9–INCH DIAMETER AND 10 FEET LONG. USE 12–INCH OR 20–INCH DIAMETER WATTLES TO PROTECT LARGER UNSTABLE AREAS.
B. FILTERMITT: 100% ORGANIC HESSIAN FABRIC (BURLAP) FILLED WITH A BLEND OF COMPOST AND PARTIALLY DECOMPOSED CHIPPED OR SHREDDED WOODY MATERIAL. MINIMUM 9–INCH DIAMETER AND 10 FEET LONG. USE 12–INCH OR 18–INCH DIAMETER TO PROTECT LARGER UNSTABLE AREAS.
C. MULCH: ORGANICS INCLUDING STRAW, PROCESSED PINE / HEMLOCK TWIGS AND NEEDLES.
D. SEED MIXES: PERENNIAL RYEGRASS, KENTUCKY BLUEGRASS, AND / OR FINE FESCUE, DISEASE RESISTANT. NON–MAINTAINED AREA OPTION – NEW ENGLAND WETLAND PLANTS, INC. SEMI–SHADE GRASS AND FORBS MIX (VIRGINIA WILDRYE, CANADA WILD RYE, PARTRIDGE PEA, RED FESCUE, SPIKED GAYFEATHER/ MARSH BLAZING STAR, SENSITIVE FERN, ZIGZAG ASTER, HOLLOW–STEM JOE PYE WEED, WHITE AVENS, EASTERN COLUMBINE, & PATH RUSH).
E. ROCK RIPRAP: SOUND, ANGULAR, 6–INCH MINUS PROCESSED ROCK, BLAST ROCK, OR TAILINGS.
F. CRUSHED STONE: SOUND, ANGULAR, 2–INCH MINUS PROCESSED CRUSHED STONE

## PART 3 – EXECUTION

3.01 THROUGHOUT CONSTRUCTION

A. DEVISE WORK SEQUENCE SO AS TO LIMIT DRAINAGE AREA THAT IS TRIBUTARY TO DISTURBED AREAS. DEVISE, EMPLOY, AND MAINTAIN CONTROL MEASURES SUCH AS DIVERSION CHANNELS AND BERMS, STRATEGICALLY LOCATED STOCKPILES, AND SEDIMENT BASINS TO SUBDIVIDE DRAINAGE AREAS INTO SMALL, MANAGEABLE SUBAREAS, THEREBY MINIMIZING RUNOFF AND THE POTENTIAL FOR EROSION.
B. MAINTAIN BARRIER AT LIMIT OF WORK AND PROTECT EXISTING VEGETATION / FACILITIES OUTSIDE OF LIMIT OF WORK.
C. MAINTAIN SPARE MATERIAL STOCKPILES FOR IMMEDIATE EMPLOYMENT / REPAIR / EXPANSION OF CONTROL MEASURES. AT A MINIMUM, SUCH MATERIALS SHALL INCLUDE STRAW WATTLES, FILTERMITT, STAKES, AND CRUSHED STONE.
D. INSPECT AND MAINTAIN EFFECTIVENESS OF CONTROL MEASURES BY REPAIRING AS NECESSARY TO ENSURE INTENDED FUNCTION; BY SUPPLEMENTING AS NECESSARY FOR ADEQUATE EXTENT; BY REMOVING TRAPPED PRODUCTS OF EROSION AS NECESSARY TO MAINTAIN EFFECTIVE TRAP VOLUME.
E. LIMIT EXTENT OF WORK AREA SO THAT ALL DISTURBED AREAS CAN BE STABILIZED WITH CONTROL MEASURES WITHIN A 24–HOUR PERIOD.
F. INSTALL CONTROL MEASURES AS SOON AS PRACTICABLE AFTER EACH MANAGEABLE PORTION OF EARTHWORK IS COMPLETE. EMPLOY TEMPORARY MEASURES AS NECESSARY TO STABILIZE DISTURBED AREAS, EVEN WHERE SUBSEQUENT CONSTRUCTION OPERATIONS MAY REQUIRE RE–DISTURBANCE.
G. WHEN INTENSE RAINFALL IS EXPECTED, CONSIDER, DEVISE, AND EMPLOY REINFORCING CONTROL MEASURES PRIOR TO THE RAINFALL EVENT TO MEET THE REQUIREMENTS DESCRIBED IN 1.01.A. IF NECESSARY, EMPLOY TEMPORARY CONTROL MEASURES ON MATERIAL STOCKPILES TO COUNTERACT POTENTIAL SEDIMENT TRANSPORT DURING INTENSE RAINFALL.
H. WHEN VEHICLE REFUELING IS REQUIRED ON SITE, CONDUCT REFUELING OPERATIONS OUTSIDE OF ENVIRONMENTALLY SENSITIVE AREAS.
I. PROPERLY DISPOSE OF DEBRIS, SOLID WASTE, TRASH, AND CONSTRUCTION WASTE / BYPRODUCTS OFF SITE.
J. SWEEP ON–SITE PAVED AREAS AND OFF–SITE STREETS AS NECESSARY TO PREVENT SILT AND DEBRIS ORIGINATING ON SITE FROM ENTERING CLOSED DRAINAGE SYSTEMS AND / OR ENVIRONMENTALLY SENSITIVE AREAS.

3.02 SITE PREPARATION AND ACCESS

A. WALK SITE AND IDENTIFY LOCATIONS OF LIMIT OF WORK AND ENVIRONMENTALLY SENSITIVE AREAS. ESTABLISH CONSTRUCTION STAGING AREA, LOCATED BEYOND ENVIRONMENTALLY SENSITIVE AREAS.
B. INSTALL CONTROL MEASURES AS SHOWN ON THE DRAWINGS, INCLUDING THOSE DEFINING THE LIMIT OF WORK.
C. LIMIT VEHICULAR TRAFFIC TO AND FROM SITE TO MINIMIZE TRANSPORT OF SEDIMENT.

3.03 CLEARING, GRUBBING, AND STRIPPING

A. SCHEDULE GRUBBING AND STRIPPING TO OCCUR IMMEDIATELY PRIOR TO EARTH DISTURBANCE. DEPENDING ON SITE AREA, CONSIDER MULTIPLE GRUBBING PHASES, SEQUENCED TO TAKE ADVANTAGE OF THE EROSION PREVENTION POTENTIAL OF EXISTING VEGETATIVE COVER.
B. MINIMIZE THE AREA OF EXISTING VEGETATION REMOVED WHEREVER POSSIBLE.
C. LOCATE AND SIZE STOCKPILES TO MINIMIZE EROSION POTENTIAL, TAKING ADVANTAGE OF TERRAIN SLOPE AND ASPECT, WHERE APPROPRIATE.
D. PROTECT VEGETATION, INCLUDING ROOT SYSTEMS, BEYOND LIMIT OF CLEARING.
E. PROCESS TIMBER, STUMPS, SLASH, AND BRUSH SO AS TO PROTECT ENVIRONMENTALLY SENSITIVE AREAS AND INSTALLED CONTROL MEASURES. PROPERLY DISPOSE OF EXCESS OFF SITE. BURIAL OF STUMPS ON SITE IS PROHIBITED.

3.04 SITE GRADING

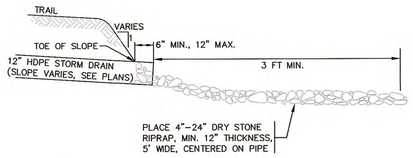
A. WHERE APPLICABLE, FOLLOW EXCAVATION AND FILL PRACTICES SHOWN ON DRAWINGS TO LOCALIZE AND MINIMIZE EROSION.
B. MONITOR SEDIMENT VOLUME IN TEMPORARY SEDIMENT BASINS AND AT DIVERSION BERMS AND CHECK DAMS. IN ALL AREAS EXCEPT THOSE THAT DO NOT PRESENT POTENTIAL PROBLEMS WITH REGARD TO FUTURE SOIL STABILITY, DRAINAGE, OR BEARING CAPACITY, REMOVE AND PROPERLY DISPOSE OF TRAPPED SEDIMENT BEFORE BRINGING SITE TO FINAL SUBGRADE.

3.05 STORMWATER MANAGEMENT SYSTEM

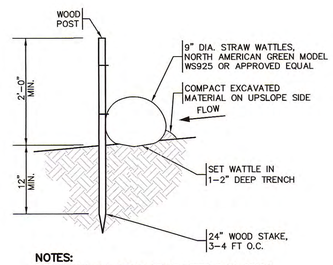
A. THE STORMWATER MANAGEMENT SYSTEM INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, DRYWELLS, DISCHARGE STRUCTURES / WEIRS, CULVERTS, OPEN CHANNELS, CURBS, GUTTERS, SWALES, CATCH BASINS, SWALE LEAK–OFFS, DRAINAGE PIPES, AND SIMILAR STORMWATER RUNOFF CONVEYANCE, TREATMENT, AND STORAGE FACILITIES.
B. INSTALL STORMWATER MANAGEMENT SYSTEM COMPONENTS STARTING AT THE DOWNSTREAM END AND PROCEED UPSTREAM. WHERE POSSIBLE, COMPLETE INSTALLATION OF BASINS PRIOR TO BEGINNING WORK ON UPSTREAM SYSTEM COMPONENTS.
C. INSTALL CONTROL MEASURES AT FINISHED UPSTREAM AND DOWNSTREAM PIPE ENDS AS SOON AS POSSIBLE AFTER COMPLETION OF PIPE RUN. SUCH MEASURES INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO, RIPRAP, CHECK DAMS, STRAW WATTLES, AND VELOCITY DISSIPATORS.
D. AT THE END OF EACH DAY OR WHEN RAINFALL IS EXPECTED, PLUG UPSTREAM END OF PIPES / DAM OPEN CHANNELS OR OTHERWISE REDIRECT POTENTIAL RUNOFF AND PREVENT FLOW FROM ENTERING PARTIALLY COMPLETED SYSTEM / SYSTEM COMPONENTS.
E. WHERE PORTIONS OF A NEW SYSTEM ARE TO BE ACTIVATED PRIOR TO COMPLETION OF THE ENTIRE SYSTEM, EMPLOY CONTROL MEASURES TO PREVENT SILT AND DEBRIS FROM ENTERING THE SYSTEM. EMPLOY SILT SACKS OR FABRIC ON CATCH BASIN INLETS, AND PIPE AND CULVERT OPENINGS. EMPLOY CHECK DAMS AND TEMPORARY SEDIMENT BASINS UPSTREAM OF AND ALONG OPEN CHANNELS, SWALES, AND DITCHES TO TRAP SEDIMENT UPGRADIENT OF ENVIRONMENTALLY SENSITIVE AREAS.
F. REMOVE TRAPPED SEDIMENT AND DEBRIS FROM ALL SYSTEM COMPONENTS AFTER COMPLETION OF INSTALLATION, AND AGAIN AFTER THE ENTIRE SITE IS PERMANENTLY STABILIZED BY ESTABLISHED VEGETATION, FINISH LANDSCAPE MATERIALS, PAVED SURFACES, AND/OR ROOF AREA. REMOVE TRAPPED SEDIMENT AND DEBRIS FROM DETENTION / RETENTION BASIN BOTTOMS SO THAT FINISH BOTTOM MATERIALS / INFILTRATION FUNCTION CONFORM TO DESIGN.

3.06 LANDSCAPING

A. COMPLETE LANDSCAPING AS SOON AS POSSIBLE AFTER COMPLETION OF FINAL SUBGRADE.
B. IMMEDIATELY AFTER PLACEMENT OF TOPSOIL, STABILIZE WITH CONTROL MEASURES INCLUDING, BUT NOT NECESSARILY LIMITED TO, SEED MIXES (AS STATED IN PART 2 – PRODUCTS, 2.01.D) OR MULCH. IN NON–MAINTAINED AREAS OF CONCORD, SEED MIX AND MULCH TO BE USED.

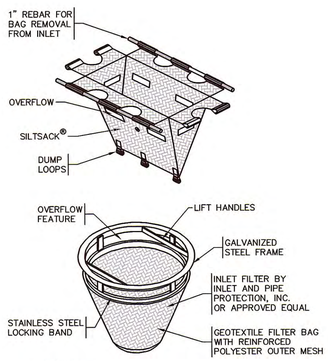



RIPRAP AT PIPE OUTLET
TYPICAL CROSS SECTION
NOT TO SCALE



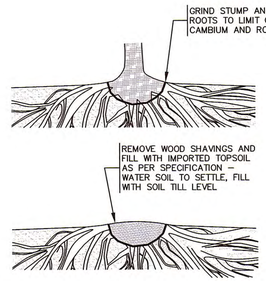

**NOTES:**
[1] INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
[2] TRAPPED SEDIMENT SHALL BE REMOVED TO A NON–SENSITIVE UPLAND AREA.

STRAW WATTLE
TYPICAL CROSS SECTION
NOT TO SCALE



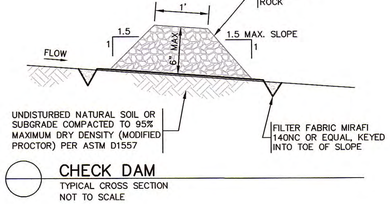

**NOTES:**
[1] CLEAN SILT SACK WHEN 30% FULL
[2] BURLAP IS NOT AN ACCEPTABLE GEOTEXTILE

SILT SACK
TYPICAL CROSS SECTION
NOT TO SCALE

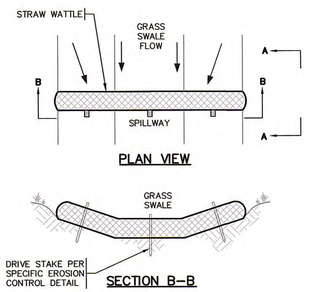



NOTE:
1. NOTIFY C.O. IMMEDIATELY IN THE EVENT ARCHEOLOGICAL REMAINS ARE DISCOVERED.

STUMP GRINDING & REMOVAL
TYPICAL CROSS SECTION
NOT TO SCALE

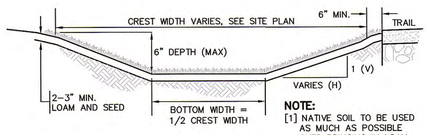



CHECK DAM
TYPICAL CROSS SECTION
NOT TO SCALE



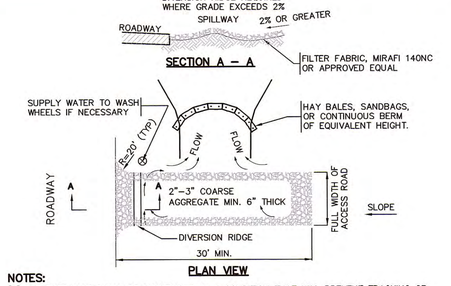

**NOTES:**
[1] EMBED STRAW WATTLES 2" INTO THE SOIL AND 'KEY' INTO THE GRASS SWALE.
[2] PLACE STRAW WATTLES PERPENDICULAR TO THE FLOW
[3] INSPECT AND REPAIR BARRIER AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY
[4] REMOVED SEDIMENT SHALL BE DEPOSITED TO NON–SENSITIVE UPLAND AREA
[5] EROSION CONTROL MEASURES TO BE INSTALLED EVERY 50' WITHIN APPLICABLE GRASS SWALES

EROSION CONTROL CHECK DAM
NOT TO SCALE



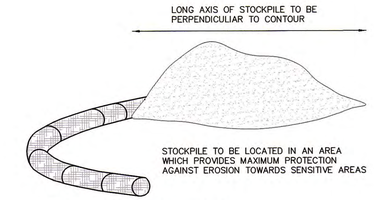

**NOTE:**
[1] NATIVE SOIL TO BE USED AS MUCH AS POSSIBLE OVER BRINGING IN LOAM FROM OTHER SOURCES.

GRASS SWALE
TYPICAL CROSS SECTION
NOT TO SCALE

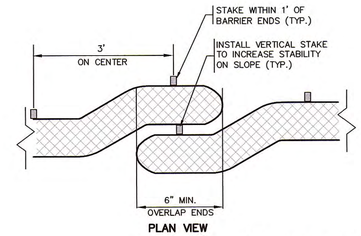



**NOTES:**
[1] THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
[2] WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT–OF–WAY.
[3] WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
[4] USE SANDBAGS, HAY BALES OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED.

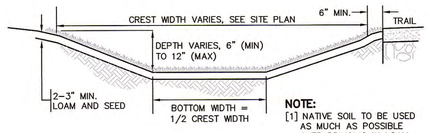
CONSTRUCTION ENTRANCE
NOT TO SCALE




TEMPORARY STOCKPILE
ISOMETRIC VIEW
NOT TO SCALE

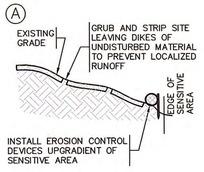



FILTERMITT (EROSION CONTROL SOCK)
NOT TO SCALE

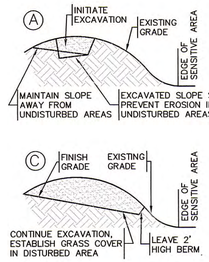



**NOTE:**
[1] NATIVE SOIL TO BE USED AS MUCH AS POSSIBLE OVER BRINGING IN LOAM FROM OTHER SOURCES.

GRASS SWALE LEAK OFF
TYPICAL CROSS SECTION
NOT TO SCALE




FILL PROCEDURE
SLOPE PROFILES
NOT TO SCALE




EXCAVATION PROCEDURE
TYPICAL CROSS SECTION
NOT TO SCALE

## DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

THIS DRAWING MAY NOT SHOW CONSTRUCTION DETAILS AND SPECIFICATIONS FOR ALL PROPOSED IMPROVEMENTS, AND MAY NOT IDENTIFY ALL CONSTRUCTION WORK ITEMS/AREAS OF CONTRACTOR JURISDICTION.

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS M. PAULING
CIVIL
No. 47114
REGISTERED PROFESSIONAL ENGINEER
4/11/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

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NATIONAL PARK SERVICE DEVELOPMENT
TRAIL REPAIR

EROSION CONTROL &
CONSTRUCTION DETAILS

MINUTE MAN NATIONAL PARK
CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY:LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C8.1 |
|---|---|---|---|
| CHK. BY: NMP | | | |



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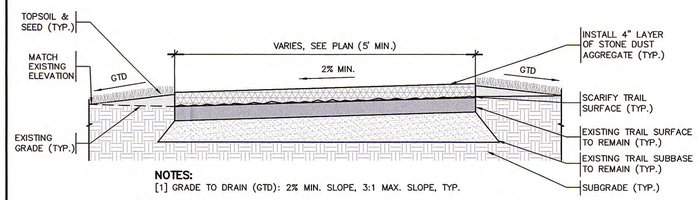
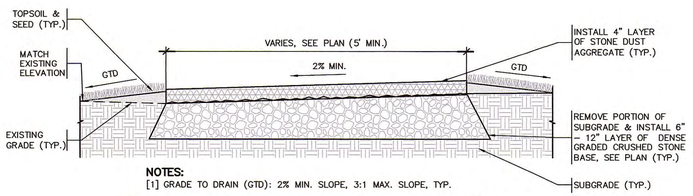



**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## HARDENED TRAIL SURFACE – RESURFACE
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE

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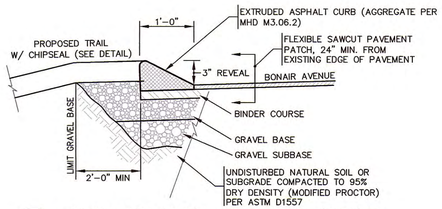
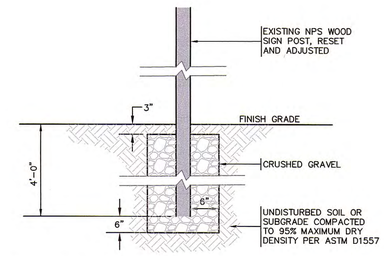
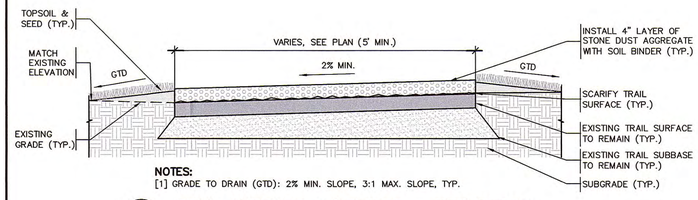
## HARDENED TRAIL SURFACE – NEW TRAIL
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE




## CAPE COD BERM AT BONAIR AVENUE
TYPICAL CROSS SECTION
NOT TO SCALE

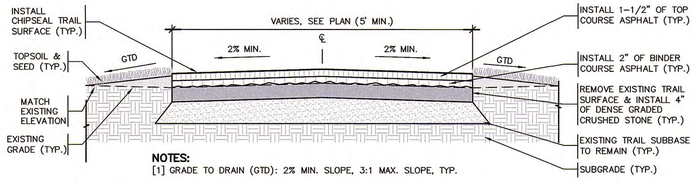



## SIGN POST BASE
NOT TO SCALE



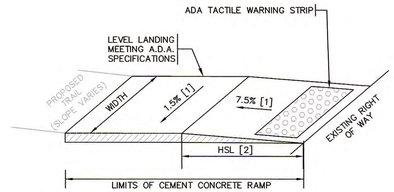

**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## TRAIL SURFACE W/ BINDER – RESURFACE
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE



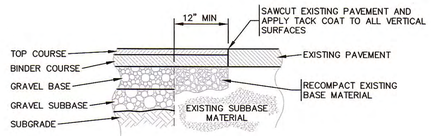

**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## ASPHALT W/ CHIPSEAL TRAIL SURFACE – NEW
TYPICAL CROSS SECTION (CROWNED)
NOT TO SCALE



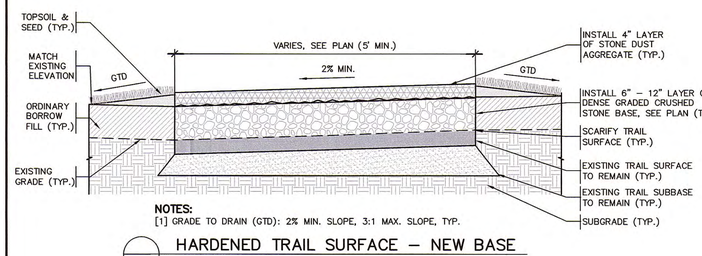

NOTES:
[1] TOLERANCE FOR CONSTRUCTION 0.5%
[2] HSL = HIGH SIDE TRANSITION LENGTH (SEE M/E 107.9.0)
[3] USABLE SIDEWALK WIDTH PER AAB = WIDTH – CURB WIDTH

## ADA ACCESSIBLE CURB RAMP
TYPICAL PLAN VIEW
NOT TO SCALE



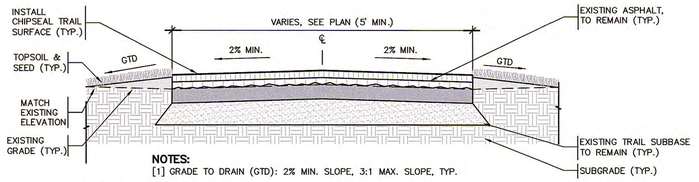

**NOTES:**
[1] FLEXIBLE PAVEMENT REMOVAL SHALL BE INITIATED BY MAKING A FULL–DEPTH VERTICAL SAWCUT AT THE LOCATIONS INDICATED ON THE PLANS. SAWCUTS SHALL BE ACCOMPLISHED USING A STANDARD DIAMOND–TYPE BLADE SAW.
[2] IF SAWCUT IS WITHIN THREE (3) FEET OF AN EXISTING BUILDING, CURB LINE OR EXISTING FENCE, COMPLETELY REMOVE EXISTING PAVEMENT AND REPLACE ACCORDING TO THE REQUIREMENTS OF THE BITUMINOUS CONCRETE PAVEMENT SECTION.

## FLEXIBLE PAVEMENT SAWCUT DETAIL
TYPICAL CROSS SECTION
NOT TO SCALE



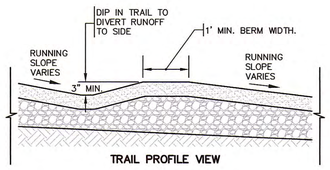

**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## HARDENED TRAIL SURFACE – NEW BASE
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE

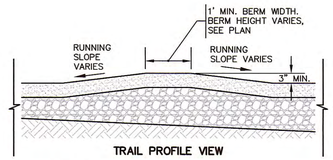



**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

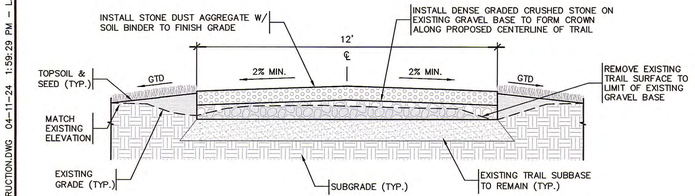
## CHIPSEAL TRAIL RESURFACE
TYPICAL CROSS SECTION (CROWNED)
NOT TO SCALE




## TRAIL BERM W/ DIP
PROFILE SECTION
NOT TO SCALE

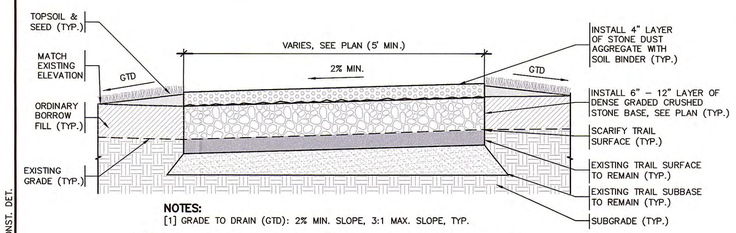



## TRAIL BERM
PROFILE SECTION
NOT TO SCALE



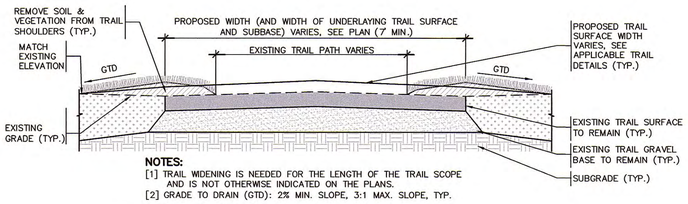

**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## NORTH BRIDGE TRAIL SECTION W/ CROWN
TYPICAL CROSS SECTION (CROWNED)
NOT TO SCALE



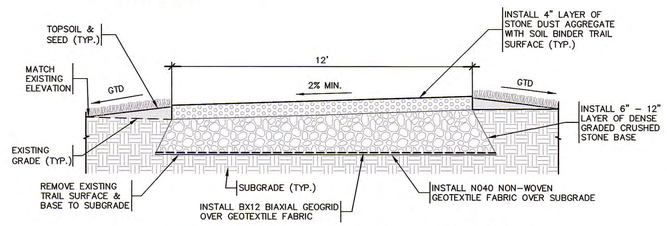

**NOTES:**
[1] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

## TRAIL SURFACE W/ BINDER – NEW BASE
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE

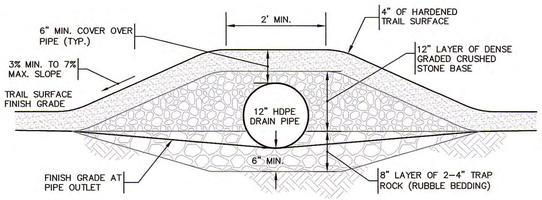



**NOTES:**
[1] TRAIL WIDENING IS NEEDED FOR THE LENGTH OF THE TRAIL SCOPE AND IS NOT OTHERMSE INDICATED ON THE PLANS.
[2] GRADE TO DRAIN (GTD): 2% MIN. SLOPE, 3:1 MAX. SLOPE, TYP.

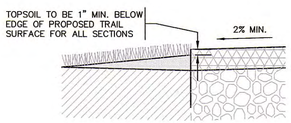
## TRAIL WIDENING
TYPICAL CROSS SECTION (CROWNED)
NOT TO SCALE




## NORTH BRIDGE TRAIL SECTION W/ GEOGRID
TYPICAL CROSS SECTION (CROSS SLOPED)
NOT TO SCALE




## NEW CULVERT CROSSING UNDER TRAIL
TYPICAL CROSS SECTION
NOT TO SCALE




## TYPICAL TRAIL EDGE
TYPICAL CROSS SECTION
NOT TO SCALE

DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

THIS DRAWING MAY NOT SHOW CONSTRUCTION DETAILS AND SPECIFICATIONS FOR ALL PROPOSED IMPROVEMENTS, AND MAY NOT IDENTIFY ALL CONSTRUCTION WORK ITEMS/AREAS OF CONTRACTOR JURISDICTION.

COMMONWEALTH OF MASSACHUSETTS — NICHOLAS M. PAULING — CIVIL — No. 47114 — REGISTERED PROFESSIONAL ENGINEER
4/9/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

| NO. | DATE | BY | APP. | REVISION DESCRIPTION |
|---|---|---|---|---|
| 2 | 4/9/24 | DJG | NMP | ISSUED FOR CONSTRUCTION |
| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |

GPR Engineering Solutions for Land & Structures
GOLDSMITH, PREST & RINGWALL, INC.
39 MAIN STREET, SUITE 301, AYER, MA 01432
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
VOICE: 978.772.1590 FAX: 978.772.1591
www.gpr-inc.com

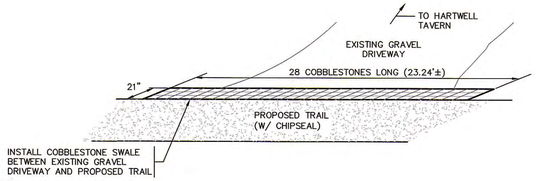
# NATIONAL PARK SERVICE DEVELOPMENT TRAIL REPAIR

## CONSTRUCTION DETAILS

MINUTE MAN NATIONAL PARK
CONCORD, LINCOLN AND LEXINGTON

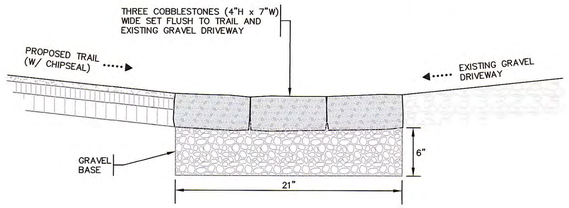
PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY: LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C8.2 |
|---|---|---|---|
| CHK. BY: NMP | | | |



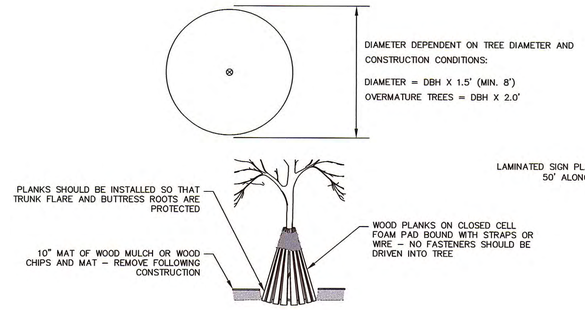

ISOMETRIC VIEW

NOTE:
SIZE OF COBBLESTONES SHALL BE 10" LENGTH X 7" WIDTH X 4" HEIGHT



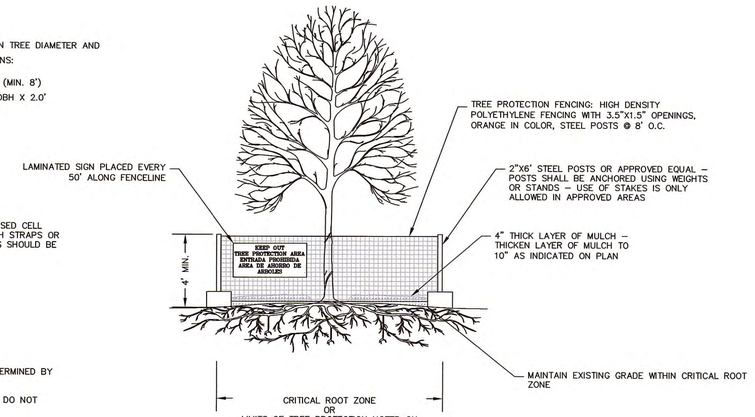

CROSS-SECTION

## COBBLESTONE SWALE FOR DRIVEWAY JUNCTION
NOT TO SCALE




NOTES:

1. TREE PROTECTION SHALL BE PROVIDED AS INDICATED ON DRAWINGS, OR AS DETERMINED BY CONTRACTING OFFICER DURING PROJECT COORDINATION.
2. PLANK TRUNK PROTECTION SHALL ONLY BE PROVIDED AS INDICATED ON PLANS. DO NOT INSTALL UNLESS EXPRESSLY INDICATED OR APPROVED BY CONTRACTING OFFICER.
3. ANY DAMAGE TO TREES ON ANY PORTION OF SITE SHALL BE REPORTED TO CONTRACTING OFFICER OR PARK REPRESENTATIVE AS SOON AS POSSIBLE.
4. OVERMATURE TREES SHALL BE DESIGNATED BY CONTRACTING OFFICER BEFORE CONSTRUCTION.



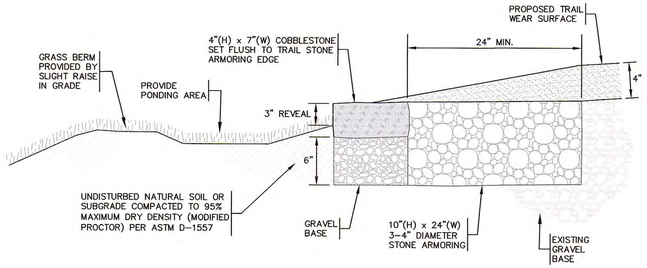

**TREE AND PLANT PROTECTION:**

1. NO PRUNING OF LIMBS OR ROOTS ON ANY PART OF THE TREE SHALL BE PERFORMED EXCEPT UNDER GUIDANCE OF CERTIFIED ARBORIST OR AN APPROVED PARK REPRESENTATIVE.
2. INSTALL PROTECTION FENCING, SIGNAGE, AND ANY NECESSARY ACCESSORIES AS INDICATED IN DRAWINGS AND SPECIFICATIONS.
3. REMOVE TREES AND OTHER VEGETATION ONLY AS INDICATED ON THE DRAWINGS AND AS PER SPECIFICATIONS. REMOVAL SHALL BE COMPLETED USING INDUSTRY BEST PRACTICES. TRANSPORT OFFSITE TO AN APPROVED DISPOSAL SITE.
4. TREES MARKED ALONG TRAIL FOR PROTECTION ARE VERY CLOSE TO TRAIL AND IN THE PATH OF CONSTRUCTION. TREES REQUIRE TRUNK PROTECTION DURING CONSTRUCTION. IF TREE REQUIRES REMOVAL, THIS TREE SHOULD BE REPLACED IN KEEPING WITH OTHER TREES, IN APPROPRIATE, APPROVED SPECIES FOR LOCATION.
5. ALL TREES AND NATURAL AREAS NOTED IN TREE PROTECTION PLAN SHALL BE PROTECTED DURING CONSTRUCTION WITH TEMPORARY FENCING AT THE START OF ANY SITE PREPARATION WORK THROUGH THE ENTIRETY OF CONSTRUCTION.
6. PROTECTIVE FENCING SHALL EXPAND TO INCLUDE TREES WHOSE TRUNKS ARE WITHIN FIVE FEET OF CONSTRUCTION ZONE. EXTRA CARE SHOULD BE TAKEN TO AVOID DAMAGE BY CONSTRUCTION ACTIVITY.
7. EROSION AND SEDIMENTATION CONTROL BARRIERS SHALL BE MAINTAINED TO PREVENT SOIL BUILDUP IN PROTECTED AREA.
8. REMOVAL OF SUB-GRADE MATERIALS WITHIN CRITICAL ROOT ZONE SHALL BE DONE BY HAND UTILIZING HAND TOOLS AND/OR AN AIR SPADE WHEN LARGE (2" DIAMETER OR GREATER) ROOTS ARE UNCOVERED. EXPOSED ROOTS WITHIN THE EXCAVATED AREA SHALL BE PRUNED AND KEPT MOIST UNTIL SUBGRADE MATERIALS HAVE BEEN LIFTED INTO SITE AND COMPACTED. ROOT PRUNING SHALL BE OVERSEEN BY CERTIFIED ARBORIST OR AN APPROVED PARK REPRESENTATIVE.
9. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC, AND EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS THROUGH COORDINATION WITH CONTRACTING OFFICER.
10. IN THE EVENT OF DAMAGE TO TREES OR LANDSCAPE, CONTRACTOR SHALL CONTACT PARK REPRESENTATIVE IMMEDIATELY.
11. REFER TO SPECIFICATIONS FOR ADDITIONAL TREE PROTECTION REQUIREMENTS.

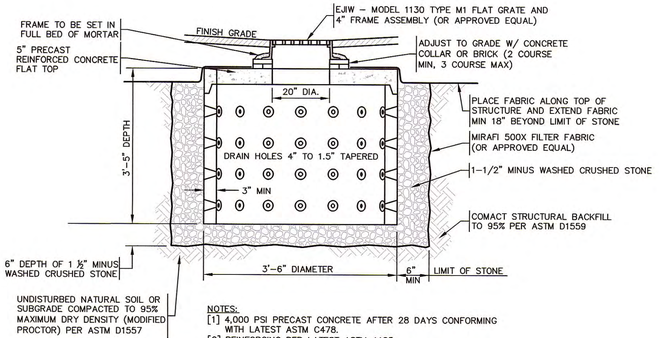
**TREE REPLACEMENT:**

1. TREES MAY BE DAMAGED DURING CONSTRUCTION OR CALLED OUT FOR REMOVAL ON PLANS. ANY REMOVED TREE MUST BE REPLACED. REPLACEMENT SPECIES SHALL BE APPROVED BY CONTRACTING OFFICER.
2. PLANTS SHOWN FOR REMOVAL OR NEEDING PROTECTION ON PLAN ARE PRELIMINARY. CONTRACTOR SHALL FLAG TREES ALONG TRAIL WHICH REQUIRE PROTECTION OR REMOVAL BEFORE CONSTRUCTION BEGINS FOR REVIEW BY CONTRACTING OFFICER. FINAL DETERMINATION FOR REMOVAL SHALL BE MADE BY CONTRACTING OFFICER.
3. NEWLY PLANTED TREES SHALL BE UNDER CARE OF CONTRACTOR DURING PERIOD OF ESTABLISHMENT, UNTIL ACCEPTED BY CONTRACTING OFFICER. TREE SHALL BE GIVEN WATER AND CARE DURING THAT PERIOD. TREE SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITY.
4. EVERY NEW TREE SHALL RECEIVE A SLOW RELEASE WATERING DEVICE AND PROTECTIVE DEER FENCING.

## TREE PROTECTION DETAIL
NOT TO SCALE




## COBBLESTONE EDGE WITH STONE ARMORING
TYPICAL CROSS SECTION
NOT TO SCALE




NOTES:
[1] 4,000 PSI PRECAST CONCRETE AFTER 28 DAYS CONFORMING WITH LATEST ASTM C478.
[2] REINFORCING PER LATEST ASTM A185.
[3] PRECAST 160-GAL MINI-DRY WELL BY SHEA CONCRETE (OR APPROVED EQUAL).
[4] FILTER FABRIC SHALL BE WRAPPED AROUND ENTIRE DIAMETER AND BOTTOM OF STONE.

## DRYWELL
TYPICAL CROSS SECTION
NOT TO SCALE

# MATERIAL SPECIFICATIONS

## 31 05 19.13 – GEOTEXTILES FOR EARTHWORK

### MIRAFI 140NC

MIRAFI 140NC IS A NEEDLE PUNCHED NON-WOVEN GEOTEXTILE COMPOSED OF POLYPROPYLENE FIBERS, WHICH ARE FORMED INTO A STABLE NETWORK SUCH THAT THE FIBERS RETAIN THEIR RELATIVE POSITION. MIRAFI 140NC IS INERT TO BIOLOGICAL DEGRADATION AND RESISTS NATURALLY ENCOUNTERED CHEMICALS, ALKALIS, AND ACIDS.

REFER TO CHECK DAM & CONSTRUCTION ENTRANCE DETAILS (SHEET C8.1).

| MECHANICAL PROPERTIES | TEST METHOD | UNIT | MINIMUM AVERAGE ROLL VALUE | |
|---|---|---|---|---|
| | | | MD | CD |
| Grab Tensile Strength | ASTM D4632 | lbs (N) | 100 (445) | 100 (445) |
| Grab Tensile Elongation | ASTM D4632 | % | 50 | 50 |
| Trapezoid Tear Strength | ASTM D4533 | lbs (N) | 45 (200) | 45 (200) |
| CBR Puncture Strength | ASTM D6241 | lbs (N) | 250 (1113) | |
| | | | MAXIMUM OPENING SIZE | |
| Apparent Opening Size (AOS) | ASTM D4751 | U.S. Sieve (mm) | 70 (0.212) | |
| | | | MINIMUM ROLL VALUE | |
| Permittivity | ASTM D4491 | $sec^{-1}$ | 2.0 | |
| Flow Rate | ASTM D4491 | gal/min/ft² (l/min/m²) | 140 (5704) | |
| | | | MINIMUM TEST VALUE | |
| UV Resistance (at 500 hours) | ASTM D4355 | % strength retained | 70 | |
| PHYSICAL PROPERTIES | | UNIT | ROLL SIZE | |
| Roll Dimensions (width x length) | | ft (m) | 12.5 x 360 (3.8 x 110) | 15 x 360 (4.57 x 110) |
| Roll Area | | yd² (m²) | 500 (418) | 600 (502) |
| Roll Weight | | lbs (kg) | 145 (66) | 170 (77) |

### MIRAFI 500X

MIRAFI 500X GEOTEXTILE IS COMPOSED OF HIGH-TENACITY POLYPROPYLENE FIBERS, WHICH ARE WOVEN INTO A STABLE NETWORK SUCH THAT THE YARNS RETAIN THEIR RELATIVE POSITION. MIRAFI 500X IS INERT TO BIOLOGICAL DEGRADATION AND RESISTANT TO NATURALLY ENCOUNTERED CHEMICALS, ALKALIS, AND ACIDS.

REFER TO DRYWELL DETAIL (THIS SHEET).

| Mechanical Properties | Test Method | Unit | Minimum Average Roll Value | |
|---|---|---|---|---|
| | | | MD | CD |
| Grab Tensile Strength | ASTM D4632 | lbs (N) | 200 (890) | 200 (890) |
| Grab Tensile Elongation | ASTM D4632 | % | 15 | 15 |
| Trapezoid Tear Strength | ASTM D4533 | lbs (N) | 75 (334) | 75 (334) |
| CBR Puncture Strength | ASTM D6241 | lbs (N) | 700 (3115) | |
| | | | Maximum Opening Size | |
| Apparent Opening Size (AOS) | ASTM D4751 | U.S. Sieve (mm) | 40 (0.425) | |
| | | | Minimum Roll Value | |
| Permittivity | ASTM D4491 | $sec^{-1}$ | 0.05 | |
| Flow Rate | ASTM D4491 | gal/min/ft² (l/min/m²) | 4 (163) | |
| | | | Minimum Test Value | |
| UV Resistance (at 500 hours) | ASTM D4355 | % strength retained | 70 | |

| Physical Properties | Unit | Roll Sizes | | |
|---|---|---|---|---|
| Roll Dimensions (width x length) | ft (m) | 12.5 x 432 (3.8 x 132) | 15 X 360 (4.57 x 110) | 17.5 x 309 (5.3 x 94.2) |
| Roll Area | yd² (m²) | 600 (502) | | |

## 31 25 00 – EROSION AND SEDIMENT CONTROL MEASURES

### FILTERMITT (EROSION CONTROL SOCK)

PROVIDED BY:
GROUNDSCAPES EXPRESS, INC.
P.O. BOX 737
WRENTHAM, MA 02093
508-384-7140
OFFICE@GROUNDSCAPESEXPRESS.COM

FILTERMITT DETAINS SEDIMENT, ABSORBS ODORS AND DEGRADES VOLATILE ORGANIC COMPOUNDS, ALLOWS WATER BY-PASS, AND IS A FOOD RESOURCE FOR BENEFICIAL MICROORGANISMS, WHICH REMEDIATE BY METABOLIZING WOOD PRESERVATIVES, PETROLEUM PRODUCTS, PESTICIDES, AND BOT CHLORINATED AND NON-CHLORINATED HYDROCARBONS IN STORMWATER RUNOFF FROM REACHING WATER RESOURCES, PREVENTS EROSION AND SILTING ON EMBANKMENTS PARALLEL TO CREEKS, LAKES, AND RIVERS, PREVENTS EROSION AND TURF LOSS ON ROADSIDES, HILLSIDES, PLAYING FIELDS, AND GOLF COURSES.

REFER TO FILTERMITT (EROSION CONTROL SOCK) DETAIL (SHEET C8.1)

| Performance Design Diameter | 9 in. | 12 in. | 18 in. | Testing Lab Reference |
|---|---|---|---|---|
| Effective height | 9 in. plus or minus 1" | 12 in. plus or minus 1" | 13.5 in. plus or minus 1" | Soil Control Lab Inc. |
| Effective circumference | 25.1 in. | 38 in. | 56.5 in. | Soil Control Lab Inc. |
| Density dry | 11.5 Lbs./per linear ft. | 25.6 Lbs./per linear ft. | 55.25 Lbs./per linear ft. | Soil Control Lab Inc. |
| Maximum sediment storage height | 4 in. | 6 in. | 6.75 in. | Soil Control Lab Inc. |
| Maximum continuous length | 1-100/per linear ft. | 1-100/per linear ft. | 1-100/per linear ft. | Soil Control Lab Inc. |
| Staking requirement 2:1 slope or greater | Maximum every 10 linear ft. | Maximum every 10 linear ft. | Maximum every 10 linear ft. | Soil Control Lab Inc. |
| Outside casing 100% biodegradable hessen | 50% 7 Mill-50% 10 Mill | 50% 7 Mill-50% 10 Mill | 50% 7 Mill-50% 10 Mill | Soil Control Lab Inc. |
| Maintenance requirement (remove sediment) | 2 in. | 3 in. | 3.5 in. | Soil Control Lab Inc. |
| Functional Longevity | 2 - 7 yrs. | 2 - 7 yrs. | 2 - 7 yrs. | Soil Control Lab Inc. |
| Maximum Slope Length (<2%) | 750 ft. | 1000 ft. | 1300 ft. | Soil Control Lab Inc. |
| Hydraulic Flow Through Rate | 6 -14 Gpm per linear ft. | 6 -14 Gpm per linear ft. | 6 -14 Gpm per linear ft. | Soil Control Lab Inc. |
| Total Solids Removal | 98% | 98% | 98% | Soil Control Lab Inc. |

### STRAW WATTLES

WATTLES ARE MADE WITH 100% CLEAN, CERTIFIED WEED FREE WHEAT STRAW FIBER MATRIX AND ARE BOUND INTO A TIGHT TUBULAR ROLL OF SPECIFIC LENGTH AND DIAMETER. WHEN WATTLES ARE PLACED ON THE FACE OF SLOPES OR CHANNELS THEY INTERCEPT STORMWATER RUNOFF, REDUCE ITS HYDRAULIC ENERGY, RELEASE THE RUNOFF AS SHEET FLOW AND PROVIDE REMOVAL OF SEDIMENT FROM THE RUNOFF. STRAW WATTLES HAVE A CAPTURE RATE OF ROUGHLY 5 TO 18 PERCENT PER FOOT OF LENGTH WITH A MEDIAN EFFECTIVENESS OF 85%. WATTLES ARE FLEXIBLE AND CONFORM TO THE SOIL SURFACE AND ARE INSTALLED AND SECURED BY STAKING. STRAW WATTLE NETTING SHALL BE 100% BIODEGRADABLE NATURAL JUTE FIBER.

9" DIAMETER
25 FT LENGTH
35 LBS
1.4 LBS/FT
PLUS OR MINUS 10%

12" DIAMETER
20 FT LENGTH
50 LBS
2.5 LBS/FT
PLUS OR MINUS 10%

REFER TO STRAW WATTLE DETAIL (SHEET C8.1).

DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

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COMMONWEALTH OF MASSACHUSETTS – NICHOLAS M. PAULING – CIVIL – No. 47114 – REGISTERED PROFESSIONAL ENGINEER
4/11/2024

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|---|---|---|---|---|
| 2 | 4/9/24 | DJG | NMP | ISSUED FOR CONSTRUCTION |
| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |

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www.gpr-inc.com

NATIONAL PARK SERVICE DEVELOPMENT
TRAIL REPAIR

CONSTRUCTION DETAILS AND MATERIAL SPECIFICATIONS

MINUTE MAN NATIONAL PARK
CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
NATIONAL PARK SERVICE
174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY:LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C8.3 |
|---|---|---|---|
| CHK. BY: NMP | | | |

P:\23-----\231032\DWG\231032_ISSUED FOR CONSTRUCTION.DWG 04-11-24 2:00:08 PM - LAYOUT C8.3-CONST. DET. & SPECS

## 31 25 00 – EROSION AND SEDIMENT CONTROL MEASURES (CONTINUED)

### SILT SACK

MANUFACTURER:
FERGUSON ENTERPRISES LLC
DBA ACF ENVIRONMENTAL
2831 CARDWELL RD
RICHMOND, VA 23234
1–800–448–3636
WWW.FERGUSONGSS.COM

SILT SACK SHALL BE MANUFACTURED FROM A SPECIFICALLY DESIGNED WOVEN POLYPROPYLENE GEOTEXTILE AND SEWN BY A DOUBLE NEEDLE MACHINE, USING A HIGH STRENGTH NYLON THREAD.

SILT SACK SEAMS HAVE BEEN TESTED BY A THIRD PARTY LABORATORY UNDER ASTM D–4884 (STANDARD TEST METHOD FOR STRENGTH OF SEWN OR BONDED SEAMS OF GEOTEXTILES).

SILT SACK SHALL BE MANUFACTURED TO FIT THE OPENING OF THE CATCH BASIN OR DROP INLET. SILT SACK WILL HAVE THE FOLLOWING FEATURES: TWO DUMP STRAPS ATTACHED AT THE BOTTOM TO FACILITATE THE EMPTYING OF THE SILT SACK; SILT SACK SHALL HAVE LIFTING STRAPS AS AN INTEGRAL PART OF THE SYSTEM TO BE USED TO LIFT THE SILT SACK FROM THE BASIN; SILT SACK SHALL HAVE A RESTRAINT CORD APPROXIMATELY HALFWAY UP THE DEPTH OF THE SACK TO KEEP THE SIDE FROM EXPANDING TOWARD THE CATCH BASIN WALL (THIS CORD IS ALSO A VISUAL MEANS OF INDICATING WHEN THE SACK SHOULD BE EMPTIED). ONCE THE CORD IS COVERED IN SEDIMENT, THE SILT SACK SHOULD BE EMPTIED, CLEANED, AND PLACED BACK INTO THE BASIN FOR REUSE.

REFER TO SILT SACK DETAIL (SHEET C8.1)

## 31 32 16 – CHEMICAL TREATMENT SOIL STABILIZATION

### ORGANIC–LOCK (SOIL BINDER)

PROVIDED BY:
ENVIROBOND PRODUCTS CORPORATION
6191–2100 BLOOR STREET WEST
TORONTO, ONTARIO, CANADA
M6S 5A5
1–866–636–8476

ORGANIC–LOCK LICENSED DEALERS TO BLEND THE ORGANIC–LOCK WITH THEIR LOCAL PRE–APPROVED AGGREGATE, THIS ENSURES THE ORGANIC–LOCK BINDER IS HOMOGENEOUSLY BLENDED WITH THE SPECIFIED AGGREGATE.

ORGANIC–LOCK BLENDED AGGREGATE SURFACE TO BE ELEVATED IN COMPARISON TO ADJACENT MATERIAL TO ENSURE SURFACE WATERSHED OFF AND AWAY FROM SPECIFIED MATERIAL.

COMPACT SLOPED EDGE WITH HAND TAMPER PRIOR TO SURFACE COMPACTION. WHEN COMPACTING FINAL SURFACE, OVERHANG THE ROLLER NO MORE THAN 4" PAST EDGE OF ORGANIC–LOCK BLENDED AGGREGATE TO ENSURE COMPACTION OF ENTIRE SURFACE.

MANUFACTURER NOTE: FOR ANY SPECIFICATION OR DETAIL ORIENTED QUESTIONS, CONTACT TECHNICAL TEAM AT INFO@ORGANIC–LOCK.COM.

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

REFER TO TRAIL SECTION DETAILS (SHEET C8.2).

## 31 37 16.13 – RUBBLE–STONE RIPRAP

### RIPRAP

RIPRAP SHALL BE SOUND, DURABLE ROCK WHICH IS ANGULAR IN SHAPE. ROUNDED STONES, BOULDERS, SANDSTONE OR SIMILAR SOFT STONE OR RELATIVELY THIN SLABS WILL NOT BE ACCEPTABLE. EACH STONE SHALL WEIGH NOT LESS THAN 25 LBS NOT MORE THAN 125 LB AND AT LEAST 75% OF THE VOLUME SHALL CONSIST OF STONES WEIGHING NOT LESS THAN 75 LB EACH. THE REMAINDER OF THE STONES SHALL BE GRADED SO THAT WHEN PLACED WITH THE LARGER STONES THE ENTIRE MASS WILL BE COMPACT.

REFER TO RIPRAP AT PIPE OUTLET DETAIL (SHEET C8.1).

## 32 01 90.24 – STUMP GRINDING & REMOVAL

### STUMP GRINDING & REMOVAL

EQUIPMENT AND MACHINERY INVOLVED: THE PRIMARY MACHINERY FOR THIS TASK IS THE STUMP GRINDER. THIS POWERFUL MACHINE USES A ROTATING CUTTING DISK THAT CHIPS AWAY AT THE STUMP.

INITIAL SETUP AND SAFETY PRECAUTIONS: BEFORE STARTING, ENSURE THE AREA IS CLEAR OF ROCKS AND DEBRIS. ALSO, WEARING SAFETY GOGGLES, GLOVES, AND EAR PROTECTION IS CRUCIAL.

ASSESSING THE SIZE AND TYPE OF STUMP: THE STUMP'S SIZE AND TREE SPECIES CAN INFLUENCE THE GRINDING TIME AND EFFORT.

REFER TO STUMP GRINDING & REMOVAL DETAIL (SHEET C8.1).

## 32 05 13 – LOAM

### LOAM

LOAM SHALL BE FERTILE, FRIABLE SOIL OBTAINED FROM NATURALLY WELL–DRAINED AREAS OR SHALL BE THE PRODUCT OF A COMMERCIAL SAND AND GRAVEL PROCESSING FACILITY. IT SHALL BE UNCONTAMINATED BY SALT WATER, FOREIGN MATTER, OR SUBSTANCES HARMFUL TO PLANT GROWTH. LOAM SHALL BE FREE OF DEBRIS, ROCKS, CLODS, AND ANY OTHER EXTRANEOUS MATTER. LOAM FOR ROADSIDES SHALL HAVE NO MATERIAL GREATER THAN 1 INCH IN DIAMETER. LOAM FOR LAWNS SHALL HAVE NO MATERIAL GREATER THAN 1/2 INCH IN DIAMETER.

REFER TO TRAIL SECTION DETAILS (SHEET C8.2).

## 32 05 16 – AGGREGATES FOR SURFACE WEAR LAYER

### STABILIZED STONEDUST

PROVIDED BY:
READ CUSTOM SOILS.
37 POWER ROAD
WESTFORD, MA 01886
(781) 828 – 6300
WWW.READCUSTOMSOILS.COM

STABILIZED STONEDUST IS A 3/8" MINUS PULVERIZED STONE (LOCALLY SOURCED) PRECISION BLENDED WITH A WATER–ACTIVATED BINDER.

STABILIZED STONEDUST HAS A BULK DENSITY OF APPROXIMATELY 111 POUNDS PER CUBIC FOOT, SO ONE CUBIC YARD WEIGHS 1.5 TONS. AVERAGE COMPACTION FACTOR IS 15 – 18%. COVERAGE RATE AT A 4" DEPTH = 50 SQ. FT. / TON (LIGHT VEHICLE TRAFFIC)

REFER TO TRAIL SURFACE W/ BINDER DETAILS (SHEET C8.2).

### STABILIZED STONEDUST (CONTINUED)

GRAIN SIZE - mm.

| % +3" | % Gravel | | % Sand | | | % Fines |
|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | |
| 0.0 | 0.0 | 1.0 | 22.0 | 38.5 | 22.8 | 15.7 |

| SIEVE SIZE | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 5.8 | 100.0 | | |
| #4 | 99.0 | | |
| #8 | 72.6 | | |
| #16 | 59.3 | | |
| #30 | 44.1 | | |
| #50 | 33.3 | | |
| #100 | 15.9 | | |
| #200 | 14.7 | | |

(no specification provided)

Material Description: Nickel Stone Dust

Atterberg Limits: PL= LL= PI=

Coefficients: $D_{90}$= 3.0230 $D_{85}$= 2.5460 $D_{60}$= 1.2069 $D_{50}$= 0.8155 $D_{30}$= 0.3426 $D_{15}$= $D_{10}$= $C_u$= $C_c$=

Classification: USCS= AASHTO=

Remarks: Water content: 0.08%

**Source of Sample:** Nickel Stone Dust **Date:** 1-20-2022
**Sample Number:** S-3

### 3/8" MINUS BEIGE DENSE GRADE (ALTERNATIVE)

PROVIDED BY:
READ CUSTOM SOILS.
37 POWER ROAD
WESTFORD, MA 01886
(781) 828 – 6300
WWW.READCUSTOMSOILS.COM

3/8" MINUS CRUSHED GRAVEL IS A COMBINATION OF COARSE AGGREGATES WITH A MAXIMUM SIZE OF 3/8" AND FINE AGGREGATES UNIFORMLY PREMIXED WITH A PREDETERMINED QUANTITY OF WATER.

COARSE AGGREGATE SHALL CONSIST OF HARD, DURABLE PARTICLES OF FRAGMENTS OF STONE. MATERIALS THAT BREAK UP WHEN ALTERNATELY FROZEN OR THAWED OR WETTED AND DRIED SHALL NOT BE USED.

COARSE AGGREGATE SHALL HAVE A PERCENTAGE OF WEAR, BY THE LOS ANGELES TEST, OF NOT MORE THAN 45.

FINE AGGREGATE SHALL CONSIST OF NATURAL OR CRUSHED SAND.

THE COMPOSITE MATERIAL SHALL BE FREE FROM CLAY, LOAM OR OTHER PLASTIC MATERIAL, AND SHALL CONFORM TO THE GRADATION REQUIREMENTS LISTED BELOW.

REFER TO TRAIL SECTIONS AND NEW CULVERT CROSSING UNDER TRAIL DETAIL (SHEET C8.2).

**Sample ID:** Beige Dense Grade **Source of Material:** Westford

Sieve Analysis

Sieve Size

| Standard | Alternate | % Passing on Each Sieve | USDA Specification Ranges (Min.) | (Max.) |
|---|---|---|---|---|
| 10 | 2.00 mm | 44.5 | 100% | 100% |
| 18 | 1.00 mm | 32.6 | 60% | 80% |
| 35 | 0.50 mm | 23.8 | 25% | 45% |
| 60 | 0.25 mm | 15.3 | 8% | 20% |
| 140 | 0.11 mm | 7.06 | 0% | 8% |
| 270 | 0.05 mm | 2.97 | 0% | 3% |

## 32 05 19.13 – GEOTEXTILES FOR EXTERIOR IMPROVEMENTS

### ACF N040

ACF N040 IS A POLYPROPYLENE, NEEDLE PUNCHED NON–WOVEN GEOTEXTILE FOR USE IN DRAINAGE AND SEPARATION APPLICATIONS. IT HAS BEEN STABILIZED TO RESIST DEGRADATION DUE TO ULTRAVIOLET EXPOSURE AND IS RESISTANT TO COMMONLY ENCOUNTERED MILDEW, INSECTS AND SOIL CHEMICALS, AND IS NON–BIODEGRADABLE. POLYPROPYLENE IS STABLE WITH pH RANGE OF 2 TO 13.

REFER TO NORTH BRIDGE TRAIL SECTION W/ GEOGRID DETAIL (SHEET C8.2).

| Geotextile Property | Test Method | Minimum Average Roll Values |
|---|---|---|
| Grab Tensile Strength | ASTM D4632 | 100 Lbs |
| Grab Tensile Elongation | ASTM D4632 | 50 % |
| CBR Puncture Strength | ASTM D6241 | 250 Lbs |
| Trapezoid Tear Strength | ASTM D4533 | 45 Lbs |
| UV Resistance @ 500 Hours | ASTM D4355 | 70 % |
| AOS | ASTM D4751 | 70 Sieve |
| Permittivity ($sec^{-1}$) | ASTM D4491 | 1.7 $sec^{-1}$ |
| Flow Rate | ASTM D4491 | 140 gpm/$ft^2$ |

*Results quoted above are the mean of multiple tests conducted at an independent testing facility. N040 meets or exceeds values listed.*

| Packaging | | |
|---|---|---|
| Roll Width | 12.5 ft. | 15 ft. |
| Roll Length | 360 ft. | 360 ft. |
| Roll Area | 500 sy | 600 sy |

## 32 05 19.19 – GEOGRID FOR EXTERIOR IMPROVEMENTS

### ACF BX12

ACF BX12 GEOGRID IS COMPOSED OF POLYPROPYLENE RESIN WHICH IS EXTRUDED INTO A STABLE GEOGRID STRUCTURE. ACF BX12 GEOGRID IS INERT TO BIOLOGICAL DEGRADATION AND RESISTANT TO NATURALLY ENCOUNTERED CHEMICALS, ALKALIS, AND ACIDS.
ACF BX12 GEOGRID INCREASES ROADBED AND FOUNDATION WEARING CAPACITY, WHILE PROLONGING THE SERVICE LIFE OF EACH BY THE CONFINEMENT OF THE BASE COURSE. ACF BX12 PREVENTS LATERAL SPREADING OF THE BASE OR SUB–BASE AGGREGATE AND ALLOWS FOR SHEAR INTERACTION TO DEVELOP BETWEEN THE AGGREGATE AND THE GEOGRID. ACF BX12 GEOGRID REDUCES THE APPLIED VERTICAL PRESSURE OF HEAVY LOADS AT DEPTH OF AGGREGATE BY SPREADING THE LOAD OVER A WIDER AREA.

REFER TO NORTH BRIDGE TRAIL SECTION W/ GEOGRID DETAIL (SHEET C8.2).

| Geogrid Property | Test Method | Typical Roll Value MD | CD |
|---|---|---|---|
| Ultimate Tensile Strength[1] | ASTM D6637 | 1310 lbs/ft | 1970 lbs/ft |
| Tensile Strength @ 2%[1] | ASTM D6637 | 410 lbs/ft | 620 lbs/ft |
| Tensile Strength @ 5%[1] | ASTM D6637 | 810 lbs/ft | 1340 lbs/ft |
| UV Resistance | ASTM D4355 | 100% | |
| Junction Efficiency[2] | ASTM D7737 | 93% | |
| Flexural Stiffness[3] | | 750,000 mg-cm | |
| Aperture Stability[4] | | 0.65 m-N/deg | |
| Resistance to UV Degradation[5] | ASTM D4355 | 100% | |
| Rib Thickness | | 0.05 in | |
| Aperture Size | | 1.0 in | 1.3 in |
| Roll Size (width x length) | | 12.5 ft x 246 ft | |
| Roll Area | | 341 $yds^2$ | |

## 32 11 16.16 – AGGREGATE SUBBASE COURSE

### 2–4" TRAP ROCK (RUBBLE BEDDING)

TRAP ROCK SHALL CONSIST OF HARD, DURABLE ANGULAR SHAPED STONES WHICH ARE THE PRODUCT OF THE PRIMARY CRUSHING OF A STONE CRUSHER. ROUNDED STONE, BOULDERS, SANDSTONE AND SIMILAR SOFT STONE OR RELATIVELY THIN SLABS WILL NOT BE ACCEPTABLE.

STONE SHALL BE FREE FROM OVERBURDEN, SPOIL, SHALE, ORGANIC MATERIAL AND MEET THE GRADATION REQUIREMENTS LISTED BELOW.

REFER TO NEW CULVERT CROSSING UNDER TRAIL DETAIL (SHEET C8.2).

| TRAP ROCK | |
|---|---|
| SIZE OF STONE (IN.) | PERCENT PASSING BY WEIGHT |
| 6 IN. | 100 |
| 4 IN. | 25–75 |
| 2 IN. | 0–5 |

## 32 11 23 – AGGREGATE BASE COURSE

### DENSE GRADED CRUSHED STONE BASE

DENSE GRADED CRUSHED STONE IS A COMBINATION OF CRUSHER–RUN COARSE AGGREGATES OF CRUSHED STONE AND FINE AGGREGATES UNIFORMLY PREMIXED WITH A PREDETERMINED QUANTITY OF WATER.

COARSE AGGREGATE SHALL CONSIST OF HARD, DURABLE PARTICLES OF FRAGMENTS OF STONE. MATERIALS THAT BREAK UP WHEN ALTERNATELY FROZEN OR THAWED OR WETTED AND DRIED SHALL NOT BE USED.

COARSE AGGREGATE SHALL HAVE A PERCENTAGE OF WEAR, BY THE LOS ANGELES TEST, OF NOT MORE THAN 45.

FINE AGGREGATE SHALL CONSIST OF NATURAL OR CRUSHED SAND.

THE COMPOSITE MATERIAL SHALL BE FREE FROM CLAY, LOAM OR OTHER PLASTIC MATERIAL, AND SHALL CONFORM TO THE GRADATION REQUIREMENTS LISTED BELOW.

REFER TO TRAIL SECTIONS AND NEW CULVERT CROSSING UNDER TRAIL DETAIL (SHEET C8.2).

| DENSE GRADED CRUSHED STONE BASE | |
|---|---|
| SIEVE DESIGNATION | PERCENT PASSING BY WEIGHT |
| 2 IN. | 100 |
| 1–1/2 IN. | 70–100 |
| 3/4 IN. | 50–85 |
| #4 | 30–55 |
| #50 | 8–24 |
| #200 | 3–10 |

## 32 12 16 – HOT MIX ASPHALT

### HOT MIX ASPHALT

A. COARSE AGGREGATE
THE COARSE MINERAL AGGREGATE SHALL BE CLEAN, HARD, DURABLE, CRUSHED ROCK CONSISTING OF THE ANGULAR FRAGMENTS OBTAINED BY BREAKING AND CRUSHING SHATTERED NATURAL ROCK, REASONABLY FREE FROM THIN AND/OR ELONGATED PIECES, FREE FROM DIRT OR OTHER OBJECTIONABLE MATERIALS. IT SHALL BE SURFACE DRY AND SHALL HAVE A MOISTURE CONTENT OF NOT MORE THAN 0.5 PERCENT AFTER DRYING. AGGREGATES FROM MULTIPLE SOURCES OF SUPPLY SHALL NOT BE MIXED OR STORED IN THE SAME STOCKPILE.

B. FINE AGGREGATE
THE FINE AGGREGATE SHALL CONSIST OF ONE OF THE FOLLOWING: 100% NATURAL SAND, 100% STONE SAND, A BLEND OF SAND AND STONE SCREENINGS, A BLEND OF NATURAL SAND AND STONE SAND.

NATURAL SAND SHALL CONSIST OF INERT, HARD, DURABLE GRAINS OF QUARTZ OR OTHER HARD, DURABLE ROCK, FREE FROM TOPSOIL OR CLAY, SURFACE COATINGS, ORGANIC MATTER OR OTHER DELETERIOUS MATERIALS.

STONE SAND SHALL BE A PROCESSED MATERIAL PREPARED FROM STONE SCREENINGS TO PRODUCE A CONSISTENTLY GRADED MATERIAL CONFORMING TO SPECIFICATION REQUIREMENTS.

STONE SCREENINGS SHALL BE THE PRODUCT OF A SECONDARY CRUSHER AND SHALL BE FREE FROM DIRT, CLAY, ORGANIC MATTER, EXCESS FINES OR OTHER DELETERIOUS MATERIAL.

REFER TO TRAIL SECTION DETAILS (SHEET C8.2).

## 32 12 33 – PAVING SURFACE TREATMENT

### CHIPSEAL

MATERIALS:

A) ASPHALTIC BINDER. LATEX MODIFIED ASPHALTIC EMULSION CONSISTING OF PLANT MIXED BLEND OF RAPID SETTING HOMOGENEOUS ASPHALT EMULSION, LATEX ADDITIVE AND ANTI–STRIPPIGN AGENT AS REQUIRED IN CONFORMANCE WITH MASSDOT SECTION M3 "BITUMINOUS MATERIALS."

1. ASPHALT EMULSION SHALL BE ANIONIC EMULSIFIED ASPHALT CONFORMING TO AASHTO M–140 (ASTM D977); OR CATIONIC EMULSIFIED ASPHALT CONFORMING TO AASHTO–M208 (ASTM D 2397). FIELD DILUTED EMULSIONS AND MIXTURE OF ANIONIC AND CATIONIC EMULSIONS ARE PROHIBITED.

2. LATEX ADDITIVE SHALL BE STYRENE BUTADIENE RUBBER (SBR) LATEX SPECIFICALLY FORMULATED FOR USE WITH EMULSIFIED BITUMINOUS CEMENT AND BLENDED INTO THE ASPHALT OR EMULSIFIER SOLUTION AT THE EMULSION PLANT PRIOR TO EMULSIFICATION PROCESS AT A RATE OF 3 PARTS PER 100.

3. ANTI–STRIPPING OR WETTING ADDITIVE AS REQUIRED BY AGGREGATE/BITUMEN AFFINITY TEST AASHTO T182 (ASTM D 1664), SHALL BE SPECIFICALLY FORMULATED FOR USE WITH ASPHALT EMULSIONS.

B) COVER AGGREGATE. COMPLIES WITH THE LATEST EDITION OF MASSDOT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES" SECTION M2 "AGGREGATES AND RELATED MATERIALS." COVER AGGREGATE SHALL BE FREE FROM DUST, CLAY, SOOT AND ALL OTHER DELETERIOUS SUBSTANCES, HAVING MOISTURE CONTENT LESS THAN 0.5%.

1. TESTING OF AGGREGATE SHALL BE IN ACCORDANCE WITH THE FOLLOWING METHODS.
   a. SIEVE ANALYSIS. AASHTO T27
   b. MATERIAL PASSING THE #200 SIEVE. AASHTO T11
   c. WATER CONTENT. AASHTO T142
   d. AGGREGATE/BITUMEN AFFINITY. AASHTO T182 (ASTM D1664)

2. WHEN TESTED IN ACCORDANCE WITH AASHTO T182 (ASTM D1664), AGGREGATE SHALL HAVE A RETAINED BITUMINOUS FILM ABOVE 95 PERCENT. USE OF AGGREGATES WHICH DO NOT MEET THIS REQUIREMENT MAY BE PERMITTED IN CONJUNCTION WITH AN APPROVED ANTI–STRIPPING ADDITIVE.

C) MATERIAL FOR BLOTTING OVERSPRAY OR SPILL OF LIQUID ASPHALT SHALL BE FINE AGGREGATE MATCHING THE COVER AGGREGATE MATERIAL, WITH STONES OF APPROXIMATELY HALF THE SIZE.

REFER TO ASPHALT W/ CHIPSEAL TRAIL SURFACE – NEW & CHIPSEAL TRAIL RESURFACE DETAILS (SHEET C8.2).

DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION
☐ PERMIT ☐ CONSTRUCTION RECORD

THIS DRAWING MAY NOT SHOW CONSTRUCTION DETAILS AND SPECIFICATIONS FOR ALL PROPOSED IMPROVEMENTS, AND MAY NOT IDENTIFY ALL CONSTRUCTION WORK ITEMS/AREAS OF CONTRACTOR JURISDICTION.

COMMONWEALTH OF MASSACHUSETTS – NICHOLAS M. PAULING – CIVIL – No. 47114 – REGISTERED PROFESSIONAL ENGINEER
4/11/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

| NO. | DATE | BY | APP. | REVISION DESCRIPTION |
|---|---|---|---|---|
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| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |

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## 32 14 40 – STONE PAVING

### COBBLESTONES

PROVIDED BY:
TLC SUPPLY, INC.
36 VERNON STREET
QUINCY, MA 02169
(617) 773 – 0055
WWW.TLCSUPPLY.COM

SIZE: (JUMBO) – 4" X 7" X 10"
# PIECES PER PALLET: 105
APPROXIMATE WEIGHT PER PALLET: 2,994 LBS
APPROXIMATE WEIGHT PER PIECE: 28.5 LBS
APPROXIMATE PIECES PER SQUARE FOOT: 2.06 PCS
APPROXIMATE PIECES PER LINEAR FOOT: 1.2 PCS
COLOR: LIGHT GRAY (OR APPROVED EQUAL)

REFER TO COBBLESTONE SWALE FOR DRIVEWAY JUNCTION & COBBLESTONE EDGE W/ STONE ARMORING DETAILS (SHEET C8.3)

## 32 16 23 – SIDEWALKS (CONCRETE CURB RAMP)

### ADA ACCESSIBLE CURB RAMP

MATERIALS:
GRAVEL BORROW, TYPE B (M1.03.0)
CEMENT CONCRETE – 4,000 PSI, 3/4 INCH, 610 (M4.02.00)
PREFORMED EXPANSION JOINT FILLER (M9.14.0)

SIDE FORMS AND TRANSVERSE FORMS SHALL BE SMOOTH, FREE FROM WARP, OF SUFFICIENT STRENGTH TO RESIST SPRINGING OUT OF SHAPE, OF A DEPTH TO CONFORM TO THE THICKNESS OF THE PEDESTRIAN CURB RAMP AND OF A TYPE SATISFACTORY TO THE ENGINEER.

ALL MORTAR OR DIRT SHALL BE COMPLETELY REMOVED FROM FORMS THAT HAVE BEEN PREVIOUSLY USED. THE FORMS SHALL BE WELL STAKED AND THOROUGHLY GRADED AND SET TO THE ESTABLISHED LINES WITH THEIR UPPER EDGE CONFORMING TO THE GRADE OF THE FINISHED PEDESTRIAN CURB RAMP WHICH SHALL HAVE SUFFICIENT PITCH TO THE ROADSIDE EDGE TO PROVIDE FOR SURFACE DRAINAGE.

ALL PEDESTRIAN CURB RAMP JOINTS AND TRANSITION SECTIONS WHICH DEFINE GRADE CHANGES SHALL BE FORMED STAKED AND CHECKED FOR DIMENSION, GRADE AND SLOPE CONFORMANCE PRIOR TO PLACING CEMENT CONCRETE.

ALL FORMS SHALL BE OILED BEFORE PLACING CONCRETE.

REFER TO ADA ACCESSIBLE CURB RAMP (SHEET C8.2)

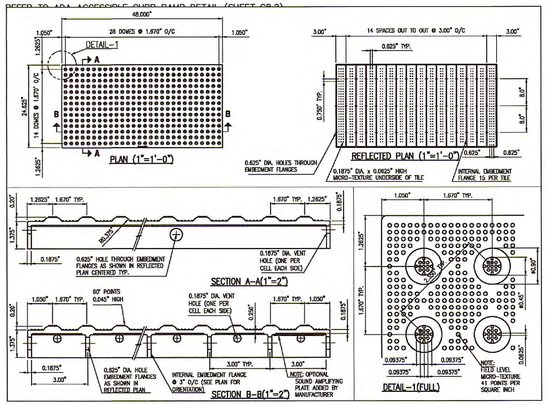
## 32 17 26 – TACTILE WARNING SURFACING

### ADA TACTILE WARNING STRIP

A) VITRIFIED POLYMER COMPOSITE (VPC) CAST IN PLACE WARNING TILES SHALL INCLUDE: CONTINUOUS STRAND WOVEN FIBERGLASS SHEET MATRIX EMBEDDED WITHIN AN EPOXY POLYMER COMPOSITION WITH AN ULTRA–VIOLET COATING EMPLOYING ALUMINUM OXIDE PARTICLES IN THE TRUNCATED DOMES; "ARMOR TILE" AS DISTRIBUTED UNDER LICENSE BY ENGINEERED PLASTICS INC. (1–800–682–2525) OR EQUIVALENT APPROVED PRODUCT.

B) DIMENSIONS: THE TILE SHALL INCORPORATE AN IN–LINE PATTERN OF TRUNCATED DOMES MEASURING NOMINAL 0.2" HEIGHT, 0.9" BASE DIAMETER, 0.45" TOP DIAMETER SPACED CENTER–TO–CENTER 2.35" AS MEASURED ON A DIAGONAL AND 1.67" AS MEASURED SIDE BY SIDE IN–LINE. FOR WHEELCHAIR SAFETY THE FIELD AREA SHALL CONSIST OF A NON–SLIP SURFACE WITH A MINIMUM OF 40 – 90° RAISED POINTS 0.045" HIGH, PER SQUARE INCH. CAST IN PLACE WARNING TILES SHALL BE HELD WITHIN THE FOLLOWING DIMENSIONS AND TOLERANCES: 24" (L) x 48" (W), PART NO. ADA–C–2448.

REFER TO ADA ACCESSIBLE CURB RAMP DETAIL (SHEET C8.2)




## 32 31 19 – DECORATIVE METAL FENCES AND GATES

### PIGTAIL STEP–IN FENCE POST

PROVIDED BY:
ZAREBA SYSTEMS, INC.
69 N LOCUST STREET
LITITZ, PA 17543
(855) 592 – 7322

MODEL #PTP39
SIZE: 1/4" DIA. X 39" LONG
STEEL POST WITH INSULATED LOOP AND WELDED FOOT STEP

## 32 33 43 – SITE SEATING AND TABLES

### BENCHES & ADA PICNIC TABLES

PROVIDED BY:
NATIONAL OUTDOOR FURNITURE, INC.
144 MURDOCK ROAD
POMFRET CENTER, CT 06259
(888) 516 – 8873
(860) 974 – 1551
EMAIL: NOFINC@EARTHLINK.NET
WWW.NATIONALOUTDOORFURNITURE.COM

8' HEAVY DUTY TABLE – ADA PORTABLE (OR APPROVED EQUAL)
- OVERALL DIMENSIONS: 95"L X 60–1/6"D X 30"H
- AVAILABLE IN SINGLE OR DOUBLE SIDED AVAILABILITY
- WOOD STYLE OR ALUMINUM STYLE, 2" X 10" PLANKS
- ALL MIG WELDED FRAME WITH ZINC PLATED HARDWARE
- FRAME AVAILABLE IN 1–5/8" AND 2–3/8" O.D. PIPE WITH 1–5/16" O.D. BRACE
- ZINC COATED, GALVANIZED, POWDER COATED FINISH OR GALVANIZED FRAME
- AVAILABLE IN UNTREATED PINE, TREATED PINE, REDWOOD STAINED PINE AND ALUMINUM PLANKS
- SOME ASSEMBLY REQUIRED
- STANDARD POWDER COAT COLORS AVAILABLE: BURGANDY, RED, ORANGE, YELLOW, SPRING GREEN, GREEN, ROYAL PURPLE, ULTRA BLUE, BLUE, SKY BLUE, BEIGE, BROWN, BLACK, MATTE BLACK, DARK GREY, CHAMPAGNE, WHITE

BOULEVARD BACKLESS BENCH – GROUND MOUNTED (OR APPROVED EQUAL)
- 1–5/8"W X 2" THICK OAK OR REDWOOD SLATS
- SEVEN GAUGE COLD ROLLED STEEL
- POWDER COATED STEEL FRAME
- 1/4–20 STAINLESS MACHINE SCREW, ALLOW DRIVE NUT (TAMPER RESISTANT)
- 2" X 2" SQ. TUBE 0.095 WALL WITH STEEL PLATE AND MOUNTING HOLES
- DIMENSIONS: 20–1/2" SEAT DEPTH X 17" SEAT HT.
- 6' LENGTH (UNLESS OTHERWISE NOTED, AVAILABLE IN 8' LENGTH)

## 32 92 19 – SEEDING

### GRASS SEED

GRASS SEED SHALL BE OF THE PREVIOUS YEAR'S CROP AND IN NO CASE SHALL THE WEED SEED CONTENT EXCEED 1% BY MASS. THE GRASS SEED SHALL CONFORM TO THE REQUIREMENTS OF THE FOLLOWING TABLE:

| GRASS SEED | | | |
|---|---|---|---|
| GRASS TYPE | PROPORTION (%) | GERMINATION MIN. (%) | PURITY MIN. (%) |
| CREEPING RED FESCUE AND/OR CHEWINGS FESCUE | 59 | 85 | 95 |
| KENTUCKY BLUE | 30 | 85 | 90 |
| PERENNIAL RYE | 5 | 90 | 98 |
| REDTOP | 5 | 85 | 92 |
| DUTCH WHITE CLOVER | 1 | 85 | 96 |

### NEW ENGLAND SEMI–SHADE GRASS AND FORBS MIX

PROVIDED BY:
NEW ENGLAND WETLAND PLANTS, INC.
820 WEST STREET
AMHERST, MA 01002
(413) 548 – 8000
EMAIL: INFO@NEWP.COM
WWW.NEWP.COM

THE NEW ENGLAND SEMI–SHADE GRASS AND FORBS MIX CONTAINS A BROAD SPECTRUM OF NATIVE GRASSES AND FORBS THAT WILL TOLERATE SEMI–SHADE AND EDGE CONDITIONS. ALWAYS APPLY ON CLEAN BARE SOIL. THE MIX MAY BE APPLIED BY HYDRO–SEEDING, BY MECHANICAL SPREADER, OR ON SMALL SITES IT CAN BE SPREAD BY HAND. LIGHTLY RAKE OR ROLL TO ENSURE PROPER SEED TO SOIL CONTACT. BEST RESULTS ARE OBTAINED WITH A SPRING SEEDING. LATE SPRING AND EARLY SUMMER SEEDING WILL BENEFIT WITH A LIGHT MULCHING OF WEED–FREE STRAW TO CONSERVE MOISTURE. IF CONDITIONS ARE DRIER THAN USUAL, WATERING WILL BE REQUIRED. LATE FALL AND WINTER DORMANT SEEDING REQUIRE AN INCREASE IN THE SEEDING RATE. FERTILIZATION IS NOT REQUIRED UNLESS THE SOILS ARE PARTICULARLY INFERTILE. PREPARATION OF A CLEAN, WEED FREE SEED BED IS NECESSARY FOR OPTIMAL RESULTS.

APPLY: 30 LBS/ACRE (1450 SQ. FT./LB)

| NEW ENGLAND SEMI–SHADE GRASS AND FORBS MIX | | |
|---|---|---|
| BOTANICAL NAME | COMMON NAME | INDICATOR |
| Elymus virginicus | Virginia Wild Rye | FACW– |
| Elymus canadensis | Canada Wild Rye | FACU+ |
| Festuca rubra | Red Fescue | FACU |
| Chamaecrista fasciculata | Partridge Pea | FACU |
| Liatris spicata | Spiked Gayfeather/Marsh Blazing Star | FAC+ |
| Onoclea sensibilis | Sensitive Fern | FACW |
| Aster prenanthoides (Symphyotrichum prenanthoide) | Zigzag Aster | FAC |
| Eupatorium fistulosum (Eutrochium fistulosum) | Hollow–Stem Joe Pye Weed | FACW |
| Eupatorium perfoliatum | Boneset | FACW |
| Juncus tenuis | Path Rush | FAC |

## 33 01 30 – MANHOLE ADJUSTMENT

### BUILDING BRICKS

BRICKS ARE MANUFACTURED FROM CLAY, SHALE, OR SIMILAR NATURALLY OCCURRING EARTHLY SUBSTANCES AND SUBJECTED TO A HEAT TREATMENT AT ELEVATED TEMPERATURES (FIRING). THE HEAT TREATMENT MUST DEVELOP SUFFICIENT FIRED BOND BETWEEN THE PARTICULATE CONSTITUENTS TO PROVIDE THE STRENGTH AND DURABILITY REQUIREMENTS OF THIS SPECIFICATION.

BRICKS ARE SHAPED DURING MANUFACTURE BY MOLDING, PRESSING, OR EXTRUSION, AND THE SHAPING METHOD IS A WAY TO DESCRIBE THE BRICK.

## 33 01 30 – MANHOLE ADJUSTMENT (CONTINUED)

### MORTAR

ALL MORTAR FOR USE IN THE CONSTRUCTION OF NON–REINFORCED UNIT MASONRY STRUCTURES SHALL CONFORM TO THE STANDARDS OF ASTM C270–10, STANDARD SPECIFICATION FOR MORTAR FOR UNIT MASONRY.

REFER TO DRYWELL DETAIL (SHEET C8.3).

## 33 41 23.16 – GRAVEL DRAINAGE LAYERS

### 1–1/2" MINUS WASHED CRUSHED STONE

DURABLE CRUSHED ROCK CONSISTING OF THE ANGULAR FRAGMENTS OBTAINED BY BREAKING AND CRUSHING SOLID OR SHATTERED NATURAL ROCK, AND FREE FROM A DETRIMENTAL QUANTITY OF THIN, FLAT, ELONGATED OR OTHER OBJECTIONABLE PIECES. A DETRIMENTAL QUANTITY WILL BE CONSIDERED AS ANY AMOUNT IN EXCESS OF 15% OF THE TOTAL WEIGHT.

THE CRUSHED STONE SHALL BE REASONABLY FREE FROM CLAY, LOAM OR DELETERIOUS MATERIAL AND NOT MORE THAN 1.0% OF SATISFACTORY MATERIAL PASSING A #200 SIEVE WILL BE ALLOWED TO ADHERE TO THE CRUSHED STONE.

REFER TO DRYWELL DETAIL (SHEET C8.3).

| 1–1/2" MINUS WASHED CRUSHED STONE | |
|---|---|
| SIEVE DESIGNATION | PERCENT PASSING BY WEIGHT |
| 2 IN. | 100 |
| 1–1/2 IN. | 95–100 |
| 1 IN. | 35–70 |
| 3/4 IN. | 0–25 |

## 33 42 11 – STORMWATER PIPING

### ADS 12" HDPE N–12 PIPE

WWW.ADSPIPE.COM

PIPE REQUIREMENTS: N–12 PIPE SHALL HAVE A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS. 12" PIPE SHALL MEET AASHTO M294, TYPE S OR SP, OR ASTM F2306.

JOINT PERFORMANCE: PIPE SHALL BE JOINED WITH COUPLING BANDS COVERING AT LEAST TWO FULL CORRUGATIONS ON EACH END OF THE PIPE. STANDARD CONNECTIONS SHALL MEET OR EXCEED THE SOIL–TIGHT REQUIREMENTS OF AASHTO M252, AASHTO M294, OR ASTM F2306.

FITTINGS: FITTINGS SHALL CONFORM TO AASHTO M252, AASHTO M294, OR ASTM F2306.

MATERIAL PROPERTIES: MATERIAL FOR PIPE AND FITTING PRODUCTION SHALL BE HIGH DENSITY POLYETHYLENE CONFORMING WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 435400C FOR 12" DIAMETER, AS DEFINED AND DESCRIBED IN THE LATEST VERSION OF ASTM D3350, EXCEPT THAT CARBON BLACK CONTENT SHOULD NOT EXCEED 4%. THE 12" PIPE MATERIAL SHALL COMPLY WITH THE NOTCHED CONSTANT LIGAMENT–STRESS (NCLS) TEST AS SPECIFIED IN SECTIONS 9.5 AND 5.1 OF AASHTO M294 AND ASTM F2306 RESPECTIVELY.

INSTALLATION: INSTALLATION SHALL BE IN ACCORDANCE WITH ASTM D2321 AND ADS RECOMMENDED INSTALLATION GUIDELINES, WITH THE EXCEPTION THAT MINIMUM COVER SHALL BE SIX INCHES.

REFER TO NEW CULVERT CROSSING UNDER TRAIL DETAIL (SHEET C8.2).

## 33 46 53 – STORMWATER LEACHING PITS

### DRYWELL

PROVIDED BY:
SHEA CONCRETE PRODUCTS, INC.
773 SALEM STREET
WILMINGTON, MA 01887
(978) 658 – 2645

ITEM NO. MDWH – 3' SECTION W/ COVER (ONE PIECE)
WEIGHT: 1,404 LBS

REFER TO DRYWELL DETAIL (SHEET C8.3)

DRAWING ISSUED FOR:

☐ CONCEPT ■ CONSTRUCTION

☐ PERMIT ☐ CONSTRUCTION RECORD

THIS DRAWING MAY NOT SHOW CONSTRUCTION DETAILS AND SPECIFICATIONS FOR ALL PROPOSED IMPROVEMENTS, AND MAY NOT IDENTIFY ALL CONSTRUCTION WORK ITEMS/AREAS OF CONTRACTOR JURISDICTION.

COMMONWEALTH OF MASSACHUSETTS – NICHOLAS M. PAULING – CIVIL – No. 47114 – REGISTERED PROFESSIONAL ENGINEER – 4/11/2024

PER 250 CMR 5.03(13), THE FOLLOWING ARE EXCLUDED FROM THE PROFESSIONAL ENGINEER'S RESPONSIBILITY: ALL BOUNDARY INFORMATION; LOCATION OF EXISTING STRUCTURES, TREES, UTILITIES, TOPOGRAPHY OR SIMILAR FEATURES; DESIGN OF RETAINING WALLS, PROPRIETARY EQUIPMENT. SEE EXISTING CONDITION NOTES.

| NO. | DATE | BY | APP. | REVISION DESCRIPTION |
|---|---|---|---|---|
| 2 | 4/9/24 | DJG | NMP | ISSUED FOR CONSTRUCTION |
| 1 | 3/6/24 | DJG | NMP | NPS COMMENTS & TOWN OF CONCORD C.C. |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# NATIONAL PARK SERVICE DEVELOPMENT TRAIL REPAIR

## MATERIAL SPECIFICATIONS

MINUTE MAN NATIONAL PARK
CONCORD, LINCOLN AND LEXINGTON

PREPARED FOR:
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174 LIBERTY STREET
CONCORD, MA 01742

| DES. BY:LT/DG | DATE: FEBRUARY 2024 | JOB 231032 | C8.5 |
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| CHK. BY: NMP | | | |