STONEFIELD

STORMWATER OPERATIONS & MAINTENANCE MANUAL

PROPOSED SELF-STORAGE FACILITY
BLOCK 85, LOTS 58 & 59.02
1613 LINCOLN HIGHWAY (NJ ROUTE 27)
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NEW JERSEY

PREPARED FOR:

1784 CAPITAL HOLDINGS, LLC

PREPARED BY:

STONEFIELD ENGINEERING & DESIGN, LLC
MARCH 12, 2021
PRI-200094

JOSHUA KLINE, PE
NEW JERSEY PROFESSIONAL ENGINEER LICENSE # 54347

REPORT CONTENTS

1.0 PROJECT DESCRIPTION

1784 Capital Holdings, LLC is proposing the construction of a three (3) story self-storage facility with a building footprint of 38,148 SF with 1,125 SF dedicated to office operations. Additional improvements include parking facilities, landscaping, utility services, site lighting, and a stormwater conveyance system. The subject property is designated Block 85, Lots 58 and 59.02 commonly known as 1613 Lincoln Highway (US Route 27) in Franklin, New Jersey (herein referred to as the "project site").

The subject property is located within the Cluster-Residential (C-R) Zone and is bounded by residential developments in all directions. The site will be accessed via one (1) ingress driveway and one (1) egress driveway along Lincoln Highway (US Route 27).

The total project area is 251,898 SF (5.78 acres), the total area of new impervious surfaces is 102,415 SF (2.35 acres), the total area of new motor vehicle surfaces is 120,881 SF (2.78 AC), and the total area of disturbance is 252,442 SF (5.80 acres). Project Figures can be found in Appendix A of this Report.

This Stormwater Operations & Maintenance Manual has been prepared to delineate operational and maintenance responsibilities for the stormwater best management practices (BMPs) proposed to meet the requirements set forth by the Township of Franklin, Somerset – Union Soil Conservation District, the Delaware and Raritan Canal Commission (DRCC), the New Jersey Department of Transportation (NJDOT), the New Jersey Administrative Code (NJAC), and the New Jersey Department of Environmental Protection (NJDEP).

2.0 PROPOSED DEVELOPMENT

1784 Capital Holdings, LLC is proposing the construction of a three (3) story self-storage facility with a building footprint of 38,148 SF with 1,125 SF dedicated to office operations. Additional improvements include parking facilities, landscaping, utility services, site lighting, and a stormwater conveyance system. The front of the site is collected via pervious pavers and discharged via a 15" RCP pipe to an existing inlet and ultimately the NJDOT stormwater conveyance system within Lincoln Highway (NJ Route 27). The building is collected via roof leaders while the areas adjacent are collected via pervious pavers and discharge via a scour hole to the west which is the Hempstead Gardens Development. The back of the site is split into two areas which are collected via catch basins and conveyed with varying sizes of HDPE pipe which discharge to one of two bioretention systems to either the east or west. The east system discharges to the Kingsberry Drive Development while the west system discharges to the Hempstead Gardens Open Area.

3.0 STORMWATER MANAGEMENT OPERATIONAL PROCEDURES

Operation and maintenance of the permanent stormwater control BMPs shall be the responsibility of the operator of the project site at the time that the applicable maintenance is required. The current owner and responsible agent of the project is:

1784 Capital Holdings, LLC
8777 N. Gainey Center Drive, Suite 191
Scottsdale, Arizona 85258
Chris Murphy
Phone: 973-705-7421

A copy of this report shall be kept on-site at all times both during and after construction. Upon reviewing agency approval, the title and date of the maintenance plan as well as the contact information of the current agent responsible for maintaining the stormwater management measures for the project shall be recorded on the deed of the property on which the measures are located. Any future change in this information such as change in property ownership shall also be recorded on the deed.

The current responsible agent shall evaluate the maintenance plan for effectiveness at least annually and revise the plan as necessary. A detailed, written log of all preventative and corrective maintenance performed for each stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders. Upon request from a public entity with jurisdiction over the project area the responsible agent shall make available the maintenance plan and associate logs and other records for review.

3.1 MAINTENANCE EQUIPMENT AND PERSONNEL

The current responsible agent shall ensure that adequate equipment and training is provided to maintenance personnel to perform the required maintenance tasks. Confined Space Entry Certification shall be required by personnel entering underground structures and pipes. The material and equipment necessary for inspection and maintenance activities shall include, but not be limited to, the following:

- *Bioretention Area Equipment:* Instruments to perform visual inspection of vegetative health, equipment to pump stormwater from the basin in the event of maintenance, vacuum truck and hose for removal of sediment from basin bottom, and necessary safety equipment.
- *Pervious Paving Area Equipment:* Material and equipment customary in pavement maintenance practices.
- *Landscape Areas:* Material and equipment customary in landscape maintenance practices.

The estimated cost of routine, scheduled maintenance activities is estimated to be approximately $15,000.00 per year. Approximate breakdown of yearly routine maintenance costs are noted below (excludes structural repairs):

MAINTENANCE COST BREAKDOWN

Basin Inspection and Maintenance	$10,000.00 per year
Landscape Areas	$5,000.00 per year

3.2 MAINTENANCE ACCESS POINTS

Access to the bioretention systems are provided via the gated access path through the proposed wall as indicated on Sheet C-4 of the Site Plans, prepared by Stonefield Engineering & Design, LLC. Pervious paver access is provided via cleanouts located along the perforated underdrain as indicated on Sheet C-6 of the Site Plans referenced above. Reduced sheets (not to scale) can be found in the Appendix of this Manual.

4.0 STORMWATER BMP INVENTORY

The stormwater management measures incorporated into this development are listed below. The corresponding Field Manuals for the stormwater management measures are located in the Appendix of the Maintenance Plan.

4.1 BIORETENTION AREAS

Two (2) stormwater bioretention areas are proposed for the project:

- *Bioretention Area B-1*: The bioretention system has an 18" terrestrial forested community with a footprint of 9,981 SF that collects 1.5 AC of drainage area (Area P-3). The stormwater discharges from the basin to the Kingsberry Drive Development Swale to the east via a 12" HDPE pipe to a scour hole.
  - *Design Purposes:*
    1. *Water Quantity*
    2. *1.25 inches in 2 hours*
  - *Dimensions: 174.3 FT (Length) x 56.6 FT (Width) x 2.4 (Depth)*
  - State Plane Coordinates: Easting (X) – 491,148.32, Northing (Y) – 595,314.62

- *Bioretention Area B-2*: The bioretention system has an 18" terrestrial forested community with a footprint of 11,368 SF that collects 1.7 AC of drainage area (Area P-4). The stormwater discharges from the basin to the Hempstead Gardens Open Area to the west via a 12" HDPE pipe to a scour hole.
    - *Design Purposes:*
        1. *Water Quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 160.1 FT (Length) x 70.8 FT (Width) x 2.75 (Depth)*
    - State Plane Coordinates: Easting (X) – 491,037.03, Northing (Y) – 595,284.48

  A typical bioretention area provides a higher level of water quality filtering than that of an infiltration basin.

4.2 PERVIOUS PAVING SYSTEMS

Five (5) pervious paving systems are proposed for the project:

- *Pervious Paving System PV-1:* The pervious pavement system is a total of 5,853 SF. The pavers are 3 1/8" thick with 4" coarse layer and 1.5 FT of stone storage. The entire system is underlain by 2" perforated pipe which discharges the stormwater conveyance system within Canfield Road.
    - *Design Purposes:*
        1. *Water quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 5,853 SF (Surface Area) x 2.09 FT (Depth)*
    - *Treatment Ratio: 0.94:1*
    - State Plane Coordinates: Easting (X) – 491,974.29 Northing (Y) – 594,647.09

- *Pervious Paving System PV-2:* The pervious pavement system is a total of 1,838 SF. The pavers are 3 1/8" thick with 4" coarse layer and 2.0 FT of stone storage. The entire system is underlain by 2" perforated pipe which discharges the stormwater conveyance system within Canfield Road.
    - *Design Purposes:*
        1. *Water quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 1,838 SF (Surface Area) x 2.59 FT (Depth)*
    - *Treatment Ratio: 2.14:1*
    - State Plane Coordinates: Easting (X) – 491,774.30 Northing (Y) – 594,905.78

- *Pervious Paving System PV-3:* The pervious pavement system is a total of 1,839 SF. The pavers are 3 1/8" thick with 4" coarse layer and 2.0 FT of stone storage. The entire system is underlain by 2" perforated pipe which discharges the stormwater conveyance system within Canfield Road.
    - *Design Purposes:*
        1. *Water quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 1,839 SF (Surface Area) x 2.59 FT (Depth)*
    - *Treatment Ratio: 2.14:1*
    - State Plane Coordinates: Easting (X) – 491,748.93 Northing (Y) – 594,884.96

- *Pervious Paving System PV-4:* The pervious pavement system is a total of 3,637 SF. The pavers are 3 1/8" thick with 4" coarse layer and 1.5 FT of stone storage. The entire system is underlain by 2" perforated pipe which discharges the stormwater conveyance system within Canfield Road.
    - *Design Purposes:*
        1. *Water quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 3,637 SF (Surface Area) x 2.09 FT (Depth)*
    - *Treatment Ratio: 1.71:1*
    - State Plane Coordinates: Easting (X) – 491,686.24 Northing (Y) – 594,798.74

- *Pervious Paving System PV-5:* The pervious pavement system is a total of 1,801 SF. The pavers are 3 1/8" thick with 4" coarse layer and 1.25 FT of stone storage. The entire system is underlain by 2" perforated pipe which discharges the stormwater conveyance system within Canfield Road.
    - *Design Purposes:*
        1. *Water quantity*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 1,801 SF (Surface Area) x 2.34 FT (Depth)*
    - *Treatment Ratio: 2.67:1*
    - State Plane Coordinates: Easting (X) – 491,665.35 Northing (Y) – 594,786.85

4.3 OTHER MAINTENANCE

In addition to the scheduled inspections for the above referenced stormwater BMPs, the following general maintenance tasks shall be performed:

1. All stormwater inlets and manholes shall be inspected for debris and sediment accumulation and structural integrity at least four (4) times annually. Debris and sediment removal shall be scheduled as required to maintain stormwater runoff conveyance efficiency and disposed of in compliance with all applicable local, state, and federal waste regulations.

2. Landscaping within the developed portions of the site shall be trimmed/mowed twice (2) monthly during the growing season. Reforested portions of the site shall be left undisturbed to vegetate naturally.

5.0 STORMWATER BMP PREVENTATIVE MAINTENANCE ACTIONS

As per N.J.A.C. 7:8-5.8(b) & (e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), maintenance plans should include specific preventative and corrective maintenance tasks such as removal of sediment, trash, and debris; mowing, pruning, and restoration of vegetation; restoration of eroded areas; elimination of mosquito breeding habitats; control of aquatic vegetation; and repair or replacement of damaged or deteriorated components.

5.1 ABOVEGROUND BIORETENTION AREAS

The drainage areas for the system are not expected to be in areas of high pollutant concentrations, proper maintenance must be performed to ensure adequate filtering is provided to the runoff of the drawing to this area. The following maintenance tasks shall be performed for the bioretention area.

5.1.1 WEEKLY

a) Watering – Immediately after installation, water daily for 14 days unless there is significant rainfall. This is crucial, particularly during dry periods during the first growing season. Plants typically require about an inch of water per week during the first growing season, you will only have to water during severe dry periods. Newly planted small plants are most vulnerable to stress. Be cautious that they do not get too dry or too wet.

b) Weeding – The maintenance contractor must have the ability to identify the rain garden planted species and potential weed species in order to avoid accidental removals due to mistaken identity. This is crucial to the rain gardens success. During the first few years, you will, more than likely, need to weed often during the growing season. You will need to weed less and less as the plants grow and surpass the weeds, so that by the third year you should only be weeding several times a year. Watch out for the most aggressive, invasive weed species.

5.1.2 QUARTERLY

All bioretention components which receive, or discharge stormwater must be checked for trapped debris and sediment accumulation at least four (4) times annually as well as after storm events exceeding one (1) inch of precipitation. These components include: the outlet structure, the bioretention bottom, curb cuts, rip rap aprons, flared end sections, and trash racks. Sediment removal shall take place when the bioretention area is completely dry. Disposal of debris and sediment shall be done in compliance with all applicable local, state, and federal waste regulations.

5.1.3 ANNUALLY

a) Mulching – Add mulch every spring to maintain a three-inch mulch layer on your rain garden. The mulch should prohibit most, if not all, weed growth. Any weeds that do succeed in growing should be easy to remove because they will have shallow roots. In addition to limiting weed seed germination, mulching also prevents the loss of soil through erosion. Remember that triple shredded hardwood mulch with no dye is preferred for rain gardens.

b) Pruning – Each spring, prune dead vegetation, deadhead flowers, and cut back tattered or unwieldy plants. This will encourage dense, new growth and improve the rain garden's filtering capacity. Remember that stems and seed heads can be left on the plants for winter interest, wildlife cover, and food for birds.

c) Soil Testing – Since you determined the nutrient and pH levels of your soil before planting the rain garden, remover to retest the soil every three to five years. Follow the recommendations to maintain the soil pH in an acidic range. If pH is less than 5.2, apply limestone; if greater than 7.0, add iron sulfate and sulfur to reduce pH. Add these amendments when no storms are expected to prevent runoff. Be sure to follow instructions or contact the local county extension office for guidance to prevent runoff of applied materials.

d) Replanting – Remove or replace plant material that is not thriving. Consider planting more of a particularly successful species.

e) Sediment Removal – The rain garden may accumulate sediment, particularly if it collects runoff from a driveway or a road. This is a sign of success; however, occasionally use a flat shovel to remove any excess sediment, leaves, or debris. Be cautious particularly of any buildup occurring near the water inlet of the rain garden, especially if your rain garden is located next to a driveway or road and you notice sand in the buildup. A grass buffer, near the rain garden's inlet and between the rain garden and the road, will prevent road sand, salt, and sediment from entering your rain garden. A small rock bed at the inlet will function similarly. The debris in the water will drop out along the grass strip or rock bed, making it easier to clean your rain garden.

f) Fertilizing – Fertilizing is NOT a part of maintaining your rain garden! The garden sustains itself with the help of organic material in the topsoil.

g) Additional Steps – Additional maintenance includes seed collection and taking cuttings from successful plants, planting more of a particularly successful species, re-seeding the berm if necessary, replacing rocks that may be diverting flow out of the garden, and building up areas where more protection is needed to prevent erosion. After installation, if the rain garden is not infiltrating at the desired rate, make holes using an augur in the rain garden and fill these holes with coarse sand.

h) Signage – Post a "No Mow" sign and be sure to consult with maintenance staff so they are mindful of the project.

5.1.4 BASIN DRAWDOWN

The following table outlines the design drawdown time (time elapsed for basin to completely drain after the end of a storm event) for the bioretention area(s) (add columns for additional basins)

Storm Event	*Precipitation (in)*	*B-1 Drawdown (hr)*	*B-2 Drawdown (hr)*
1 Year	2.76"	28.40 HR	30.64 HR
2 Year	3.34"	29.36 HR	31.60 HR
10 Year	5.01"	31.40 HR	33.64 HR
25 Year	6.15"	32.40 HR	34.44 HR
100 Year	8.21"	33.44 HR	HR

This table shall be referenced to the actual drawdown times for the detention basin to evaluate performance. Should significant increases in drawdown time be noted or if stormwater runoff remains in the basin more than 72 hours after the end of a storm event, the basin's outlet structures, pipe storage and tailwater levels must be evaluated to determine appropriate measures to be taken to ensure proper basin functionality.

5.2 PERVIOUS PAVING SYSTEMS

The pervious pavement system inspections shall be performed by checking any of the associated cleanouts within the pervious pavement system. The following maintenance tasks shall be performed for the infiltration system.

5.2.1 QUARTERLY

All pervious pavement components which receive, or discharge stormwater must be checked for trapped debris and sediment accumulation at least four (4) times annually as well as after storm events exceeding one (1) inch of precipitation. These basin components include cleanouts, stone storage, and the outlet structures. Disposal of debris and sediment shall be done in compliance with all applicable local, state, and federal waste regulations.

5.2.2 ANNUALLY

All structural components (cleanouts, stone storage, and the outlet structures) shall be checked at least once (1) annually for cracking, subsidence, spalling, erosion and deterioration.

5.2.3 BASIN DRAWDOWN

The following table outlines the design drawdown time (time elapsed for basin to completely drain after the end of a storm event) for the pervious paver systems:

Storm Event	*Precipitation (in)*	*PV-1 Drawdown (hr)*	*PV-2 Drawdown (hr)*	*PV-3 Drawdown (hr)*	*PV-4 Drawdown (hr)*	*PV-5 Drawdown (hr)*
1 Year	2.76"	27.92 HR	24.64 HR	23.28 HR	25.48 HR	23.56 HR
2 Year	3.34"	28.48 HR	24.84 HR	24.28 HR	25.84 HR	24.24 HR
10 Year	5.01"	29.84 HR	25.28 HR	24.64 HR	26.56 HR	24.68 HR
25 Year	6.15"	30.60 HR	25.44 HR	24.88 HR	26.92 HR	24.88 HR
100 Year	8.21"	31.68 HR	25.76 HR	25.12 HR	27.60 HR	25.12 HR

This table shall be referenced to the actual drawdown times for the detention basin to evaluate performance. Should significant increases in drawdown time be noted or if stormwater runoff remains in the basin more than 72 hours after the end of a storm event, the basin's outlet structures, pipe storage and tailwater levels must be evaluated to determine appropriate measures to be taken to ensure proper basin functionality.

6.0 STORMWATER BMP CORRECTIVE MAINTENANCE ACTIONS

Depending on many factors, such as the performance of preventative maintenance actions, weather, or unexpected incidents. Corrective requirements may not be precisely anticipated; however, a list of potential corrective maintenance actions may assist the responsible party in planning and estimating costs in advance.

Potential Corrective Maintenance Actions	***Stormwater Management Measures/No.***
▪ Repair/replacement of outlet pipes or orifices	Pervious Pavement Systems (PV-1 through PV-5)
▪ Repair/ Replacement of eroded or damages riprap apron ▪ Repair/ Replacement of missing or damaged trash racks ▪ Repair/ Replacement of outlet pipes or orifices ▪ Revegetation of eroded side, aquatic bench, marsh, side slope, basin bottom, grass swales, etc.	Bioretention Systems (B-1 and B-2)

The corrective maintenance actions should also be listed in the Field Manuals for the specific stormwater management measures on the site.

7.0 INSPECTION AND LOGS OF ALL PREVENTATIVE AND CORRECTIVE MEASURES

As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

As per NJDEP BMP Manual Ch. 8 (Feb, 2004), a maintenance plan shall include a schedule of regular inspections and tasks, and detailed logs of all preventative and corrective maintenance performed on the stormwater management measure, including all maintenance-related work orders. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site. Inspection Checklists in the Field Manual for the stormwater management measures on this site include:

- Appendix C-1: General Inspection Checklist Log
- Appendix C-2: General Preventative Maintenance Log
- Appendix C-3: General Corrective Maintenance Log
- Appendix C-4: Annual Evaluation Records

All inspection and maintenance activities shall be recorded to document frequency of inspection and maintenance, and implementation of corrective action. All regularly scheduled inspections, inspections following one (1) inch of precipitation, maintenance activities, and repairs shall be recorded. Refer to the Appendix of this Manual for the BMP Inspection & Maintenance Log for this facility. This log shall be considered a minimum standard for recording purposes, the Operator and Inspection/Maintenance Personnel are encouraged to supplement the Log with additional notes and photos.

8.0 ANNUAL EVALUATION OF THE EFFECTIVENESS OF THE PLAN

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

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APPENDIX A:
PROJECT PLANS
(NOT TO SCALE)

APPENDIX A-1:
SITE PLAN

LAND USE AND ZONING

BLOCK 85, LOT 58 & 59.02

CLUSTER-RESIDENTIAL ZONE (C-R)

PROPOSED USE

SELF-STORAGE FACILITY — NON-PERMITTED (V)

ZONING REQUIREMENT	REQUIRED	EXISTING	PROPOSED
MINIMUM LOT AREA	435,600 SF (10.0 AC)	251,898 SF (5.78 AC) (EN)	251,898 SF (5.78 AC) (EN)
MINIMUM LOT FRONTAGE	300 FT	200.0 FT (EN)	200.0 FT (EN)
MINIMUM FRONT YARD SETBACK*	90 FT	1.8 FT (EN)	106.5 FT
MINIMUM SIDE YARD SETBACK (ONE)	45 FT	2.8 FT (EN)	BUILDING: 45.0 FT CANOPY: 5.7 FT (V)
MINIMUM SIDE YARD SETBACK (BOTH)	100 FT	17.0 FT (EN)	BUILDING: 102.8 FT CANOPY: 63.5 FT (V)
MINIMUM REAR YARD SETBACK	75 FT	793.9 FT	235.6 FT
MAXIMUM BUILDING HEIGHT**	2.5 STORIES / 35 FT	1.5 STORIES	39.23 FT / 3 STORIES (V)
MAXIMUM BUILDING COVERAGE	20% (50,379 SF)	7.0% (17,509 SF)	33.2% (83,735 SF) (V)
MAXIMUM IMPERVIOUS COVERAGE	40% (116,579 SF)	19.1% (48,136 SF)	59.8% (150,551 SF) (V)

(V) VARIANCE
(EN) EXISTING NON-CONFORMITY
(*) PER § 112-SCHEDULE 2, FOR LOTS FRONTING ON AN ARTERIAL STREET AN ADDITIONAL 15 FT IS REQUIRED
(**) MEASURED FROM AVERAGE ELEVATION OF FINISHED GRADE AT FRONT OF THE BUILDING TO HIGHEST POINT OF THE ROOF

SIGNAGE REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 112-SCHEDULE 5	FREESTANDING SIGN REQUIREMENTS*: MAXIMUM 1 SIGN MAXIMUM SIGN AREA = 100 SF MAXIMUM SIGN HEIGHT = 10 FT MINIMUM LOT LINE SETBACK = 10 FT	1 SIGN 100 SF <10 FT 10.2 FT
	ATTACHED SIGN REQUIREMENTS*: MAXIMUM 1 SIGN MAXIMUM SIGN AREA = 5% OF THE FIRST FLOOR BUILDING FACE AREA, MAXIMUM OF 100 SF 0.05 x 3,535 SF = 16.67 SF MAXIMUM VERTICAL DIMENSION = 4 FT	1 SIGN 16.67 SF 4 FT
§ 112-111.A.(4)	EXISTING SIGNAGE REDEVELOPMENT: PROVISIONS SHALL APPLY TO SIGNS EXISTING ON EFFECTIVE DATE OF THIS CHAPTER, AS WELL AS THOSE HEREAFTER ERECTED, ENLARGED, OR RECONSTRUCTED	DOES NOT COMPLY (V)
§ 112-111.A.(5)	EXISTING SIGNAGE LANDSCAPING: THE AREA SURROUNDING AN EXISTING SIGN IS NOT REQUIRED TO BE LANDSCAPED	COMPLIES

(V) VARIANCE
(TBD) TO BE DETERMINED
(*) PER § 112-SCHEDULE 5, ONE ADDITIONAL SIGN IS PERMITTED AT REAR AND SIDE ENTRANCES, PROVIDED THAT EACH IS EQUAL TO OR LESS THAN THE MAXIMUM PERMITTED SIZE OF THE FRONT SIGN. ONE FREESTANDING SIGN PERMITTED PER ROAD FRONTAGE.

OFF-STREET PARKING REQUIREMENTS

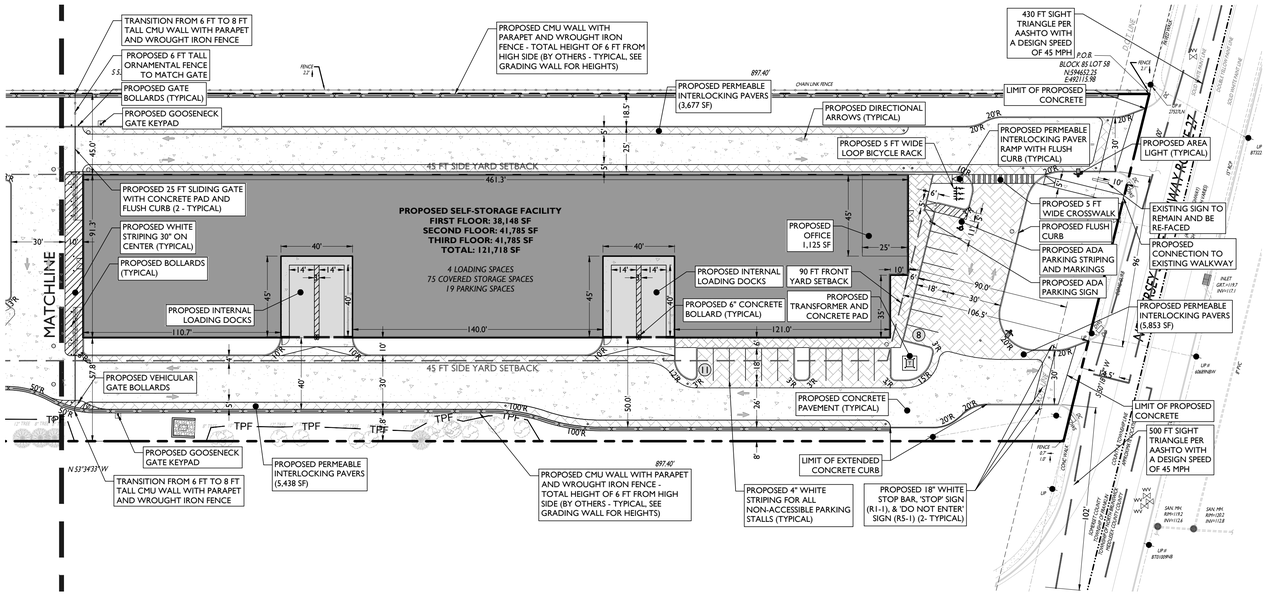
CODE SECTION	REQUIRED	PROPOSED
§ 112-SCHEDULE 4	REQUIRED PARKING (WAREHOUSE*): 1 SPACE PER 1,000 SF OF GROSS FLOOR AREA FOR THE FIRST 5,000 SF THEN 1 SPACE PER 2,500 SF 1 SPACE x (5,000 SF / 1,000 SF) = 5 SPACES 1 SPACE x ((121,718 SF - 5,000 SF) / 2,500 SF) = 46 SPACES** **TOTAL REQUIRED: 51 SPACES**	19 SPACES (V)
§ 112-83	MINIMUM PARKING SPACE DIMENSIONS: 9 FT X 18 FT	9 FT x 18 FT
§ 112-85	PARKING SPACE SEPARATION REQUIREMENT: ALL PARKING SPACES SHALL BE SEPARATED FROM WALKWAYS, SIDEWALKS, STREETS OR ALLEYS BY CURBING.	COMPLIES
§ 112-86	PRIVATE WALK ADJACENT TO BUILDING REQUIREMENTS: MINIMUM WIDTH = 4 FT	6 FT
§ 112-87	RESIDENTIAL BUFFER REQUIREMENT: OFF-STREET PARKING AND LOADING <50 FT FROM RESIDENTIAL PROPERTY: MINIMUM PLANT SCREENING = 6 FT	COMPLIES
§ 112-88	MINIMUM DRIVE AISLE WIDTH REQUIREMENTS: 90 DEGREE PARKING = 26 FT 60 TO 45 DEGREE PARKING = 18 FT NO PARKING ONE-WAY = 15 FT NO PARKING TWO-WAY = 22 FT	26 FT 30 FT 34 FT 25 FT
§ 112-90.A	DRIVEWAY REQUIREMENTS: MINIMUM WIDTH = 12 FT MAXIMUM WIDTH = 36 FT	MINIMUM = 25 FT MAXIMUM = 35 FT
§ 112-90.B	DRIVEWAY GRADE REQUIREMENTS: MAXIMUM GRADE = 15%	3.75%
§ 112-91	DRIVEWAY LOCATION REQUIREMENTS: TO INTERSECTION OF TWO STREETS: MINIMUM 25 FT TO ANY OTHER DRIVEWAY ON SAME LOT: MINIMUM 50 FT	102.5 FT 98.3 FT
§ 112-102.C	PARKING LOCATION REQUIREMENTS: NOT PERMITTED IN: FRONT YARD AREA 15 FT TO SIDE OR REAR YARD BUFFER AREAS	DOES NOT COMPLY (V)
§ 112-104	LOADING BERTH REQUIREMENTS: MINIMUM SIZE: 12 FT WIDTH x 48 FT LENGTH x 15 FT HEIGHT	14 FTx40 FTx15 FT (V)

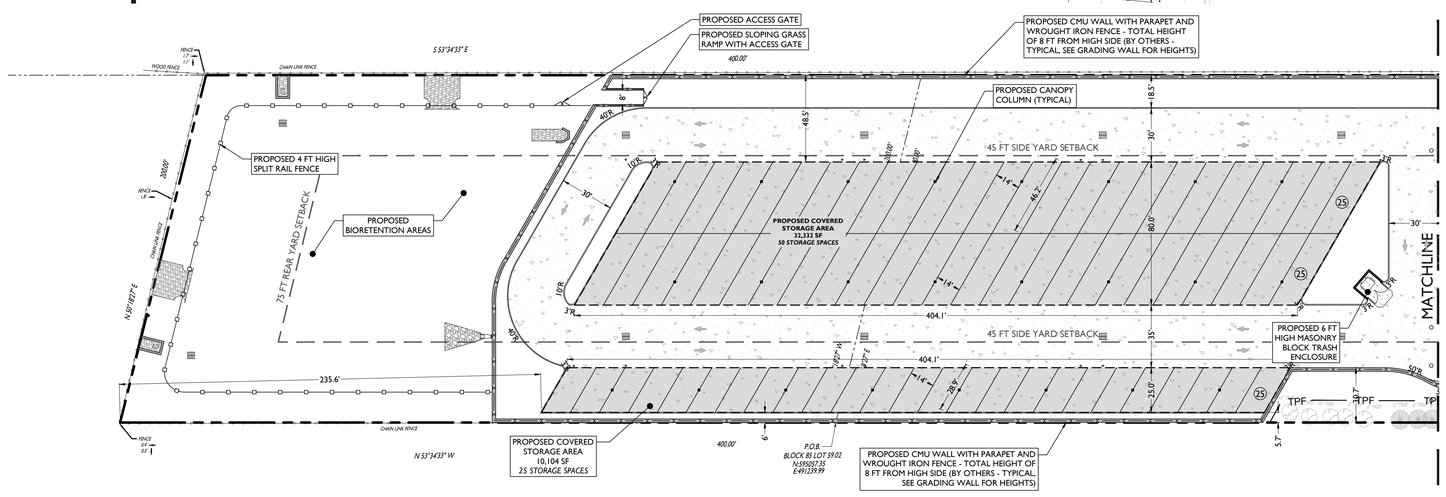
(V) VARIANCE
(EN) EXISTING NON-CONFORMITY
(W) WAIVER
(*) PER § 112-SCHEDULE 4, NOTE 3 - IF A CASE OF USE IS NOT SPECIFICALLY MENTIONED, THE MOST SIMILAR USE THAT IS MENTIONED SHALL APPLY
(**) PER § 112-101, IF THE REQUIRED OFF-STREET PARKING AND LOADING CALCULATIONS RESULTS IN A FRACTIONAL SPACE, THE FRACTION SHALL BE DISREGARDED

COMMERCIAL DESIGN REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 112-206.6.D.	BICYCLE REQUIREMENTS: PARKING IS REQUIRED BIKEWAYS BUFFERED FROM CIRCULATION	COMPLIES
§ 112-206.8.A(1)	OPEN SPACE REQUIREMENTS: PARKING RATIO < 5:1,000 SF = MINIMUM 10 SF SITE AMENITIES PER 10 PARKING SPACES 10 SF x (94 PARKING SPACES / 10 PARKING SPACES) = 94 SF	94 SF
§ 112-206.9.C.(2)	STORAGE LOCATION REQUIREMENTS: OUTDOOR STORAGE, TRASH COLLECTION, OR LOADING MUST BE LOCATED MORE THAN 20 FT FROM ANY PUBLIC STREET, SIDEWALK, OR PEDESTRIAN WALKWAY	COMPLIES
§ 112-111.A.(5)	EXISTING SIGNAGE LANDSCAPING: THE AREA SURROUNDING AN EXISTING SIGN IS NOT REQUIRED TO BE LANDSCAPED	COMPLIES

(V) VARIANCE





GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

40' 0' 40' 80'
GRAPHIC SCALE IN FEET
1" = 40'

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	SAWCUT LINE
	PROPOSED CURB
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE PAVEMENT
	PROPOSED PERVIOUS PAVERS
	PROPOSED AREA LIGHT
	PROPOSED RETAINING WALL
X X	PROPOSED WROUGHT IRON FENCE
	PROPOSED GUIDERAIL
	PROPOSED BUILDING DOORS

ISSUE	DATE	BY	DESCRIPTION
01	03/12/2021	AHM	FOR AGENCY SUBMISSION

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STONEFIELD engineering & design
Rutherford, NJ · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Detroit, MI
www.stonefieldeng.com
15 Spring Street, Princeton, NJ 08542
Phone 609.362.6900

PRELIMINARY & FINAL MAJOR SITE PLAN

ARCO MURRAY | DESIGN BUILD

PROPOSED SELF-STORAGE FACILITY
BLOCK 85, LOTS 58 & 59.02
161 ROUTE 27 (NJ ROUTE 27)
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NEW JERSEY

JOSHUA H. KLINE, P.E.
NEW JERSEY LICENSE No. 54347
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' | PROJECT ID: PRI-200094

TITLE: SITE PLAN

DRAWING: **C-4**

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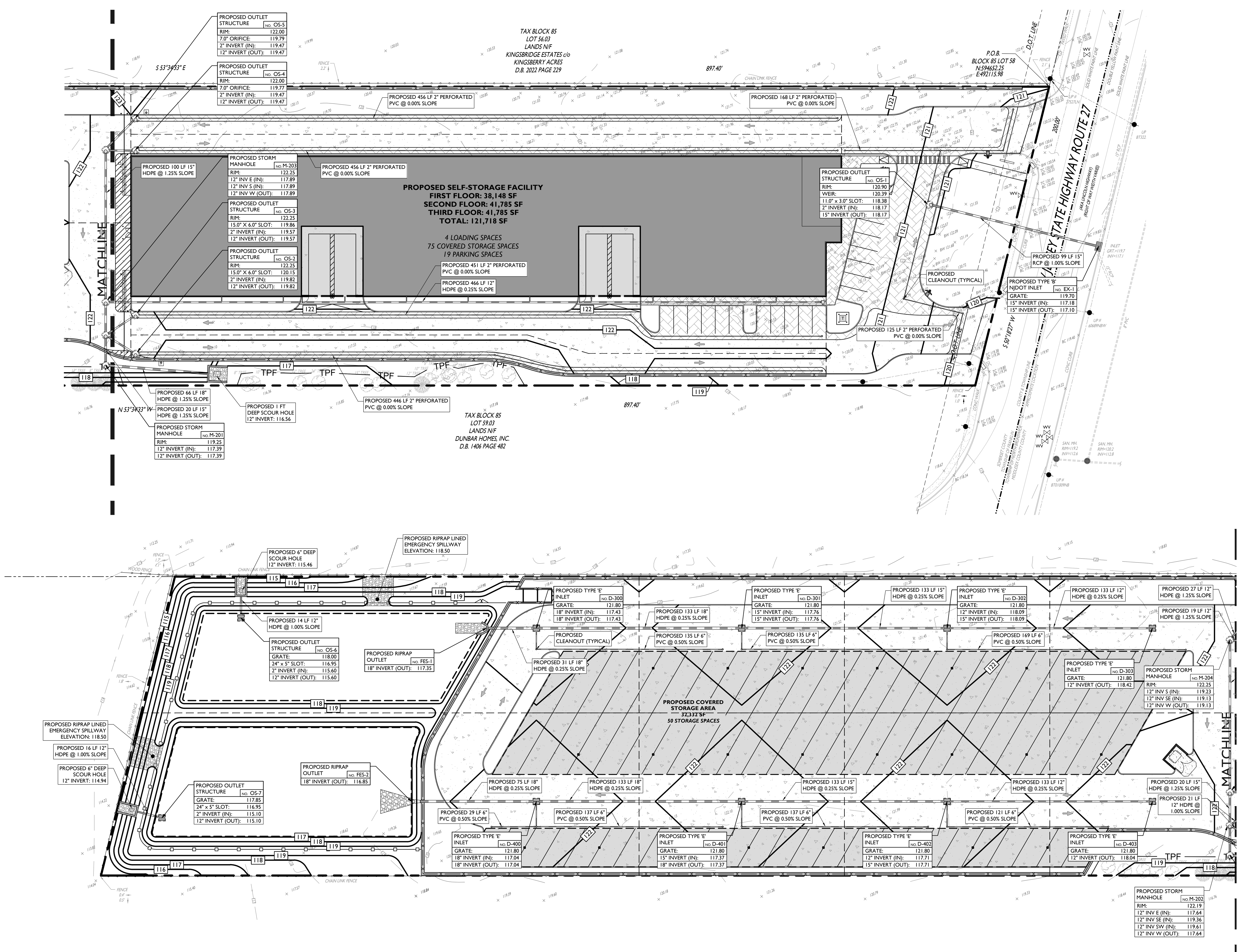
APPENDIX A-2:
DRAINAGE PLAN



SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED STORMWATER STRUCTURES
	PROPOSED STORMWATER PIPING

DRAINAGE AND UTILITY NOTES

1. THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR STORMWATER IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING.
2. CONTRACTOR SHALL START CONSTRUCTION OF STORM LINES AT THE LOWEST INVERT AND WORK UP-GRADIENT.
3. THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IMMEDIATELY IN WRITING.
4. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.

EXCAVATION, SOIL PREPARATION, AND DEWATERING NOTES

1. THE CONTRACTOR IS REQUIRED TO REVIEW THE REFERENCED GEOTECHNICAL DOCUMENTS PRIOR TO CONSTRUCTION, THESE DOCUMENTS SHALL BE CONSIDERED A PART OF THE PLAN SET.
2. THE CONTRACTOR IS REQUIRED TO PREPARE SUBGRADE SOILS BENEATH ALL PROPOSED IMPROVEMENTS AND BACKFILL ALL EXCAVATIONS IN ACCORDANCE WITH RECOMMENDATIONS BY THE GEOTECHNICAL ENGINEER OF RECORD.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHORING FOR ALL EXCAVATIONS AS REQUIRED. CONTRACTOR SHALL HAVE THE SHORING DESIGN PREPARED BY A QUALIFIED PROFESSIONAL. SHORING DESIGNS SHALL BE SUBMITTED TO STONEFIELD ENGINEERING & DESIGN, LLC. AND THE OWNER PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL OPEN EXCAVATIONS ARE PERFORMED AND PROTECTED IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS.
5. THE CONTRACTOR IS RESPONSIBLE FOR ANY DEWATERING DESIGN AND OPERATIONS, AS REQUIRED, TO CONSTRUCT THE PROPOSED IMPROVEMENTS. THE CONTRACTOR SHALL OBTAIN ANY REQUIRED PERMITS FOR DEWATERING OPERATIONS AND GROUNDWATER DISPOSAL.

STORMWATER INFILTRATION BMP CONSTRUCTION NOTES

1. PRIOR TO THE START OF CONSTRUCTION, ANY AREA DESIGNATED TO BE USED FOR AN INFILTRATION BMP (E.G. BASIN, BIORETENTION AREA, ETC.) SHALL BE FENCED OFF AND SHALL NOT BE UTILIZED AS STORAGE FOR CONSTRUCTION EQUIPMENT OR AS A STOCKPILE AREA FOR CONSTRUCTION MATERIALS. NO ACTIVITY SHALL BE PERMITTED WITHIN THE INFILTRATION BASIN AREA UNLESS RELATED TO THE CONSTRUCTION OF THE INFILTRATION BASIN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY ALL SUBCONTRACTORS OF BASIN AREA RESTRICTIONS.
2. THE CONTRACTOR SHALL MAKE EVERY EFFORT, WHERE PRACTICAL, TO AVOID SUBGRADE SOIL COMPACTION IN THE AREAS DESIGNATED TO BE USED FOR AN INFILTRATION BMP.
3. ALL EXCAVATION WITHIN THE LIMITS OF ANY INFILTRATION BMP SHALL BE PERFORMED WITH THE LIGHTEST PRACTICAL EXCAVATION EQUIPMENT. ALL EXCAVATION EQUIPMENT SHALL BE PLACED OUTSIDE THE LIMITS OF THE BASIN WHERE FEASIBLE. THE USE OF LIGHT-WEIGHT, RUBBER-TIRED EQUIPMENT (LESS THAN 8 PSI APPLIED TO THE GROUND SURFACE) IS RECOMMENDED WITHIN THE BASIN LIMITS.
4. THE SEQUENCE OF SITE CONSTRUCTION SHALL BE COORDINATED WITH BASIN CONSTRUCTION TO ADHERE TO SEQUENCING LIMITATIONS.
5. DURING THE FINAL GRADING OF AN INFILTRATION BASIN, THE BOTTOM OF THE BASIN SHALL BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW AND THEN SMOOTHED OUT WITH A LEVELING DRAW OR EQUIVALENT GRADING EQUIPMENT. ALL GRADING EQUIPMENT SHALL BE LOCATED OUTSIDE OF THE BASIN BOTTOM WHERE FEASIBLE.
6. FOLLOWING CONSTRUCTION OF AN INFILTRATION BASIN, SOIL INFILTRATION TESTING BY A LICENSED GEOTECHNICAL ENGINEER IS REQUIRED TO CERTIFY COMPLIANCE WITH THE DESIGN INFILTRATION RATES IN ACCORDANCE WITH APPENDIX E OF THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S BEST MANAGEMENT PRACTICES MANUAL, LATEST EDITION. IF THE FIELD INFILTRATION RATES ARE LOWER THAN THE RATE USED DURING DESIGN, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING IMMEDIATELY TO DETERMINE THE APPROPRIATE COURSE OF ACTION.
7. THE CONTRACTOR SHALL NOTIFY THE MUNICIPALITY TO DETERMINE IF WITNESS TESTING IS REQUIRED DURING INFILTRATION BASIN EXCAVATION AND/OR SOIL INFILTRATION TESTING.

STORMWATER UNDERGROUND BMP CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL INSTALL AND BACKFILL THE UNDERGROUND BMP IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. UNDERGROUND BASINS SHALL UTILIZE A STONE BACKFILL WITH A MINIMUM VOID RATIO OF 40%.
3. NO CONSTRUCTION LOADING OVER UNDERGROUND BASINS IS PERMITTED UNTIL BACKFILL IS COMPLETE PER THE MANUFACTURER'S SPECIFICATIONS. NO VEHICLES SHALL BE STAGED OR OPERATE FROM A FIXED POSITION OVER THE BASIN.

40' 0' 40' 80'

GRAPHIC SCALE IN FEET
1" = 40'

ISSUE	DATE	BY	DESCRIPTION
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PROPOSED SELF-STORAGE FACILITY
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JOSHUA H. KLINE, P.E.
NEW JERSEY LICENSE No. 54347
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' | PROJECT ID: PRI-200094

TITLE:
STORMWATER MANAGEMENT PLAN

DRAWING:
C-6

APPENDIX A-3:
LANDSCAPING PLAN

LANDSCAPING AND BUFFER REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 112-206.9-A(1) PARKING LOT LANDSCAPING	(A) INTERIOR LANDSCAPE SHALL MINIMIZE THE EXPANSIVE APPEARANCE OF PARKING LOTS, PROVIDE SHADED PARKING AREAS, AND MITIGATE NEGATIVE ACOUSTIC IMPACTS OF VEHICLES. (B) PROVIDE TREES AND OTHER LANDSCAPE SCREENING TO PARKING AREAS (C) THE INTEROIR OF ALL UNCOVERED PARKING BLOCK SPACES MUST BE LANDSCAPED.	COMPLIES
§ 112-206.9-A(2) PARKING LOT LANDSCAPING	(A) PROVIDE AN ATTRACTIVE, SHADED ENVIRONMENT ALONG STREET EDGES, PROVIDE VISUAL COHESION ALONG STREETS, BUFFER TRAFFIC, FOCUS VIEWS, AND INCREASE SENSE OF NEIGHBORHOOD SCALE AND CHARACTER; (B) A LOW CONTINUOUS LANDSCAPED HEDGE; (C) A LOW DECORATIVE MASONRY WALL IN COMBINATION WITH LANDSCAPE	COMPLIES
§ 112-206.9-A(3) PARKING LOT LANDSCAPING	(3) ENTRY LANDSCAPING ANNOUCES AND HIGHLIGHTS ENTRIES IN THE DEVELOPMENT. (A) BUILDING SETBACK AREAS ALONG THOUROUGHFARE, COLLECTOR, OR RESIDENTIAL STREETS OR ALONG PRIVATE DRIVES, MUST BE LANDSCAPED; (B) ARTICULATE BUILDING FACADES WITH LANDSCAPED SEATING AREAS TO PROVIDE VISUAL INTEREST AND PEDESTRIAN-FRIENDLY PLACES; (C) LANDSCAPING AT STREET INTERSECTIONS AND DRIVEWAY CORNERS MUST "PULL BACK" TO OPEN VIEW LINES INTO THE SITE AND NOT INTERFERE WITH SIGHT TRIANGLES.	COMPLIES
§ 112-206.9-A(4) PARKING LOT LANDSCAPING	SPECIAL ATTENTION SHOULD BE PAID TO PRESERVING USE OF NATURAL FEATURES AND VEGETATION WHICH ARE SIGNIFICANT BECAUSE OF UNIQUE CHARACTER, HISTORY, SIZE, VARIETY AND/OR GROWTH HABITS	COMPLIES
§ 112-206.9-A(4) PARKING LOT LANDSCAPING	(1) LOCATE LOADING DOCKS, STORAGE, AND SERVICE AREAS IN AREAS OF LOW VISIBILITY (2) NO AREAS FOR OUTDOOR STORAGE, TRASH COLLECTION OR COMPACTION, LOADING, OR OTHER SUCH USES MUST BE LOCATED WITHIN 20 FEET OF ANY PUBLIC STREET, PUBLIC SIDEWALK, OR INTERNAL PEDESTRIAN WALKWAY. (3) LOADING DOCKS, TRUCK PARKING, STORAGE, TRASH SERVICE FUNCTIONS MUST BE INCORPORATED INTO THE OVERALL DESIGN OF THE BUILDING AND LANDSCAPING SO THAT THE VISUAL AND ACOUSTIC IMPACTS OF THESE FUNCTIONS ARE FULLY CONTAINED AND OUT OF VIEW FROM ADJACENT PROPERTIES AND PUBLIC STREETS. SCREENING MATERIALS MUST BE THE SAME AS, OR OF EQUAL QUALITY TO, THE MATERIALS USED FOR THE PRIMARY BUILDING AND LANDSCAPING.	COMPLIES

LANDSCAPING NOTES

1. THE CONTRACTOR SHALL RESTORE ALL DISTURBED GRASS AND LANDSCAPED AREAS TO MATCH EXISTING CONDITIONS UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
2. THE CONTRACTOR SHALL RESTORE ALL DISTURBED LAWN AREAS WITH A MINIMUM 4 INCH LAYER OF TOPSOIL AND SEED.
3. THE CONTRACTOR SHALL RESTORE MULCH AREAS WITH A MINIMUM 3 INCH LAYER OF MULCH .
4. THE MAXIMUM SLOPE ALLOWABLE IN LANDSCAPE RESTORATION AREAS SHALL BE 3 FEET HORIZONTAL TO 1 FOOT VERTICAL (3:1 SLOPE) UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR IS REQUIRED TO LOCATE ALL SPRINKLER HEADS IN AREA OF LANDSCAPING DISTURBANCE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL RELOCATE SPRINKLER HEADS AND LINES IN ACCORDANCE WITH OWNER'S DIRECTION WITHIN AREAS OF DISTURBANCE.
6. THE CONTRACTOR SHALL ENSURE THAT ALL DISTURBED LANDSCAPED AREAS ARE GRADED TO MEET FLUSH AT THE ELEVATION OF WALKWAYS AND TOP OF CURB ELEVATIONS EXCEPT UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET. NO ABRUPT CHANGES IN GRADE ARE PERMITTED IN DISTURBED LANDSCAPING AREAS.

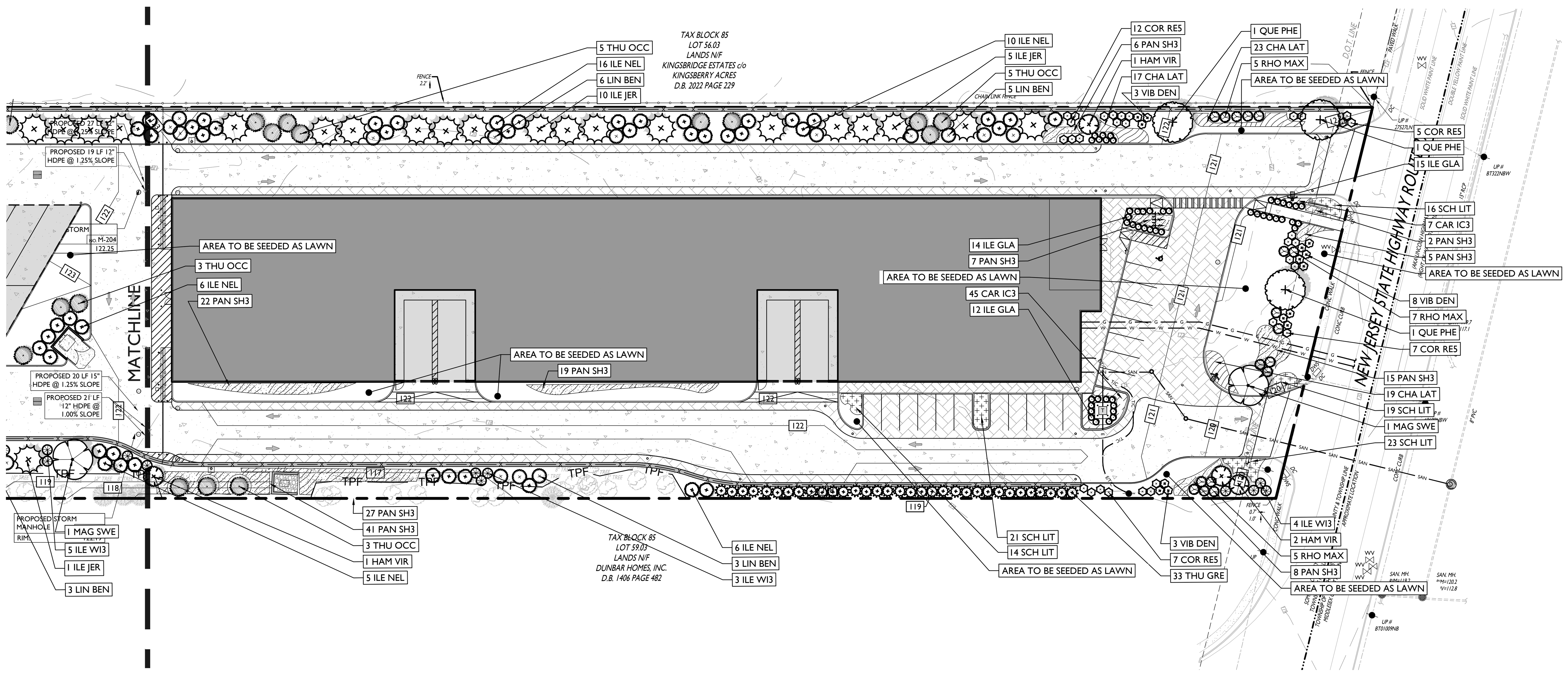
IRRIGATION NOTE:

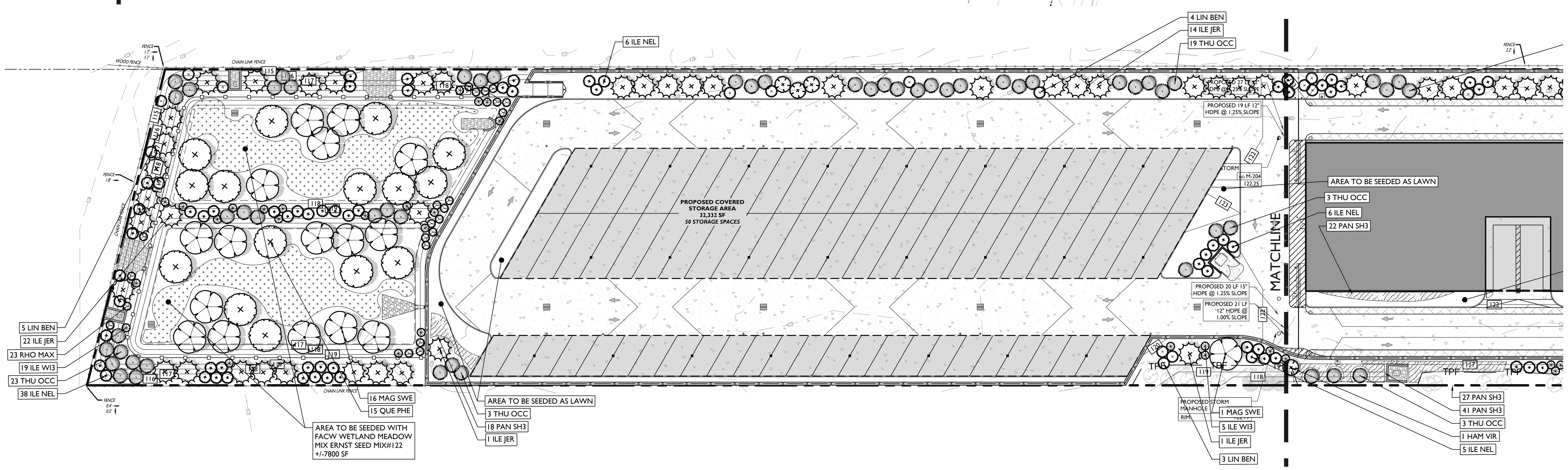
IRRIGATION CONTRACTOR TO PROVIDE A DESIGN FOR AN IRRIGATION SYSTEM SEPARATING PLANTING BEDS FROM LAWN AREA. PRIOR TO CONSTRUCTION, DESIGN IS TO BE SUBMITTED TO THE PROJECT LANDSCAPE DESIGNER FOR REVIEW AND APPROVAL. WHERE POSSIBLE, DRIP IRRIGATION AND OTHER WATER CONSERVATION TECHNIQUES SUCH AS RAIN SENSORS SHALL BE IMPLEMENTED. CONTRACTOR TO VERIFY MAXIMUM ON SITE DYNAMIC WATER PRESSURE AVAILABLE MEASURED IN PSI. PRESSURE REDUCING DEVICES OR BOOSTER PUMPS SHALL BE PROVIDED TO MEET SYSTEM PRESSURE REQUIREMENTS. DESIGN TO SHOW ALL VALVES, PIPING, HEADS, BACKFLOW PREVENTION, METERS, CONTROLLERS, AND SLEEVES WITHIN HARDSCAPE AREAS.

PLANT SCHEDULE

TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	MAG SWE	18	MAGNOLIA VIRGINIANA	SWEET BAY	3" CAL	B&B
	QUE PHE	18	QUERCUS PHELLOS	WILLOW OAK	3" CAL	B&B
EVERGREEN TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	ILE JER	61	ILEX OPACA `JERSEY QUEEN`	AMERICAN HOLLY	6` - 7` HT	B&B
	ILE NEL	87	ILEX X `NELLIE R. STEVENS`	NELLIE R. STEVENS HOLLY	6` - 7` HT	B&B
	THU OCC	60	THUJA OCCIDENTALIS	AMERICAN ARBORVITAE	6` - 7` HT	B&B
	THU GRE	33	THUJA OCCIDENTALIS `GREEN GIANT`	GREEN GIANT ARBORVITAE	6` - 7` HT	B&B
FLOWERING TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	HAM VIR	7	HAMAMELIS VIRGINIANA	COMMON WITCH HAZEL	4` - 5` HT.	B&B
SHRUBS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	COR RES	31	CORNUS SERICEA	RED TWIG DOGWOOD	3 GAL.	POT
	ILE WI3	31	ILEX VERTICILLATA	WINTERBERRY	5 GAL	POT
	LIN BEN	26	LINDERA BENZOIN	SPICEBUSH	7 GAL	POT
	VIB DEN	14	VIBURNUM DENTATUM `ARROWWOOD`	ARROWWOOD VIBURNUM	7 GAL	POT
EVERGREEN SHRUBS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	ILE GLA	48	ILEX GLABRA	INKBERRY HOLLY	3 GAL	POT
	RHO MAX	40	RHODODENDRON MAXIMUM	ROSE BAY	5 GAL	POT
SHRUB AREAS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
	CAR IC3	52	CAREX X `ICE DANCE`	ICE DANCE SEDGE	1 GAL	24" o.c.
	CHA LAT	59	CHASMANTHIUM LATIFOLIUM	WOOD OATS	1 GAL.	36" o.c.
	PAN SH3	170	PANICUM VIRGATUM `SHENANDOAH`	SWITCH GRASS	3 GAL	48" o.c.
	SCH LIT	93	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM GRASS	1 GAL.	30" o.c.

NOTE: IF ANY DISCREPANCIES OCCUR BETWEEN AMOUNTS SHOWN ON THE LANDSCAPE PLAN AND WITHIN THE PLANT LIST, THE PLAN SHALL DICTATE.





BEFORE YOU BREAK GROUND FOR A PROJECT AROUND YOUR YARD, SUCH AS A FENCE, IN-GROUND POOL, OR HOME ADDITION, YOU MUST CALL NEW JERSEY ONE CALL AT (800) 272-1000 TO REQUEST A MARK OUT OF THE UTILITY SERVICES THAT ARE UNDERGROUND. IT IS RECOMMENDED THAT YOU CALL 3 DAYS BEFORE YOU DIG. THE STATE OF NEW JERSEY REQUIRES THAT YOU CALL "BEFORE" YOU DIG SO THAT YOU CAN IDENTIFY WHERE THE UNDERGROUND UTILITIES ARE LOCATES (SUCH AS WATER, GAS, ELECTRIC, PHONE, CABLE, ETC.) ONCE THE SERVICES ARE "MARKED OUT", YOU CAN DIG WITHOUT THE RISK OF INTERRUPTING SERVICE FROM ONE OF THESE UTILITIES, DAMAGING PROPERTY OR SUFFERING PERSONAL INJURY. IF YOU ARE HAVING A PROFESSIONAL DO THE WORK FOR YOU, THEY ARE RESPONSIBLE TO CONTACT ONE CALL. UTILITY SERVICES ARE MARKED OUT WITH PAINT OR A FLAG. THE FOLLOWING LIST WILL HELP YOU IDENTIFY WHAT UTILITY HAS PERFORMED A MARK OUT:

ONE CALL — NEW JERSEY

ELECTRIC=RED, GAS/OIL=YELLOW, COMMUNICATION TV=ORANGE, WATER=BLUE, SEWER=GREEN, TEMPORARY SURVEY MARKINGS=MAGENTA, PROPOSED EXCAVATION=WHITE

40' 0' 40' 80'

GRAPHIC SCALE IN FEET
1" = 40'

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NEW JERSEY LICENSE No. 54347
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' PROJECT ID: PRI-200094

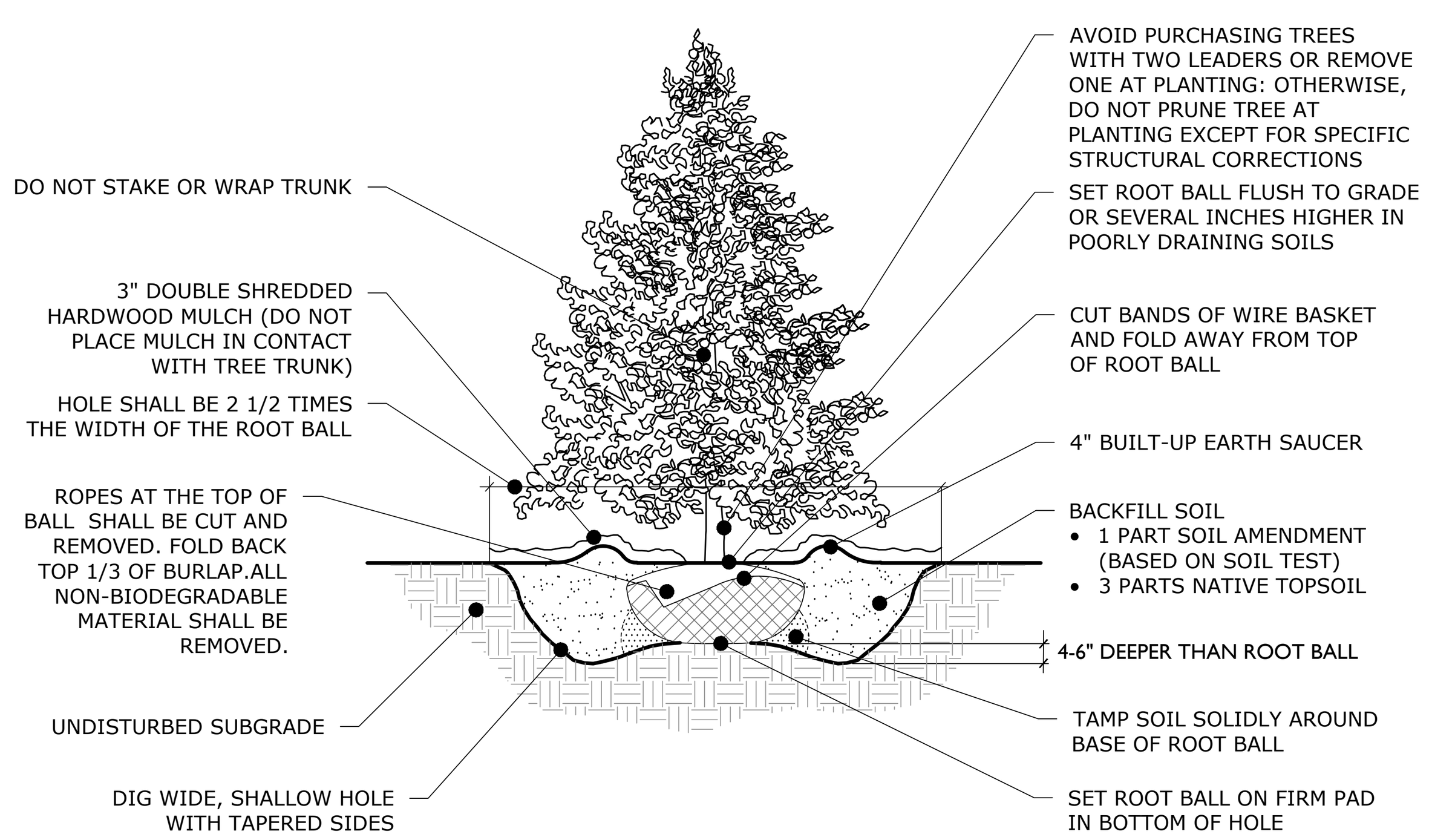
TITLE: **LANDSCAPING PLAN**

DRAWING: **C-10**

Z:\PRINCETON\PRI\2020\PRI-200094 ARCO MURRAY - 1613 ROUTE 27, FRANKLIN, NJ\CADD\PLOT\RDP-10-11-LAND.DWG

NOTES:

1. FOR CONTAINER-GROWN TREES, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER
2. THOROUGHLY SOAK THE TREE ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
3. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILDS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX



REFERENCES ARCHITECTURAL GRAPHIC STANDARDS COPYRIGHT 2000

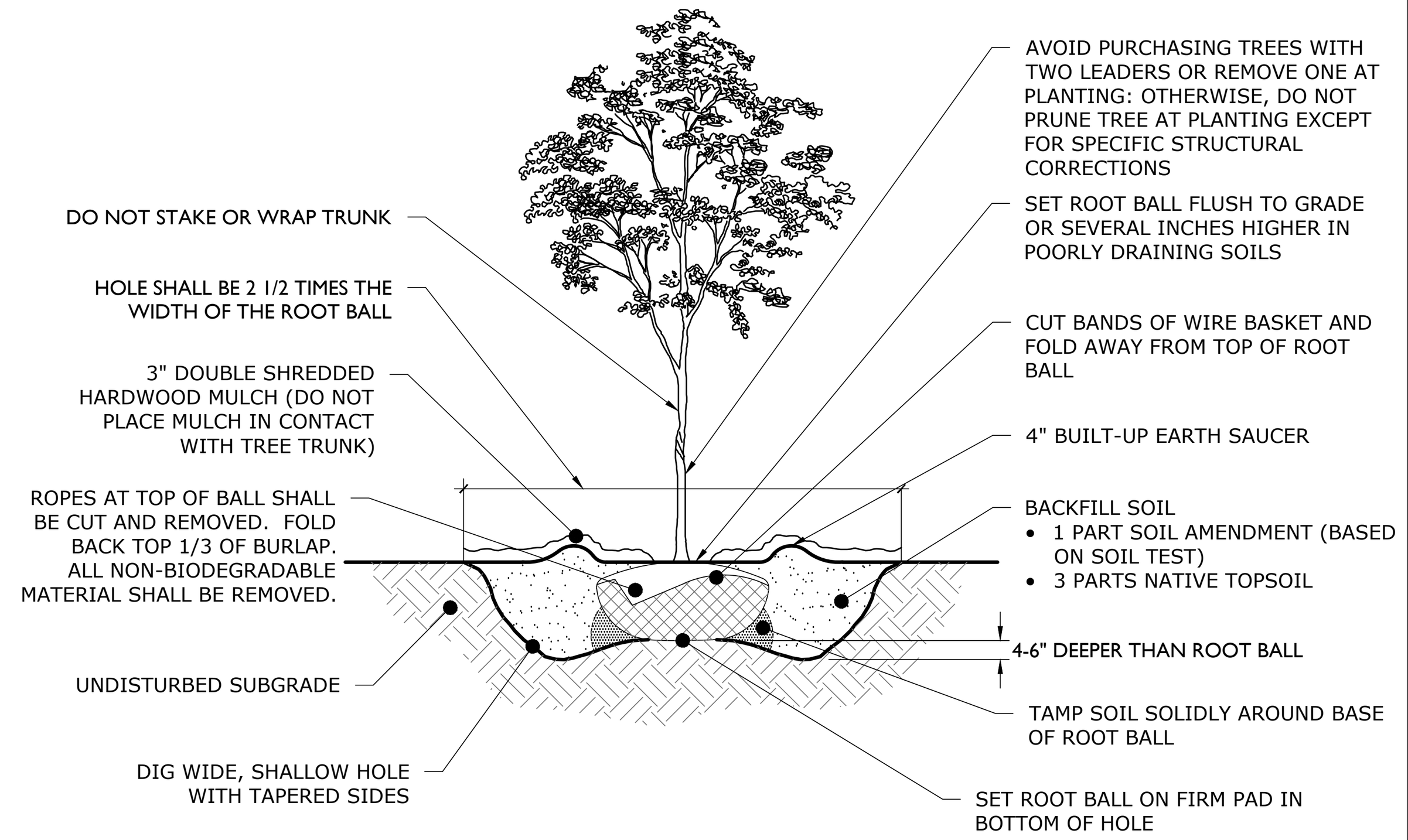
EVERGREEN TREE PLANTING DETAIL

NOT TO SCALE

1

NOTES:

1. FOR CONTAINER-GROWN TREES, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.
2. THOROUGHLY SOAK THE TREE ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
3. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX



REFERENCES ARCHITECTURAL GRAPHIC STANDARDS COPYRIGHT 2000

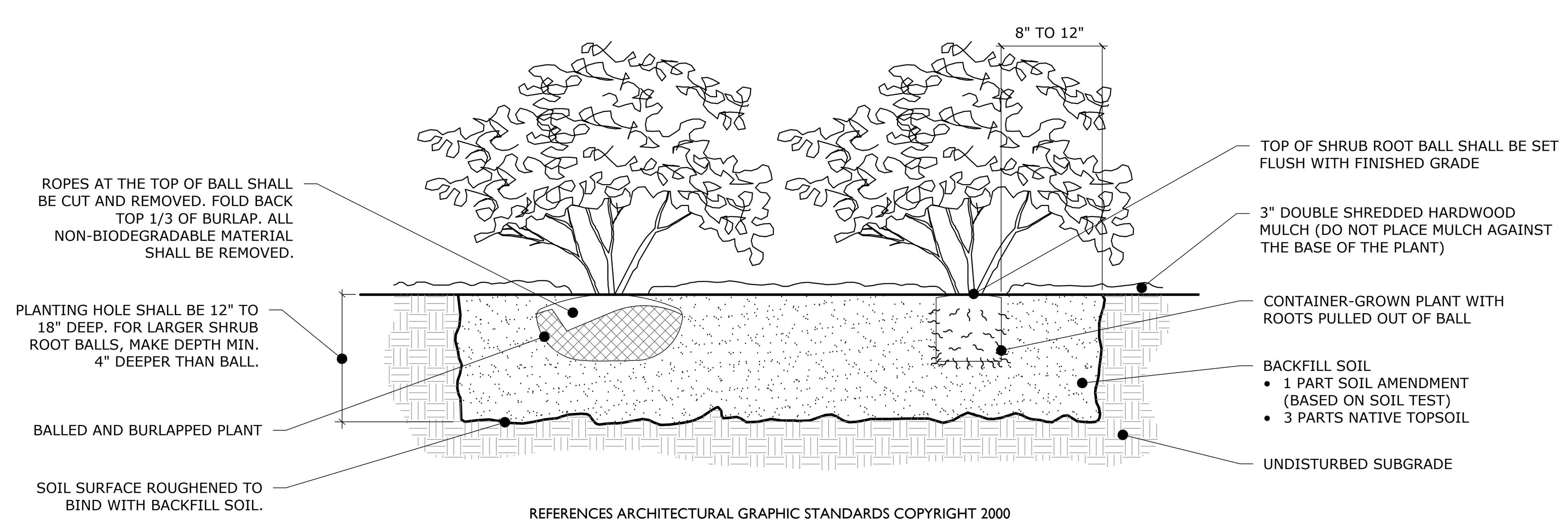
DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

2

NOTES:

1. FOR THE CONTAINER-GROWN SHRUBS, USE FINGERS OR SMALL HAND TOOL TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.
2. THOROUGHLY SOAK THE SHRUB ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL



REFERENCES ARCHITECTURAL GRAPHIC STANDARDS COPYRIGHT 2000

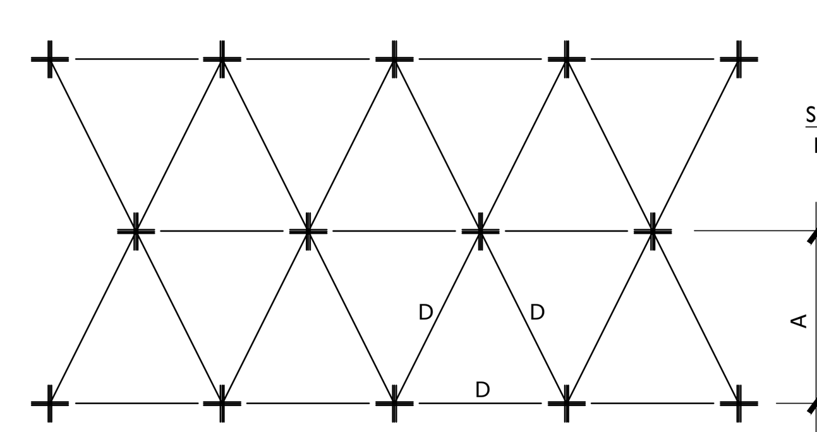
DECIDUOUS AND EVERGREEN SHRUB PLANTING DETAIL

NOT TO SCALE

3

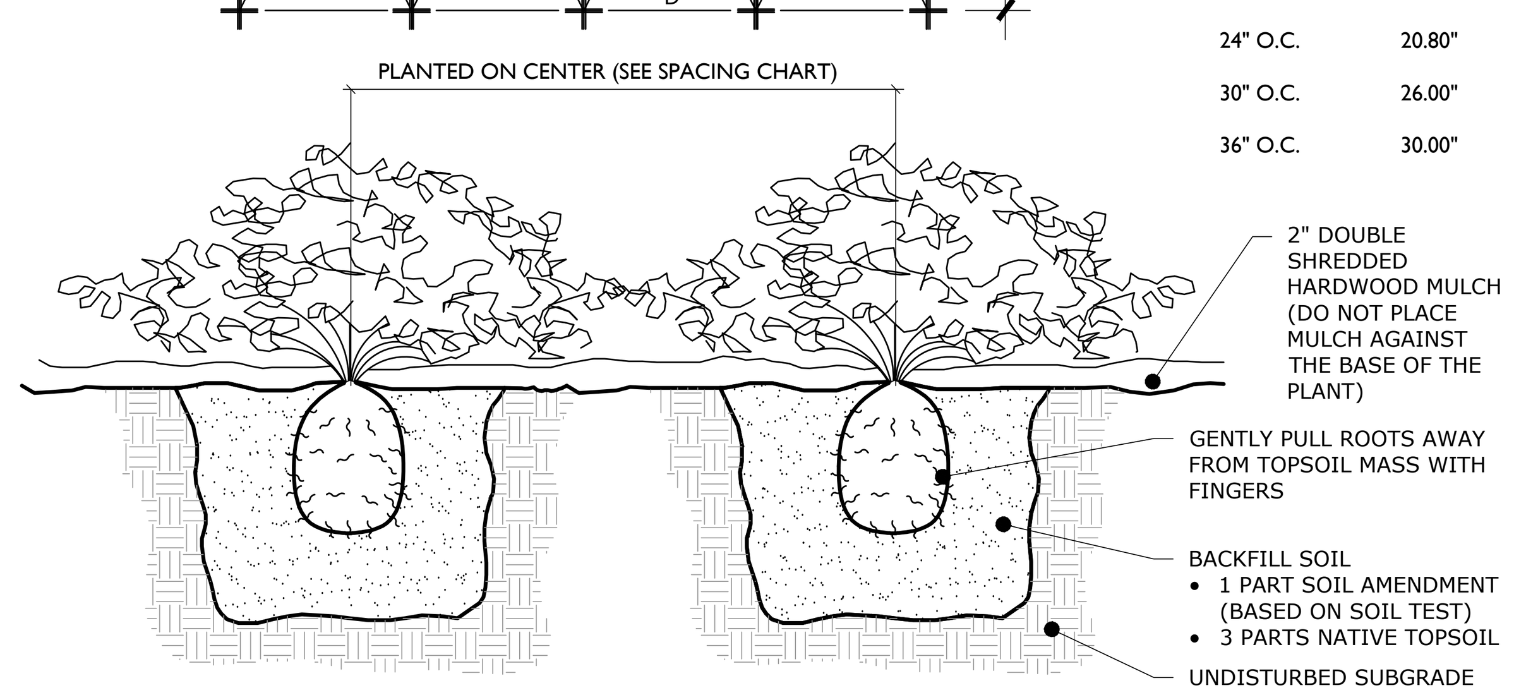
NOTES:

1. THOROUGHLY SOAK THE GROUND COVER ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
2. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILDS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILDS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX
3. ALL GROUND COVER AREAS SHALL BE TREATED WITH A PRE-EMERGENT PER MANUFACTURER'S SPECIFICATIONS



SPACING CHART
NOT TO SCALE

SPACING "D"	ROW "A"
6" O.C.	5.20"
8" O.C.	6.93"
10" O.C.	8.66"
12" O.C.	10.40"
15" O.C	13.00"
18" O.C.	15.60"
24" O.C.	20.80"
30" O.C.	26.00"
36" O.C.	30.00"



GROUND COVER/PERENNIAL/ANNUAL PLANTING DETAIL

NOT TO SCALE

4

GENERAL LANDSCAPING NOTES:

1. THE LANDSCAPE CONTRACTOR SHALL FURNISH ALL MATERIALS AND PERFORM ALL WORK IN ACCORDANCE WITH THESE SPECIFICATIONS, APPROVED OR FINAL DRAWINGS, AND INSTRUCTIONS PROVIDED BY THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIALS, OR OWNER/OWNER'S REPRESENTATIVE. ALL WORK COMPLETED AND MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH THE INTENTION OF THE SPECIFICATIONS, DRAWINGS, AND INSTRUCTIONS AND EXECUTED WITH THE STANDARD LEVEL OF CARE FOR THE LANDSCAPE INDUSTRY.
2. WORK MUST BE CARRIED OUT ONLY DURING WEATHER CONDITIONS FAVORABLE TO LANDSCAPE CONSTRUCTION AND TO THE HEALTH AND WELFARE OF PLANTS. THE SUITABILITY OF SUCH WEATHER CONDITIONS SHALL BE DETERMINED BY THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL.
3. IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR, BEFORE ORDERING OR PURCHASING MATERIALS, TO PROVIDE SAMPLES OF THOSE MATERIALS TO THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL FOR APPROVAL, IF SO REQUESTED.
4. IF SAMPLES ARE REQUESTED, THE LANDSCAPE CONTRACTOR IS TO SUBMIT CERTIFICATION TAGS FROM TREES, SHRUBS AND SEED VERIFYING TYPE AND PURITY.
5. UNLESS OTHERWISE AUTHORIZED BY THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL, THE LANDSCAPE CONTRACTOR SHALL PROVIDE NOTICE AT LEAST FORTY-EIGHT HOURS (48 HRS.) IN ADVANCE OF THE ANTICIPATED DELIVERY DATE OF ANY PLANT MATERIALS TO THE PROJECT SITE. A LEGIBLE COPY OF THE INVOICE, SHOWING VARIETIES AND SIZES OF MATERIALS INCLUDED FOR EACH SHIPMENT SHALL BE FURNISHED TO THE PROJECT LANDSCAPE DESIGNER, OR GOVERNING MUNICIPAL OFFICIAL.
6. THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL RESERVES THE RIGHT TO INSPECT AND REJECT PLANTS AT ANY TIME AND AT ANY PLACE.

PROTECTION OF EXISTING VEGETATION NOTES:

1. BEFORE COMMENCING WORK, ALL EXISTING VEGETATION WHICH COULD BE IMPACTED AS A RESULT OF THE PROPOSED CONSTRUCTION ACTIVITIES MUST BE PROTECTED FROM DAMAGE BY THE INSTALLATION OF TREE PROTECTION FENCING. FENCING SHALL BE LOCATED AT THE DRIP-LINE OR LIMIT OF DISTURBANCE AS DEPICTED WITHIN THE APPROVED OR FINAL PLAN SET, ESTABLISHING THE TREE PROTECTION ZONE. FENCE INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED "TREE PROTECTION FENCE DETAIL." NO WORK MAY BEGIN UNTIL THIS REQUIREMENT IS FULFILLED. THE FENCING SHALL BE INSPECTED REGULARLY BY THE LANDSCAPE CONTRACTOR AND MAINTAINED UNTIL ALL CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
2. IN ORDER TO AVOID DAMAGE TO ROOTS, BARK OR LOWER BRANCHES, NO VEHICLE, EQUIPMENT, DEBRIS, OR OTHER MATERIALS SHALL BE DRIVEN, PARKED OR PLACED WITHIN THE TREE PROTECTION ZONE. ALL ON-SITE CONTRACTORS SHALL USE ANY AND ALL PRECAUTIONARY MEASURES WHEN PERFORMING WORK AROUND TREES, WALKS, PAVEMENTS, UTILITIES, AND ANY OTHER FEATURES EITHER EXISTING OR PREVIOUSLY INSTALLED UNDER THIS CONTRACT.
3. IN RARE INSTANCES WHERE EXCAVATING, FILL, OR GRADING IS REQUIRED WITHIN THE DRIP-LINE OF TREES TO REMAIN, THE WORK SHALL BE PERFORMED AS FOLLOWS:
   - TRENCHING: WHEN TRENCHING OCCURS AROUND TREES TO REMAIN, THE TREE ROOTS SHALL NOT BE CUT, BUT THE TRENCH SHALL BE TUNNELED UNDER OR AROUND THE ROOTS BY CAREFUL HAND DIGGING AND WITHOUT INJURY TO THE ROOTS. NO ROOTS, LIMBS, OR WOODS ARE TO HAVE ANY PAINT OR MATERIAL APPLIED TO ANY SURFACE.
   - RAISING GRADES: WHEN THE GRADE AT AN EXISTING TREE IS BELOW THE NEW FINISHED GRADE, AND FILL NOT EXCEEDING 6 INCHES (6") IS REQUIRED, CLEAN, WASHED GRAVEL FROM ONE TO TWO INCHES (1" - 2") IN SIZE SHALL BE PLACED DIRECTLY AROUND THE TREE TRUNK. THE GRAVEL SHALL EXTEND OUT FROM THE TRUNK ON ALL SIDES A MINIMUM OF 18 INCHES (18") AND FINISH APPROXIMATELY TWO INCHES (2") ABOVE THE FINISH GRADE AT TREE. INSTALL GRAVEL BEFORE ANY EARTH FILL IS PLACED. NEW EARTH FILL SHALL NOT BE LEFT IN CONTACT WITH THE TRUNK OF ANY TREE REQUIRING FILL. WHERE FILL EXCEEDING 6 INCHES (6") IS REQUIRED, A DRY LAID TREE WELL SHALL BE CONSTRUCTED. IF APPLICABLE, TREE WELL INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED "TREE WELL DETAIL."
   - LOWERING GRADES: EXISTING TREES LOCATED IN AREAS WHERE THE NEW FINISHED GRADE IS TO BE LOWERED, SHALL HAVE RE-GRADING WORK DONE BY HAND TO THE INDICATED ELEVATION, NO GREATER THAN SIX INCHES (6"). ROOTS SHALL BE CUT CLEANLY THREE INCHES (3") BELOW FINISHED GRADE UNDER THE DIRECTION OF A LICENSED ARBORIST. WHERE CUT EXCEEDING 6 INCHES (6") IS REQUIRED, A DRY LAID RETAINING WALL SHALL BE CONSTRUCTED. IF APPLICABLE, THE RETAINING WALL INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED "TREE RETAINING WALL DETAIL."

SOIL PREPARATION AND MULCH NOTES:

1. LANDSCAPE CONTRACTOR SHALL OBTAIN A SOIL TEST OF THE IN-SITU TOPSOIL BY A CERTIFIED SOIL LABORATORY PRIOR TO PLANTING. LANDSCAPE CONTRACTOR SHALL ALLOW FOR A TWO WEEK TURNAROUND TIME FROM SUBMITTAL OF SAMPLE TO NOTIFICATION OF RESULTS.
2. BASED ON SOIL TEST RESULTS, ADJUST THE RATES OF LIME AND FERTILIZER THAT SHALL BE MIXED INTO THE TOP SIX INCHES (6") OF TOPSOIL. THE LIME AND FERTILIZER RATES PROVIDED WITHIN THE "SEED SPECIFICATION" OR "SOD SPECIFICATION" IS APPROXIMATE AND FOR BIDDING PURPOSES ONLY. IF ADDITIONAL AMENDMENTS ARE NECESSARY, ADJUST THE TOPSOIL AS FOLLOWS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM.
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85%) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX.
3. TOPSOIL SHALL BE FERTILE, FRIABLE, NATURAL TOPSOIL OF LOAMING CHARACTER, WITHOUT ADMIXTURE OF SUBSOIL MATERIAL OBTAINED FROM A WELL-DRAINED ARABLE SITE, FREE FROM ALL CLAY, LUMPS, COARSE SANDS, STONES, PLANTS, ROOTS, STICKS, AND OTHER FOREIGN MATERIAL GREATER THAN ONE INCH (1").
4. TOPSOIL SHALL HAVE A PH RANGE OF 5.0-7.0 AND SHALL NOT CONTAIN LESS THAN 6% ORGANIC MATTER BY WEIGHT.
5. OBTAIN TOPSOIL ONLY FROM LOCAL SOURCES OR FROM AREAS HAVING SIMILAR SOIL CHARACTERISTICS TO THAT FOUND AT THE PROJECT SITE.
6. CONTRACTOR SHALL PROVIDE A SIX INCH (6") DEEP LAYER OF TOPSOIL IN ALL PLANTING AREAS. TOPSOIL SHALL BE SPREAD OVER A PREPARED SURFACE IN A UNIFORM LAYER TO ACHIEVE THE DESIRED COMPACTED THICKNESS. THE SPREADING OF TOPSOIL SHALL NOT BE CONDUCTED UNDER MUDDY OR FROZEN SOIL CONDITIONS.
7. UNLESS OTHERWISE NOTED IN THE CONTRACT, THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF TOPSOIL AND THE ESTABLISHMENT OF FINE-GRADING WITHIN THE DISTURBED AREA OF THE SITE.
8. LANDSCAPE CONTRACTOR SHALL VERIFY THAT THE SUB-GRADE ELEVATION MEETS THE FINISHED GRADE ELEVATION (LESS THE REQUIRED TOPSOIL), IN ACCORDANCE WITH THE APPROVED OR FINAL GRADING PLAN.
9. ALL LAWN AND PLANTING AREAS SHALL BE GRADED TO A SMOOTH, EVEN AND UNIFORM PLANE WITH NO ABRUPT CHANGE OF SURFACE AS DEPICTED WITHIN THE APPROVED OR FINAL CONSTRUCTION SET UNLESS OTHERWISE DIRECTED BY THE PROJECT LANDSCAPE DESIGNER OR MUNICIPAL OFFICIAL.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER SURFACE AND SUBSURFACE PLANT BED DRAINAGE PRIOR TO THE INSTALLATION OF PLANTINGS. IF POOR DRAINAGE CONDITIONS EXIST, CORRECTIVE ACTION SHALL BE TAKEN PRIOR TO INSTALLATION. ALL PLANTING AND LAWN AREAS SHALL BE GRADED AND MAINTAINED TO ALLOW A FREE FLOW OF SURFACE WATER.
11. DOUBLE SHREDDED HARDWOOD MULCH OR APPROVED EQUAL SHALL BE USED AS A THREE INCH (3") TOP DRESSING IN ALL SHRUB PLANTING BEDS AND AROUND ALL TREES PLANTED BY LANDSCAPE CONTRACTOR. GROUND COVER, PERENNIAL, AND ANNUAL PLANTING BEDS SHALL BE MULCHED WITH A TWO INCH (2") TOP DRESSING. SINGLE TREES OR SHRUBS SHALL BE MULCHED TO AVOID CONTACT WITH TRUNK OR PLANT STEM. MULCH SHALL BE OF SUFFICIENT CHARACTER AS NOT TO BE EASILY DISPLACED BY WIND OR WATER RUNOFF.
12. WHENEVER POSSIBLE, THE SOIL PREPARATION AREA SHALL BE CONNECTED FROM PLANTING TO PLANTING.
13. SOIL SHALL BE LOOSENED WITH A BACKHOE OR OTHER LARGE COARSE-TILING EQUIPMENT UNLESS THE SOIL IS FROZEN OR EXCESSIVELY WET. TILING THAT PRODUCES LARGE, COARSE CHUNKS OF SOIL IS PREFERABLE TO TILING THAT RESULTS IN FINE GRAINS UNIFORM IN TEXTURE. AFTER THE AREA IS LOOSENED IT SHALL NOT BE DRIVEN OVER BY ANY VEHICLE.
14. APPLY PRE-EMERGENT WEED CONTROL TO ALL PLANT BEDS PRIOR TO MULCHING. ENSURE COMPATIBILITY BETWEEN PRODUCT AND PLANT MATERIAL.

`5. ALL PLANTING SOIL SHALL BE AMENDED WITH THE FOLLOWING:

MYCRO® TREE SAVER - A DRY GRANULAR MYCORRHIZAL FUNGI INOCULANT THAT IS MIXED IN THE BACKFILL WHEN PLANTING TREES AND SHRUBS. IT CONTAINS SPORES OF BOTH ECTOMYCORRHIZAL AND VA MYCORRHIZAL FUNGI (VAM), BENEFICIAL RHIZOSPHERE BACTERIA, TERRA-SORB SUPERABSORBENT HYDROGEL TO REDUCE WATER LEACHING, AND SELECTED ORGANIC MICROBIAL NUTRIENTS.
- DIRECTIONS FOR USE: USE 3-OZ PER EACH FOOT DIAMETER OF THE ROOT BALL, OR 3-OZ PER INCH CALIPER. MIX INTO THE BACKFILL WHEN TRANSPLANTING TREES AND SHRUBS. MIX PRODUCT IN A RING-SHAPED VOLUME OF SOIL AROUND THE UPPER PORTION OF THE ROOT BALL, EXTENDING FROM THE SOIL SURFACE TO A DEPTH OF ABOUT 8 INCHES, AND EXTENDING OUT FROM THE ROOT BALL ABOUT 8 INCHES INTO THE BACKFILL. APPLY WATER TO SOIL SATURATION.
- MYCOR® TREE SAVER® IS EFFECTIVE FOR ALL TREE AND SHRUB SPECIES EXCEPT RHODODENDRONS, AZALEAS, AND MOUNTAIN LAUREL, WHICH REQUIRE ERICOID MYCORRHIZAE.
- SOIL PH: THE FUNGI IN THIS PRODUCT WERE CHOSEN BASED ON THEIR ABILITY TO SURVIVE AND COLONIZE PLANT ROOTS IN A PH RANGE OF 3 TO 9.
- FUNGICIDES: THE USE OF CERTAIN FUNGICIDES CAN HAVE A DETRIMENTAL EFFECT ON THE INOCULATION PROGRAM. SOIL APPLICATION OF ANY FUNGICIDE IS NOT RECOMMENDED FOR TWO WEEKS AFTER APPLICATION.
- OTHER PESTICIDES: HERBICIDES AND INSECTICIDES DO NOT NORMALLY INTERFERE WITH MYCORRHIZAL FUNGAL DEVELOPMENT, BUT MAY INHIBIT THE GROWTH OF SOME TREE AND SHRUB SPECIES IF NOT USED PROPERLY.

HEALTHY START MACRO TABS 12-8-8
- FERTILIZER TABLETS ARE PLACED IN THE UPPER 4 INCHES OF BACKFILL SOIL WHEN PLANTING TREES AND SHRUBS.
- TABLETS ARE FORMULATED FOR LONG-TERM RELEASE BY SLOW BIODEGRADATION, AND LAST UP TO 2 YEARS AFTER PLANTING. TABLETS CONTAIN 12-8-8 NPK FERTILIZER, AS WELL AS A MINIMUM OF SEVEN PERCENT (7%) HUMIC ACID BY WEIGHT, MICROBIAL NUTRIENTS DERIVED FROM SEA KELP, PROTEIN BYPRODUCTS, AND YUCCA SCHIDIGERA, AND A COMPLEMENT OF BENEFICIAL RHIZOSPHERE BACTERIA. THE STANDARD 21 GRAM TABLET IS SPECIFIED HERE. DIRECTIONS FOR USE: FOR PLANTING BALLED & BURLAPPED (B&B) TREES AND SHRUBS, MEASURE THE THICKNESS OF THE TRUNK, AND USE ABOUT 1 TABLET (21-G) PER HALF-INCH. PLACE THE TABLETS DIRECTLY NEXT TO THE ROOT BALL, EVENLY DISTRIBUTED AROUND ITS PERIMETER, AT A DEPTH OF ABOUT 4 INCHES.

PLANT QUALITY AND HANDLING NOTES:

1. ALL PLANT MATERIAL SHALL CONFORM TO THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2004) OR LATEST REVISION AS PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION.
2. IN ALL CASES, BOTANICAL NAMES LISTED WITHIN THE APPROVED OR FINAL PLANT LIST SHALL TAKE PRECEDENCE OVER COMMON NAMES.
3. ALL PLANTS SHALL BE OF SELECTED SPECIMEN QUALITY, EXCEPTIONALLY HEAVY, TIGHTLY KNIT, SO TRAINED OR FAVORED IN THEIR DEVELOPMENT AND APPEARANCE AS TO BE SUPERIOR IN FORM, NUMBER OF BRANCHES, COMPACTNESS AND SYMMETRY. ALL PLANTS SHALL HAVE A NORMAL HABIT OR SOUND, HEALTHY, VIGOROUS PLANTS WITH WELL DEVELOPED ROOT SYSTEM. PLANTS SHALL BE FREE OF DISEASE, INSECT PESTS, EGGS OR LARVAE.
4. PLANTS SHALL NOT BE PRUNED BEFORE DELIVERY. TREES WITH ABRASION OF THE BARK, SUNSCALDS, DISFIGURING KNOTS OR FRESH CUTS OF LIMBS OVER ONE AND ONE-FOURTH INCHES (1-1/4") WHICH HAVE NOT COMPLETELY CALLOUSED SHALL BE REJECTED.
5. ALL PLANTS SHALL BE TYPICAL OF THEIR SPECIES OR VARIETY AND SHALL HAVE A NORMAL HABIT OF GROWTH AND BE LEGIBLY TAGGED WITH THE PROPER NAME AND SIZE.
6. THE ROOT SYSTEM OF EACH PLANT SHALL BE WELL PROVIDED WITH FIBROUS ROOTS. ALL PARTS SHALL BE SOUND, HEALTHY, VIGOROUS, WELL-BRANCHED AND DENSELY FOLIATED WHEN IN LEAF.
7. ALL PLANTS DESIGNATED BALL AND BURLAP (B&B) MUST BE MOVED WITH THE ROOT SYSTEM AS SOLID UNITS WITH BALLS OF EARTH FIRMLY WRAPPED WITH BURLAP. THE DIAMETER AND DEPTH OF THE BALLS OF EARTH MUST BE SUFFICIENT TO ENCOMPASS THE FIBROUS ROOT FEEDING SYSTEMS NECESSARY FOR THE HEALTHY DEVELOPMENT OF THE PLANT. NO PLANT SHALL BE ACCEPTED WHEN THE BALL OF EARTH SURROUNDING ITS ROOTS HAS BEEN BADLY CRACKED OR BROKEN PREPARATORY TO OR DURING THE PROCESS OF PLANTING. THE BALLS SHALL REMAIN INTACT DURING ALL OPERATIONS. ALL PLANTS THAT CANNOT BE PLANTED AT ONCE MUST BE HEELED-IN BY SETTING IN THE GROUND AND COVERING THE BALLS WITH SOIL OR MULCH AND THEN WATERING. HEMP BURLAP AND TWINE IS PREFERABLE TO TREATED. IF TREATED BURLAP IS USED, ALL TWINE IS TO BE CUT FROM AROUND THE TRUNK AND ALL BURLAP IS TO BE REMOVED.
8. PLANTS TRANSPORTED TO THE PROJECT IN OPEN VEHICLES SHALL BE COVERED WITH TARPS OR OTHER SUITABLE COVERS SECURELY FASTENED TO THE BODY OF THE VEHICLE TO PREVENT INJURY TO THE PLANTS. CLOSED VEHICLES SHALL BE ADEQUATELY VENTILATED TO PREVENT OVERHEATING OF THE PLANTS. EVIDENCE OF INADEQUATE PROTECTION FOLLOWING DIGGING, CARELESSNESS WHILE IN TRANSIT, OR IMPROPER HANDLING OR STORAGE SHALL BE CAUSE FOR REJECTION OF PLANT MATERIAL. ALL PLANTS SHALL BE KEPT MOIST, FRESH, AND PROTECTED. SUCH PROTECTION SHALL ENCOMPASS THE ENTIRE PERIOD DURING WHICH THE PLANTS ARE IN TRANSIT, BEING HANDLED, OR ARE IN TEMPORARY STORAGE.
9. ALL PLANT MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH THE CORRESPONDING LANDSCAPE PLAN AND PLANTING DETAILS.
10. LANDSCAPE CONTRACTOR SHALL MAKE BEST EFFORT TO INSTALL PLANTINGS ON THE SAME DAY AS DELIVERY. IF PLANTS ARE NOT PLANTED IMMEDIATELY ON SITE, PROPER CARE SHALL BE TAKEN TO PLACE THE PLANTINGS IN PARTIAL SHADE WHEN POSSIBLE. THE ROOT BALL SHALL BE KEPT MOIST AT ALL TIME AND COVERED WITH MOISTENED MULCH OR AGED WOODCHIPS. PROPER IRRIGATION SHALL BE SUPPLIED SO AS TO NOT ALLOW THE ROOT BALL TO DRY OUT. PLANTINGS SHALL BE UNTIED AND PROPER SPACING SHALL BE ALLOTTED FOR AIR CIRCULATION AND TO PREVENT DISEASE, WILTING, AND LEAF LOSS. PLANTS THAT REMAIN UNPLANTED FOR A PERIOD OF TIME GREATER THAN THREE (3) DAYS SHALL BE HEALED IN WITH TOPSOIL OR MULCH AND WATERED AS REQUIRED TO PRESERVE ROOT MOISTURE.
11. NO PLANT MATERIAL SHALL BE PLANTED IN MUDDY OR FROZEN SOIL.
12. PLANTS WITH INJURED ROOTS OR BRANCHES SHALL BE PRUNED PRIOR TO PLANTING UTILIZING CLEAN, SHARP TOOLS. ONLY DISEASED OR INJURED PLANTS SHALL BE REMOVED.
13. IF ROCK OR OTHER UNDERGROUND OBSTRUCTION IS ENCOUNTERED, THE LANDSCAPE DESIGNER RESERVES THE RIGHT TO RELOCATE OR ENLARGE PLANTING PITS OR DELETE PLANT MATERIAL FROM THE CONTRACT.
14. IF PLANTS ARE PROPOSED WITHIN SIGHT TRIANGLES, TREES SHALL BE LIMBED AND MAINTAINED TO A HEIGHT OF EIGHT FEET (8') ABOVE GRADE, AND SHRUBS, GROUND COVER, PERENNIALS, AND ANNUALS SHALL BE MAINTAINED TO A HEIGHT NOT TO EXCEED TWO FEET (2') ABOVE GRADE UNLESS OTHERWISE NOTED OR SPECIFIED BY THE GOVERNING MUNICIPALITY OR AGENCY.
15. INSTALLATION SHALL OCCUR DURING THE FOLLOWING SEASONS:
    PLANTS (MARCH 15 - DECEMBER 15)
    LAWNS (MARCH 15 - JUNE 15 OR SEPTEMBER 1 - DECEMBER 1)
16. THE FOLLOWING TREES ARE SUSCEPTIBLE TO TRANSPLANT SHOCK AND SHALL NOT BE PLANTED DURING THE FALL SEASON (STARTING SEPTEMBER 15):

ABIES CONCOLOR	CORNUS VARIETIES	OSTRYA VIRGINIANA
ACER BUERGERIANUM	CRATAEGUS VARIETIES	PINUS NIGRA
ACER FREEMANII	CUPRESSOCYPARIS LEYLANDII	PLATANUS VARIETIES
ACER RUBRUM	FAGUS VARIETIES	POPULUS VARIETIES
ACER SACCHARINUM	HALESIA VARIETIES	PRUNUS VARIETIES
BETULA VARIETIES	ILEX X FOSTERII	PYRUS VARIETIES
CARPINUS VARIETIES	ILEX NELLIE STEVENS	QUERCUS VARIETIES (NOT Q. PALUSTRIS)
CEDRUS DEODARA	ILEX OPACA	SALIX WEEPING VARIETIES
CELTIS VARIETIES	JUNIPERUS VIRGINIANA	SORBUS VARIETIES
CERCIDIPHYLLUM VARIETIES	KOELREUTERIA PANICULATA	TAXODIUM VARIETIES
CERCIS CANADENSIS	LIQUIDAMBAR VARIETIES	TAXUX B REPANDENS
CORNUS VARIETIES	LIRIODENDRON VARIETIES	TILIA TOMENTOSA VARIETIES
CRATAEGUS VARIETIES	MALUS IN LEAF	ULMUS PARVIFOLIA VARIETIES
	NYSSA SYLVATICA	ZELKOVA VARIETIES

17. IF A PROPOSED PLANT IS UNATTAINABLE OR ON THE FALL DIGGING HAZARD LIST, AN EQUIVALENT SPECIES OF THE SAME SIZE MAY BE REQUESTED FOR SUBSTITUTION OF THE ORIGINAL PLANT. ALL SUBSTITUTIONS SHALL BE APPROVED BY THE PROJECT LANDSCAPE DESIGNER OR MUNICIPAL OFFICIAL PRIOR TO ORDERING AND INSTALLATION.
18. DURING THE COURSE OF CONSTRUCTION/PLANT INSTALLATION, EXCESS AND WASTE MATERIALS SHALL BE CONTINUOUSLY AND PROMPTLY REMOVED AT THE END OF EACH WORK DAY. ALL DEBRIS, MATERIALS, AND TOOLS SHALL BE PROPERLY STORED, STOCKPILED OR DISPOSED OF AND ALL PAVED AREAS SHALL BE CLEANED.
19. THE LANDSCAPE CONTRACTOR SHALL DISPOSE OF ALL RUBBISH AND EXCESS SOIL AT HIS EXPENSE TO AN OFF-SITE LOCATION AS APPROVED BY THE LOCAL MUNICIPALITY.
20. A 90-DAY MAINTENANCE PERIOD SHALL BEGIN IMMEDIATELY AFTER ALL PLANTS HAVE BEEN SATISFACTORILY INSTALLED.
21. MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO, REPLACING MULCH THAT HAS BEEN DISPLACED BY EROSION OR OTHER MEANS, REPAIRING AND RESHAPING WATER RINGS OR SAUCERS, MAINTAINING STAKES AND GUYS IF ORIGINALLY REQUIRED, WATERING WHEN NEEDED OR DIRECTED, WEEDING, PRUNING, SPRAYING, FERTILIZING, MOWING THE LAWN, AND PERFORMING ANY OTHER WORK REQUIRED TO KEEP THE PLANTS IN A HEALTHY CONDITION.
22. MOW ALL GRASS AREAS AT REGULAR INTERVALS TO KEEP THE GRASS HEIGHT FROM EXCEEDING THREE INCHES (3"). MOWING SHALL BE PERFORMED ONLY WHEN GRASS IS DRY. MOWER BLADE SHALL BE SET TO REMOVE NO MORE THAN ONE THIRD (1/3) OF THE GRASS LENGTH. WHEN THE AMOUNT OF GRASS IS HEAVY, IT SHALL BE REMOVED TO PREVENT DESTRUCTION OF THE UNDERLYING TURF. MOW GRASS AREAS IN SUCH A MANNER AS TO PREVENT CLIPPINGS FROM BLOWING ON PAVED AREAS, AND SIDEWALKS. CLEANUP AFTER MOWING SHALL INCLUDE SWEEPING OR BLOWING OF PAVED AREAS AND SIDEWALKS TO CLEAR THEM FROM MOWING DEBRIS.
23. GRASSED AREAS DAMAGED DURING THE PROCESS OF THE WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, WHO SHALL RESTORE THE DISTURBED AREAS TO A CONDITION SATISFACTORY TO THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIAL, OR OWNER/OWNER'S REPRESENTATIVE. THIS MAY INCLUDE FILLING TO GRADE, FERTILIZING, SEEDING, AND MULCHING.
24. SHOULD THE OWNER REQUIRE MAINTENANCE BEYOND THE STANDARD 90-DAY MAINTENANCE PERIOD, A SEPARATE CONTRACT SHALL BE ESTABLISHED.
25. LANDSCAPE CONTRACTOR SHALL WATER NEW PLANTINGS FROM TIME OF INSTALL AND THROUGHOUT REQUIRED 90-DAY MAINTENANCE PERIOD UNTIL PLANTS ARE ESTABLISHED. IF ON-SITE WATER IS NOT AVAILABLE AT THE PROJECT LOCATION, THE LANDSCAPE CONTRACTOR SHALL FURNISH IT BY MEANS OR A WATERING TRUCK OR OTHER ACCEPTABLE MANNER.
26. THE QUANTITY OF WATER APPLIED AT ONE TIME SHALL BE SUFFICIENT TO PENETRATE THE SOIL TO A MINIMUM OF EIGHT INCHES (8") IN SHRUB BEDS AND SIX INCHES (6") IN TURF AREAS AT A RATE WHICH WILL PREVENT SATURATION OF THE SOIL.
27. IF AN AUTOMATIC IRRIGATION SYSTEM HAS BEEN INSTALLED, IT CAN BE USED FOR WATERING PLANT MATERIAL. HOWEVER, FAILURE OF THE SYSTEM DOES NOT ELIMINATE THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY OF PLANT HEALTH AND ESTABLISHMENT.

PLANT MATERIAL GUARANTEE NOTES:

1. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF ONE YEAR (1 YR.) FROM APPROVAL OF LANDSCAPE INSTALLATION BY THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIAL, OR OWNER/OWNER'S REPRESENTATIVE.
2. THE LANDSCAPE CONTRACTOR SHALL REMOVE AND REPLACE DYING, DEAD, OR DEFECTIVE PLANT MATERIAL AT HIS EXPENSE. THE LANDSCAPE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS COMPANY'S OPERATIONS.
3. ALL REPLACEMENT PLANTS SHALL BE OF THE SAME SPECIES AND SIZE AS SPECIFIED ON THE APPROVED OR FINAL PLANT LIST. REPLACEMENTS RESULTING FROM REMOVAL, LOSS, OR DAMAGE DUE TO OCCUPANCY OF THE PROJECT IN ANY PART, VANDALISM, PHYSICAL DAMAGE BY ANIMALS, VEHICLES, ETC., AND LOSSES DUE TO CURTAILMENT OF WATER BY LOCAL AUTHORITIES SHALL BE APPROVED AND PAID FOR BY THE OWNER.
4. THE CONTRACTOR SHALL INSTRUCT THE OWNER AS TO THE PROPER CARE AND MAINTENANCE OF ALL PLANTINGS.

LAWN (SEED OR SOD) NOTES:

1. SEED MIXTURE SHALL BE FRESH, CLEAN, NEW CROP SEED. SOD SHALL BE STRONGLY ROOTED, UNIFORM IN THICKNESS, AND FREE OF WEEDS, DISEASE, AND PESTS.
2. SEED OR SOD SHALL BE PURCHASED FROM A RECOGNIZED DISTRIBUTOR AND SHALL BE COMPOSED OF THE MIX OR BLEND WITHIN THE PROVIDED "SEED SPECIFICATION" OR "SOD SPECIFICATION."
3. REFERENCE LANDSCAPE PLAN FOR AREAS TO BE SEEDED OR LAID WITH SOD.
4. SEEDING SHALL NOT BE PERFORMED IN WINDY WEATHER. IF THE SEASON OF THE PROJECT COMPLETION PROHIBITS PERMANENT STABILIZATION, TEMPORARY STABILIZATION SHALL BE PROVIDED IN ACCORDANCE WITH THE "TEMPORARY SEEDING SPECIFICATION."
5. PROTECT NEW LAWN AREAS AGAINST TRESPASSING WHILE THE SEED IS GERMINATING. FURNISH AND INSTALL FENCES, SIGNS, BARRIERS OR ANY OTHER NECESSARY TEMPORARY PROTECTIVE DEVICES. DAMAGE RESULTING FROM TRESPASS, EROSION, WASHOUT, SETTLEMENT OR OTHER CAUSES SHALL BE REPAIRED BY THE LANDSCAPE CONTRACTOR AT HIS EXPENSE. REMOVE ALL FENCES, SIGNS, BARRIERS OR OTHER TEMPORARY PROTECTIVE DEVICES ONCE LAWN HAS BEEN ESTABLISHED.

ISSUE	DATE	BY	DESCRIPTION
01	03/12/2021	AHM	FOR AGENCY SUBMISSION

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Rutherford, NJ · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Detroit, MI
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15 Spring Street, Princeton, NJ 08542
Phone 609.362.6900

PRELIMINARY & FINAL MAJOR SITE PLAN

ARCO MURRAY | DESIGN BUILD

PROPOSED SELF-STORAGE FACILITY
BLOCK 85, LOT 58 & 59.03
1613 LINCOLN HIGHWAY (NJ ROUTE 27)
TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NEW JERSEY

JOSHUA H. KLINE, P.E.
NEW JERSEY LICENSE No. 54347
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: AS SHOWN | PROJECT ID: PRI-200094

TITLE: LANDSCAPING DETAILS

DRAWING: C-11

Z:\PRINCETON\PRI\2020\PRI-200094 ARCO MURRAY - 1613 ROUTE 27, FRANKLIN, NJ\CADD\PLOT\RDP-10-11-LAND.DWG

APPENDIX B:
GEOTECHNICAL REPORTS

APPENDIX B-1:
WHITESTONE ASSOCIATES
(JUNE 2, 2020)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
732.592.2101
whitestoneassoc.com

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED SELF-STORAGE FACILITY
1613 ROUTE 27
SOMERSET, SOMERSET COUNTY, NEW JERSEY

Prepared for:

ARCO/MURRAY NATIONAL DALLAS, INC.
4849 Greenville Avenue, Suite 1460
Dallas, Texas 75206

Prepared by:

WHITESTONE ASSOCIATES, INC.
2430 Highway 34
Building B, Suite 101
Manasquan, New Jersey 08736

Kyle J. Kopacz, P.E.
Project Manager

Laurence W. Keller, P.E.
Principal, Geotechnical Services

Whitestone Project No.: GS2017165.000
June 2, 2020

WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
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June 2, 2020

via email

ARCO/MURRAY NATIONAL DALLS, INC.
4849 Greenville Avenue, Suite 1460
Dallas, Texas 75206

Attention: Mr. Chase Killingsworth
Project Manager

Regarding: REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED SELF-STORAGE FACILITY
1613 ROUTE 27
SOMERSET, SOMERSET COUNTY, NEW JERSEY
WHITESTONE PROJECT NO.: GJ2017165.000

Dear Mr. Killingsworth:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the attached *Report of Geotechnical Investigation* for the above-referenced project. The attached report presents the results of Whitestone's soils exploration efforts and presents recommendations for design of the proposed structural foundations and related earthwork.

Whitestone's geotechnical division appreciates the opportunity to be of service to ARCO/Murray National Dallas, Inc. (ARCO/Murray). Please note that Whitestone has the capability to perform the additional geotechnical engineering services recommended herein. Please contact us at (908) 668-7777 with any questions regarding the enclosed report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Kyle J. Kopacz, P.E.
Project Manager

Laurence W. Keller, P.E.
Principal, Geotechnical Services

KK/pwd L:\Job Folders\2020\2017165GS\Reports and Submittals\17165 ROGI.docx
Enclosures
Copy: Tyler Jones, Arco/Murray National Dallas, Inc.

REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED SELF-STORAGE FACILITY
1613 Route 27
Somerset, Somerset County, New Jersey

TABLE OF CONTENTS

REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED SELF-STORAGE FACILITY
1613 Route 27
Somerset, Somerset County, New Jersey

TABLE OF CONTENTS

FIGURES

APPENDICES

SECTION 1.0
Summary of Findings

Whitestone Associates, Inc. (Whitestone) has performed an exploration and evaluation of the subsurface conditions on the site of the proposed self-storage facility located at 1613 Route 27 in Somerset, Somerset County, New Jersey. The site of the proposed construction is shown on the *Boring Location Plan* included as Figure 1.

At the time of Whitestone's geotechnical investigation, the subject property consisted of an active plan nursery with associated buildings, pavements, landscaped areas, and utilities. Detailed grading was not available at the time of this report, however, the subject site appeared to be relatively flat lying with slight grade changes on the order of one foot to two feet.

Based on the April 9, 2020 *Proposed Site Plan – Option #1* prepared by ARCO/Murray, the proposed site improvements will include clearing of the subject site, demolishing the existing site structures, and construction of an approximately 42,000-square feet (footprint) three-story self-storage facility with associated pavements, landscaped areas and utilities. No new stormwater management areas or site retaining walls are anticipated at this time.

The geotechnical investigation included performing a reconnaissance of the site, drilling soil borings, and collecting soil samples of the various strata encountered for laboratory analyses. The data from the exploration was analyzed by Whitestone in light of the project information provided by ARCO/Murray. A summary of Whitestone's findings is presented in the following:

- **Subsurface Materials:** The subsurface tests were performed within paved portions of the subject site and encountered approximately one inch to 3.5 inches of asphalt underlain by up to four inches of gravel subbase. Underlying the surface cover, or at the surface, the majority of subsurface tests encountered existing fill materials consisting of a combination of sand, silt, and gravel with debris. Underlying the existing fill materials and/or surface cover, the subsurface test encountered natural residual soils consisting of a combination of sands, silts, and clays (USCS: SM, ML and CL). Underlying the residual deposits, the soil borings encountered highly weathered rock sampled as silty sand to termination depths ranging from 9.7 feet below ground surface (fbgs) to 24.7 fbgs. The soil borings were terminated at these depths on the weathered rock/ in-tact bedrock interface.

- **Groundwater:** Groundwater was not encountered within the deeper borings performed to a maximum depth explored of 24.7 fbgs. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.

Recommendations developed upon consideration of these findings are summarized below and presented in greater detail in the following sections of the report.

- **Foundations:** The results of the exploration indicate that the proposed structure may be supported on conventional shallow foundations bearing on the underlying natural materials and/or properly placed structural fill provided these materials are properly evaluated, placed, and compacted. Foundations bearing within these materials may be designed to impart a maximum allowable net bearing pressure of 4,000 pounds per square foot (psf).

- **Difficult Excavation Considerations:** Weathered rock, intact rock, boulders, and cobbles were encountered during this subsurface investigation at variable depths. As such, removal of dense residual materials and/or weathered rock may be required during construction. The upper few feet of the weathered rock materials typically can be removed with a large excavator equipped with ripping tools and extreme service buckets with rock teeth during mass excavation operations. Based on local experience, planned excavation depths beyond a few feet of refusal depths and in confined excavations, such as for foundation and utility trenches, will likely require ripping tools and/or a pneumatic hammer.

- **Soil Reusability:** Contingent upon construction phase evaluation, a majority of the existing fill materials, residual soils, and weathered rock materials will be suitable for selective re-use as structural fill and/or backfill provided deleterious debris is segregated, moisture contents are controlled within approximately two percent of the optimum, and particles larger than three inches are either removed or crushed. Rock fragments and cobbles/boulders greater than three inches in diameter are not recommended for reuse within structural areas, especially within or adjacent to utilities. The reuse of rock particles and cobbles/boulders larger than three inches should be carefully considered on an as-needed basis in order to provide site-specific recommendations and criteria for placement and compaction. Reuse of the site soils with more than 12% fines (USCS: SM, ML, and CL) will require mixing with a granular material, extensive moisture conditioning, and/or drying to facilitate their reuse, workability, and compaction in fill areas. Immediate reuse of on-site soil should not be expected.

SECTION 2.0
Introduction

2.1 AUTHORIZATION

Mr. Chase Killingsworth of ARCO/Murray issued authorization to Whitestone to perform a geotechnical investigation at this site relevant to the proposed self-storage facility. The geotechnical investigation was performed in general accordance with Whitestone's April 16, 2020 proposal to ARCO/Murray.

2.2 PURPOSE

The purpose of this subsurface exploration and analysis included the following:

- ascertain the various soil profile components at test locations;
- estimate the engineering characteristics of the proposed foundation bearing materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundation and floor slab design;
- provide recommendations for required earthwork and subgrade preparation;
- record groundwater and/or bedrock levels (where encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation and/or analysis (if warranted).

2.3 SCOPE

The scope of the exploration and analysis included the subsurface exploration, field testing and sampling, laboratory analyses, and a geotechnical engineering analysis and evaluation of the subsurface materials for the proposed development. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction.

2.3.1 Field Exploration

Whitestone's field exploration of the project site was conducted by means of drilling ten soil borings (identified as B-1 through B-10) performed with a truck-mounted drill rig using hollow stem augers and split-spoon sampling techniques.

Soil borings conducted during the investigation were backfilled with excavated soils from the investigation and grouted, as necessary. The subsurface investigation was conducted in the presence of a Whitestone engineer who performed field tests, recorded visual classifications, and collected samples of the various soil strata encountered. The borings were located in the field using taping measures and estimated right angles. These locations are presumed to be accurate within a few feet. The test locations are shown on the *Boring Location Plan* included as Figure 1.

Soil borings employing Standard Penetration Tests (SPTs) were conducted in general accordance with American Society for Testing and Materials (ASTM) designation D 1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, where encountered, were recorded during and immediately following the testing operations within the soil borings and test excavations. Seasonal variations, temperature effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater level.

2.3.2 Laboratory Program

In addition to Whitestone's field investigation, a laboratory program was conducted to determine additional, pertinent engineering characteristics of representative samples of site soils. The laboratory program included physical/textural testing of representative samples of various strata. The results of the laboratory program are incorporated into the findings and recommendations discussed throughout the report.

Physical and Textural Analysis: Representative samples of selected strata encountered were subjected to a laboratory program that included Atterberg limits determination (ASTM D-4318), moisture content determinations (ASTM D-2216) and washed gradation analyses (ASTM D-422) in order to perform supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table. Quantitative test results are provided in Appendix B.

PHYSICAL/TEXTURAL ANALYSES SUMMARY							
Boring	**Sample**	**Depth (fbgs)**	**Passing No. 200 Sieve (%)**	**Moisture Content (%)**	**Liquid Limit (%)**	**Plastic Index (%)**	**USCS Classification**
B-2	S-2	4.0 - 6.0	57.5	34.1	41	14	ML
B-8	S-3	4.0 - 6.0	40.1	26.7	42	12	SM

SECTION 3.0
Site Description

3.1 LOCATION AND DESCRIPTION

The subject property is located at 1613 Route 27 in Somerset, Somerset County, New Jersey. The site is bound by to the north a residential complex, to the south by Hempstead drive followed by commercial buildings, to the east by Route 27 followed by residential buildings, and to the west by commercial buildings. The site of the proposed construction is shown on the *Boring Location Plan* included as Figure 1.

3.2 EXISTING CONDITIONS

Surface Cover/Development: At the time of Whitestone's geotechnical investigation, the subject property consisted of an active plan nursery with associated buildings, pavements, landscaped areas, and utilities.

Topography: Detailed grading was not available at the time of this report, however, the subject site appeared to be relatively flat lying with slight grade changes on the order of one foot to two feet.

Utilities: At the time of Whitestone's investigation, the subject site was serviced by underground utilities including water, natural gas, and sanitary. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

Site Drainage: Surface drainage generally is expected to follow the existing topography where it is collected by storm sewer inlets located along Route 27. The termini of these inlets are unknown.

3.3 SITE GEOLOGY

The subject site is situated within the Piedmont Geomorphic Province of New Jersey. Specifically, the subject site is underlain by the Lower Jurassic-age and Upper Triassic-age Siltstone and Shale members of the Passaic Formation, which is part of the Brunswick Group. The Siltstone member generally consists of brownish-red to purplish-red, coarse-grained siltstone, and the Shale member generally consists of brownish-red shale. The majority of the overburden materials at the site consist of residual soils and weathered shale, mudstone, and sandstone. Overburden materials also include man-made fill associated with past and present development of the subject site.

3.4 PROPOSED CONSTRUCTION

Based on the April 9, 2020 *Proposed Site Plan – Option #1* prepared by ARCO/Murray, the proposed site improvements will include clearing of the subject site, demolishing the existing site structures, and construction of an approximately 42,000-square feet (footprint) three-story self-storage facility with associated pavements, landscaped areas and utilities. No new stormwater management areas or site retaining walls are anticipated at this time.

Detailed structural loading has not been provided at this time. Based on Whitestone's past experience with similar developments, the anticipated maximum column, wall, and floor slab loads for the proposed structure are anticipated to be less than 225 kips, 5.0 kips per linear foot, and 150 pounds per square foot, respectively.

The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the preliminary project details and loading noted herein. Any revisions or additions to the design assumptions on which this report is based should be brought to the attention of Whitestone for additional evaluation as warranted.

SECTION 4.0
Subsurface Conditions

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A of this report. The subsurface soil conditions encountered in the test locations consisted of the following generalized strata in order of increasing depth.

4.1 SUBSURFACE SOIL CONDITIONS

Surface Cover Materials: The subsurface tests were performed within existing paved portions of the subject site and encountered approximately one inch to 3.5 inches of asphalt underlain by up to six inches of gravel subbase.

Existing Fill Materials: Underlying the existing fill materials, the soil borings encountered existing fill materials consisting of a combination of sand, silt, and gravel with debris. The debris encountered consisted of a combination of concrete, wood, and asphalt. Where encountered, the existing fill material extended to depths ranging from approximately two fbgs to four fbgs. SPT N-values within this stratum ranged between nine blows per foot (bpf) to 20 bpf and averaged approximately 13 bpf.

Residual Deposits: Underlying the surface cover the subsurface test encountered natural residualsoils consisting of silty sand (USCS: SM), silt (USCS: ML), and lean clay (USCS: CL). The soil borings performed as part of the investigation encountered the residual deposits to depths ranging from six fbgs to 24 fbgs. SPT N-values within coarse-grained portions this stratum ranged between eight bpf to 59 bpf, generally indicating loose to very dense relative densities and averaging approximately 40 bpf. Pocket penetrometer tests performed within the fine-grained portions of this stratum measured unconfined compressive strengths ranging from 2.5 tons per square foot (tsf) to 4.0 tsf, indicating a stiff to hard relative consistency.

Weathered Rock: Beneath the residual soils, weathered rock materials were encountered within the soil borings consisting of highly weathered sandstone, sampled as silty sand with gravel. The soil borings were terminated at the weathered rock/bedrock interface at depths ranging from 9.7 fbgs to 24.7 fbgs. The majority of the SPT N-values within the weathered rock materials consistently were in the refusal range, generally indicating a very dense relative density.

4.2 GROUNDWATER

Groundwater was not encountered within the deeper borings performed to a maximum depth of approximately 24.7 fbgs. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.

SECTION 5.0
Conclusions and Recommendations

5.1 GENERAL

The results of the subsurface investigation and engineering evaluation indicate that, following overexcavation of the existing fill materials if encountered at or below proposed subgrade elevations, the proposed structures may be supported by conventional shallow foundations bearing within the natural site soils, weathered rock/intact rock materials, and/or controlled structural fill soils provided they are properly inspected, placed and compacted in accordance with Sections 5.2, 5.3, and 5.11.

Weathered rock and apparent bedrock were encountered during this subsurface investigation at variable depths throughout the site. Based on local experience, planned excavation depths within a few feet of refusal depths and in confined excavations, such as for foundation and utility trenches, will likely require ripping tools and/or a pneumatic hammer.

5.2 SITE PREPARATION AND EARTHWORK

Surface Cover Stripping and Demolition: Prior to stripping operations, all utilities should be identified and secured. The existing surface cover materials, including topsoil, vegetation, and trees to be demolished should be removed from within and at least five feet beyond the limits of the proposed construction. The resulting excavations should be backfilled with suitable materials in accordance with the recommendations of Section 5.3. The contractor should be required to perform all earthwork in accordance with the recommendations in this report, including backfilling any resulting excavations with structural fill.

Surface Preparation/Proofrolling: Prior to placing any fill or subbase materials to raise or restore grades to the desired subgrade elevations, the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions of a minimum 10-ton vibratory drum roller. The roller should be operated in static mode to compact moisture sensitive silty and clayey soils to minimize disturbance and potential degradation of the soils.

The surface should be proofrolled with a loaded tandem axle truck in the presence of a geotechnical engineer to help identify any soft or loose pockets that may require removal and replacement or further investigation. Proofrolling should be conducted after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. Any fill or backfill should be placed and compacted in accordance with Section 5.3.

Weather Performance Criteria: Because portions of the site soils are, at a minimum, somewhat moisture sensitive and may soften when exposed to water, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to precipitation. Accordingly, excavation and fill placement procedures should be performed during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils.

Subgrade Protection and Maintenance: Every effort should be made to minimize disturbance of the on-site materials by construction traffic and surface runoff. The on-site soils will deteriorate when subjected to repeated wetting and construction traffic and likely will require extensive drying or overexcavation and replacement.

Construction schedules and budgets should account for contingencies, such as importing materials to raise grades or restore overexcavations when construction must occur following wet weather or on an expedited basis. However, if properly protected and maintained during warm, dry weather as recommended herein, the site soils will provide adequate support for the proposed construction. The site contractors should employ necessary means and methods to protect the subgrade including, but not limited to the following.

- leaving existing impervious surface cover, such as pavement, in place as long as practical to protect the subgrade from freeze-thaw cycles and exposure to inclement weather;
- sealing exposed subgrade soils on a daily basis with a smooth drum roller operated in static mode;
- regrading the site as needed to maintain positive drainage away from construction areas;
- removing wet surficial soils immediately; and
- limiting exposure to precipitation and construction traffic especially following inclement weather and subgrade thawing.

Difficult Excavation Considerations: Very dense soil, cobbles/boulders, weathered rock, and apparent bedrock were encountered during this subsurface investigation at variable depths. Based on proposed site grading, removal of cobbles/boulders, weathered rock and intact rock should be anticipated during construction. The speed and ease of excavation will depend on the type of grading equipment, the equipment operator, and the geologic structure of the material, such as planes of weakness and spacing between discontinuities.

Based on local experience and the results of test boring efforts, Whitestone expects that the upper few feet of the weathered rock materials typically can be removed with a large excavator equipped with ripping tools and extreme service buckets with rock teeth without considerable difficulty during mass grading

operations. However, planned excavations beyond a few feet into the weathered materials and refusal depths in confined excavations such as utility trenches and foundations are expected to require the use of large excavation machinery equipped with ripping tools and/or pneumatic hammers.

Additionally, blasting may be considered in accordance with local ordinances to remove more resistant rock below machine refusal depths to expedite construction schedules.

5.3 STRUCTURAL FILL AND BACKFILL

Imported Fill Material: Any imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well graded sand or gravel with a maximum particle size of three inches and five percent to 15 percent of material finer than a #200 sieve. Silts, clays, and silty or clayey sands and gravels with higher percentage of fines and with a liquid limit less than 40 and a plasticity index less than 20 may be considered subject to the owner's approval, provided that the required moisture content and compaction controls are met during favorable weather conditions. The material should be free of clay lumps, organics, and deleterious material. Imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

On-Site Material: The results of the investigation indicate that the majority of the existing fill materials, natural site soils and weathered rock materials will be suitable for selective re-use as structural fill and/or backfill provided deleterious debris is segregated, moisture contents are controlled within approximately two percent of the optimum, and rock particles larger than three inches are either removed or crushed. Rock fragments and cobbles/boulders greater than three inches in diameter are not recommended for reuse in structural areas. The reuse of rock particles and cobbles/boulders larger than three inches should be carefully considered on an as-needed basis in order to provide site-specific recommendations and criteria for placement and compaction. The weathered rock encountered at this site can typically be crushed using a pneumatic sheepsfoot roller provided that the materials are placed in relatively thin lifts not exceeding six inches.

Rock fragments and cobbles/boulders between three to 12 inches may be crushed or individually placed in fill layers deeper than two feet below landscaped areas. Care must be taken to individually seat any large particles and to compact soil around large particles with hand operated equipment to minimize the risk of void formation.

On-site materials will become increasingly difficult to reuse and compact where wetted beyond the optimum moisture content. On-site materials placed as fill should be sealed on a daily basis using a smooth drum roller and graded to promote drainage and prevent ponding of stormwater. Materials that are or become exceedingly wet will likely require discing and aerating and extended time to dry during favorable weather. Immediate reuse of on-site soil should not be expected. Alternatively, imported fill materials may be used to attain the desired grades and expedite earthwork operations during wet weather periods. The stripped surface cover materials should not be used as fill or backfill.

Compaction and Placement Requirements: All fill and backfill should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density within two percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor). Whitestone recommends using a vibratory drum roller to compact the on-site soils or a small hand-held vibratory compactor within excavations. Particular attention should be brought to the backfilling efforts of the basement of the existing site building following removal.

5.4 GROUNDWATER CONTROL

Static groundwater was not encountered within the soil borings to a maximum depth explored of 24.7 fbgs. As such, Whitestone does not anticipate the need for permanent groundwater control for the proposed buildings. However, depending on the time of construction and the precipitation conditions, temporary dewatering of run-off or trapped water may be required during construction. Whitestone anticipates that dewatering typically would include sump pumping from perimeter trenches located within the required excavations. Construction phase dewatering for utilities, light pole foundations, and similar structures should be expected.

Because the subsurface soils will soften when exposed to water, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations to rainfall. Overexcavation of saturated soils and replacement with controlled structural fill and/or one foot to two feet of submerged fill as described in Section 5.3 may be required prior to resuming work on disturbed subgrade soils.

5.5 FOUNDATIONS

The results of the exploration indicate that, following overexcavation of existing fill materials if encountered at or proposed foundation elevations, the proposed structures may be supported on conventional shallow foundations bearing on the underlying natural materials and/or properly placed structural fill provided these materials are properly evaluated, placed and compacted. Foundations bearing within these materials may be designed to impart a maximum allowable net bearing pressure of 4,000 psf. Although not anticipated, shallow foundations bearing within weathered rock materials may be designed to impart a maximum allowable net bearing pressure of 6,000 psf.

Based on conditions encountered within the soil borings performed as part of this investigation, proposed development grades and the proposed embedment depth of 36 inches, minimal overexcavation of unsuitable materials beneath proposed foundation influence is anticipated to be required at the subject site. All footing bottoms should be improved by in-trench compaction in the presence of the geotechnical engineer. Regardless of loading conditions, proposed foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Below-grade wall footings should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Lateral resistance should be provided by friction resistance at the base of the footings. A coefficient of friction against sliding of 0.35 is recommended for use for foundations bearing within on-site soils or imported structural fill soils.

Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils along and below the foundation bottoms be verified by a geotechnical engineer prior to placing concrete. In the event that areas of unsuitable materials are encountered, such as existing fill materials, overexcavation and/or replacement of the materials will be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be reduced if grade is restored with lean concrete. The bottom of overexcavations should be compacted with vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials.

Partial Weathered Rock/Bedrock Support: Although not anticipated, foundations should not be supported partially on weathered rock, cobbles/boulders, or bedrock and partially on soil because of the risk of brittle fracture due to a hinging effect. If the proposed bearing elevations result with partial bearing on such materials, Whitestone recommends removing a minimum of six inches of the weathered rock/bedrock or the cobble/boulder and restoring the bearing elevation with structural fill.

Settlement: Whitestone estimates post-construction total and differential settlements of proposed foundations should be less than approximately one inch and one-half inch, respectively, if the recommendations outlined in this report are properly implemented.

Frost Coverage: Foundations not bearing entirely on competent bedrock are subject to frost action and should be placed at least 36 inches below adjacent exterior grades to provide protection from frost penetration. Interior footings not subject to frost penetration should be situated at least 18 inches below interior grades.

5.6 FLOOR SLAB

Contingent upon supplemental evaluation, Whitestone anticipates that the improved and approved existing fill materials, underlying natural soils, and/or controlled structural fill materials will be suitable for support of the proposed floor slabs provided these materials are properly evaluated, placed, compacted and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report. Localized areas of overexcavation may be anticipated due to the presence of existing fill materials, and/or if the subgrades are exposed to precipitation.

Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural backfill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum four inch layer of coarse aggregate, such as AASHTO #57 stone, dense graded aggregate, or equal, should be installed below ground-supported floor slabs to provide a capillary break. An impervious membrane also should be provided as a moisture vapor barrier beneath all floor slabs.

5.7 PAVEMENT DESIGN CRITERIA

General: Whitestone anticipates that the improved and approved existing fill materials, underlying natural soils, and/or compacted structural fill and/or backfill placed to raise or restore design elevations are expected to be suitable for support of the proposed pavements provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions. Areas of overexcavation of unsuitable fill materials may be anticipated due to the general variability encountered within the existing fill materials.

Design Criteria: A California Bearing Ratio (CBR) value of five has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. An estimated maximum load of 25,000 ESAL was for standard pavement areas and 60,000 ESALs was used for heavy duty pavement areas. Actual pavement loads should be less than this value.

Pavement Sections: The recommended flexible pavement sections are presented below in tabular format:

FLEXIBLE PAVEMENT SECTION DESIGN			
Layer	**Material**	**Standard Duty Thickness (Inches)**	**Heavy Duty Thickness (Inches)**
Asphalt Surface	NJDOT I-5 Surface	1.5	1.5
Asphalt Base	NJDOT I-2 Base	2.5	3.0
Granular Subbase	NJDOT DGA Base Course	6.0	6.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns (such as at loading areas). The recommended rigid pavement is presented below in tabular format:

RIGID PAVEMENT SECTION DESIGN			
Layer	**Material**	**Standard Duty Thickness (Inches)**	**Heavy Duty Thickness (Inches)**
Surface	4000 psi air-entrained concrete	6.0	7.0
Base	NJDOT DGA Base Course	6.0	8.0

Additional Design Considerations: The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, all subgrade soil and supporting fill or backfill must be placed, compacted, and evaluated in accordance with Sections 5.2, 5.3, and 5.11 of this report. Proper drainage must be provided for the pavement structure including appropriate grading and surface water control.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that NJDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. All rigid concrete pavements should be suitably air-entrained, jointed, and reinforced.

5.8 LATERAL EARTH PRESSURES

General: Based on information provided by ARCO/Murray, no new retaining walls are planned for the proposed development. Should a proposed retaining structure be incorporated as part of the site design, Whitestone should be contacted immediately for further evaluation.

5.9 SEISMIC AND LIQUEFACTION CONSIDERATIONS

The soil conditions encountered are most consistent with a Site Class C as defined by the *2018 International Building Code – New Jersey Edition.* Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design.

5.10 EXCAVATIONS

The majority of the site soils are consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

5.11 SUPPLEMENTAL POST INVESTIGATION SERVICES

Construction Inspection and Monitoring: The owner's geotechnical engineer should perform inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be performed to verify that the existing surface cover materials are properly removed, and suitable materials used for controlled fill are properly placed and compacted over suitable subgrade soils. The overexcavation of the existing fill materials, if encountered, within the proposed building footprint that are unsuitable for foundation support and the proofrolling of all subgrades prior to foundation, floor slab and pavement support should be witnessed and documented by the owner's geotechnical engineer.

Final Plan Review: Whitestone understands that the final site layout has not been decided upon at this time. Therefore, Whitestone recommends that this report be reviewed in its entirety once a final site plan is developed to evaluate any impacts to the recommendations as a result of any proposed alterations.

SECTION 6.0
General Comments

Supplemental recommendations may be required upon finalization of construction plans and soil bearing conditions should be checked at the appropriate time for consistency with those conditions encountered during Whitestone's preliminary geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards which may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the use of ARCO/Murray National Dallas, LLC for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

Whitestone assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

The possibility exists that conditions between borings and test pits may vary from those at specific test locations, and conditions may differ from those anticipated by the designers or contractors. In addition, the construction process may alter soil and groundwater conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the soils in the footing excavations prior to concreting in order to determine that the soils will support the bearing capacities. Monitoring and testing should also be performed to verify that suitable materials are used for controlled fills and that they are properly placed and compacted over suitable subgrade soils.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the preliminary design details furnished by ARCO/Murray National Dallas, LLC. If deviations from the noted subsurface conditions are encountered during construction, they should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

WHITESTONE
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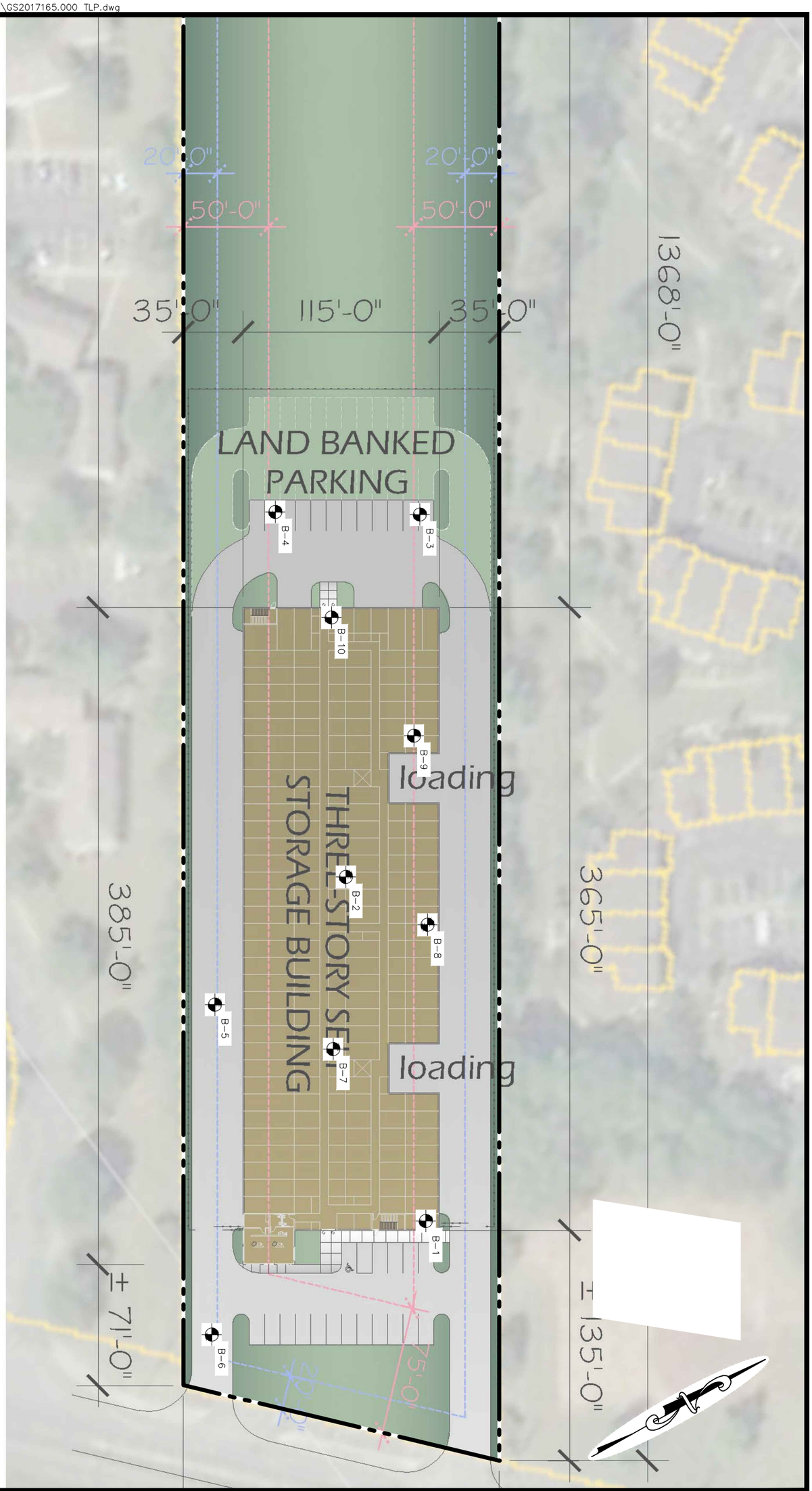
FIGURE 1
Boring Location Plan

L:\Job Folders\2020\2017165GS\Drawings and Plans\GS2017165.000 TLP.dwg



LEGEND

B-1 BORING LOCATION (APPROX.)

SUBJECT PROPERTY BOUNDARY (APPROX.)

REFERENCE

THIS PLAN IS BASED ON AN APRIL 9, 2020 PROPOSED SITE PLAN OPTION #1 PREPARED BY ARCO/MURRAY DESIGN BUILD.

0 1 inch = 60 ft. 60

PROJECT #: GS2017165.000

DESIGNED BY: GR

DATE: 6/2/20

SCALE: 1" = 60'

PROJ. MGR.: KK

FIGURE: 1

DRAWING TITLE: **BORING LOCATION PLAN**

CLIENT: **ARCO/MURRAY DESIGN BUILD**

PROJECT: PROPOSED SELF-STORAGE FACILITY
1613 ROUTE 27
SOMERSET, SOMERSET COUNTY, NJ

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
2430 HIGHWAY 34 BUILDING B, SUITE 101 MANASQUAN, NJ 08736
908.668.7777 WHITESTONEASSOC.COM

WHITESTONE ASSOCIATES, INC.

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build
Surface Elevation:	± N/S feet	**Date Started:**	5/14/2020
Termination Depth:	24.7 feet bgs	**Date Completed:**	5/14/2020
Proposed Location:	Building	**Logged By:**	MH
Drill / Test Method:	HSA / SPT	**Contractor:**	AD
	Auto Hammer	**Equipment:**	CME 55

Water Depth | Elevation (feet bgs) | (feet)			Cave-In Depth | Elevation (feet bgs) | (feet)	
During:	NE	---		
At Completion:	---	---	**At Completion:**	23.0 | ---
24 Hours:	---	---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		7 - 8 - 7 - 5	12	15	0.5	GRAVEL		6" Stone Subbase	
							RESIDUAL		Reddish-Brown Sandy Lean Clay, Moist, Stiff (CL)	
						2.0				
2 - 4	S-2		4 - 8 - 12 - 13	12	20				Reddish-Brown Sandy Silt with Gravel, Moist, Medium Dense (ML)	Mottles
4 - 6	S-3		8 - 8 - 8 - 9	20	16	5.0			As Above (ML)	Mottles
6 - 8	S-4		10 - 10 - 13 - 17	20	23				As Above (ML)	Weathered Rock in Spoon Tip
						8.0				
8 - 10	S-5		8 - 9 - 8 - 8	20	17				Reddish-Brown Sandy Lean Clay with Gravel, Moist, Very Stiff (CL)	
						10.0				Stiff Augering @ 10.0 fbgs to 23.0 fbgs
						13.0				
13 - 15	S-6		8 - 12 - 19 - 15	22	31				Reddish-Brown Sandy Silt with Gravel, Moist, Dense (ML)	
						15.0				
						18.0				
18 - 20	S-7		6 - 10 - 7 - 8	20	17				Reddish-Brown Sandy Lean Clay, Moist, Very Stiff (CL)	Qu = 2.5 tsf
						20.0				
						23.0				
23 - 24.7	S-8		8 - 26 - 41 - 50/3		67		WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	
						24.7				
						25.0			Boring Log B-1 Terminated at a Depth of 24.7 Feet Below Ground Surface	

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/14/2020		
Termination Depth:	14.5 feet bgs	**Date Completed:**	5/14/2020		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** --- | ---
	Auto Hammer	**Equipment:**	CME 55	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		11 - 5 - 4 - 5	16	9	0.3	GRAVEL		4" Stone Subbase	
							FILL		Brown Sandy Silt, Moist (FILL)	Trace Roots
						2.0				
2 - 4	S-2		3 - 3 - 5 - 5	18	8		RESIDUAL		Reddish-Brown Sandy Silt, Moist, Stiff (ML)	Qu = 1.0 tsf
4 - 6	S-3		4 - 5 - 6 - 14	22	11	5.0			As Above, Very Stiff (ML)	Qu = 2.5 tsf
						6.0				
6 - 8	S-4		14 - 14 - 16 - 19	22	30				As Above (ML)	
8 - 10	S-5		7 - 12 - 16 - 16	22	28				As Above (ML)	Mottles
						10.0				Stiff Augering @ 10.0 fbgs to 14.5 fbgs
						13.0				
13 - 13.2	S-6		50/2		50/2		WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	
						14.5				
						15.0			Boring Log B-2 Terminated at a Depth of 14.5 Feet Below Ground Surface Due to Auger Refusal	
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

Surface Elevation:	± N/S feet	**Date Started:**	5/14/2020	**Water Depth | Elevation (feet bgs) | (feet)**		**Cave-In Depth | Elevation (feet bgs) | (feet)**	
Termination Depth:	9.7 feet bgs	**Date Completed:**	5/14/2020				
Proposed Location:	Parking	**Logged By:**	MH	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:**	--- | ---	**At Completion:**	--- | ---
	Auto Hammer	**Equipment:**	CME 55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	GRAVEL		6" Stone Subbase	
0 - 2	S-1		7 - 5 - 5 - 5	8	10		FILL		Gray Gravel, Moist (FILL)	Gravel in Spoon Tip
						2.0				
2 - 4	S-2		3 - 5 - 7 - 10	20	12		RESIDUAL		Reddish-Brown Sandy Silt, Moist, Medium Dense (ML)	
4 - 6	S-3		12 - 10 - 13 - 13	20	23	5.0			As Above (ML)	
						6.0				
6 - 8	S-4		12 - 16 - 24 - 34	20	40		WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Dense (WR)	
8 - 9.7	S-5		27 - 67 - 72 - 50/3	12	139				As Above, Very Dense (WR)	
						9.7				
						10.0			Boring Log B-3 Terminated at a Depth of 9.7 Feet Below Ground Surface	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Page 1 of 1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/14/2020		
Termination Depth:	10.0 feet bgs	**Date Completed:**	5/14/2020		
Proposed Location:	Parking	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** --- | ---
	Auto Hammer	**Equipment:**	CME 55	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		10 - 5 - 4 - 3	10	9		FILL		Dark Brown Silty Sand, Moist, Loose (FILL)	Debris: Asphalt
						2.0				
2 - 4	S-2		5 - 4 - 5 - 5	12	9		RESIDUAL		Brown Sandy Lean Clay, Moist, Loose (CL)	
4 - 6	S-3		3 - 5 - 7 - 9	10	12	5.0			As Above, Medium Dense (CL)	
6 - 8	S-4		9 - 13 - 14 - 18	20	27				Yellowish-Brown Sandy Silt, Moist, Medium Dense (ML)	
8 - 10	S-5		18 - 19 - 31 - 22	20	56		WEATHERED ROCK		Light Brown Weathered Rock, Moist, Dense (WR)	
						10.0				
						15.0			Boring Log B-4 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

Page 1 of 1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/14/2020		
Termination Depth:	10.0 feet bgs	**Date Completed:**	5/14/2020		
Proposed Location:	Parking	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** --- | ---
	Auto Hammer	**Equipment:**	CME 55	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	PAVEMENT		2.5" Asphalt, 3" Stone Subbase	
0.5 - 2	S-1		9 - 8 - 12	10	20		FILL		Brown Silty Sand, Moist, Medium Dense, Debris (SM)	Debris: Wood
						2.0				
2 - 4	S-2		6 - 7 - 6 - 7	12	13		RESIDUAL		Reddish-Brown Sandy Lean Clay, Moist, Medium Dense (CL)	
4 - 6	S-3		9 - 11 - 11 - 11	20	22	5.0			As Above (CL)	
6 - 8	S-4		7 - 9 - 12 - 16	20	21				As Above (CL)	
						8.0				
8 - 10	S-5		12 - 15 - 16 - 17	20	31				Reddish-Brown Sandy Silt, Moist, Dense (ML)	
						10.0				
									Boring Log B-5 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Page 1 of 1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/15/2020		
Termination Depth:	10.0 feet bgs	**Date Completed:**	5/15/2020		
Proposed Location:	Parking	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** --- | ---
	Cat Head	**Equipment:**	CME 55	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	PAVEMENT		3.5 Asphalt, 3" Stone Subbase	
0 - 2	S-1		24 - 14 - 6 - 6	18	20		RESIDUAL		Reddish-Brown Lean Clay, Moist, Very Stiff (CL)	Qu = 2.0 tsf
2 - 4	S-2		7 - 8 - 10 - 11	22	18				As Above (CL)	Some Sand
4 - 6	S-3		11 - 16 - 18 - 21	22	34	5.0			As Above, Gravel, Hard (CL)	Qu = 4.0 tsf
						6.0				
6 - 8	S-4		16 - 19 - 20 - 24	22	39				Reddish-Brown Sandy Silt with Gravel, Moist, Dense (ML)	
8 - 10	S-5		21 - 32 - 40 - 45	20	72	10.0			As Above (ML)	Possible Weathered Rock
						15.0			Boring Log B-6 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-7

Page 1 of 1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/15/2020		
Termination Depth:	14.5 feet bgs	**Date Completed:**	5/15/2020		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** 11.0 | ---
	Cat Head	**Equipment:**	Mobile B-40	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	PAVEMENT		2.5" Asphalt	
0.5 - 2	S-1		13 - 8 - 5	12	13		FILL		Reddish-Brown to Gray Silty Sand, Moist, Debris (FILL)	Debris: Trace Concrete
2 - 4	S-2		3 - 4 - 5 - 7	3	9	4.0			Low Recovery, Presumed As Above (FILL)	Gravel in Spoon Tip
4 - 6	S-3		5 - 6 - 8 - 12	20	14	5.0	RESIDUAL		Reddish-Brown Sandy Lean Clay, Moist, Very Stiff (CL)	Qu = 2.0 tsf
6 - 7.9	S-4		22 - 30 - 50/5	20	80/11	8.0			Reddish-Brown Sandy Silt, Moist, Very Dense (ML)	Stiff Augering @ 6.0 fbgs to 13.0 fbgs
8 - 10	S-5		17 - 21 - 38 - 42	20	59	10.0				
13 - 13.4	S-6		50/5	5	50/5	14.5	WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	Hard Augering @ 13.0 fbgs to 14.5 fbgs
						15.0			Boring Log B-7 Terminated at a Depth of 14.5 Feet Below Ground Surface Due to Auger Refusal	
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-8

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/15/2020		
Termination Depth:	11.0 feet bgs	**Date Completed:**	5/15/2020		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** 9.0 | ---
	Cat Head	**Equipment:**	Mobile B-40	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	PAVEMENT		1.5" Asphalt, 4" Stone Subbase	
0.5 - 2	S-1		4 - 5 - 5	16	10		RESIDUAL		Reddish-Brown Sandy Silt with Gravel, Moist, Medium Dense (ML)	Mottles
						2.0				
2 - 4	S-2		8 - 21 - 19 - 23	20	40				Brown Sandy Lean Clay, Moist, Hard (CL)	Qu = 4.0 tsf
						4.0				
4 - 6	S-3		12 - 15 - 20 - 24	22	35				Reddish-Brown Silty Sand, Moist, Dense (SM)	Mottles
						5.0				
6 - 6.1	S-4		50/5	3	50/5	6.1	WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	Stiff Augering @ 6.0 fbgs to 11.0 fbgs
8 - 9.3	S-5		26 - 36 - 50/3	12	86/9				As Above (WR)	
						10.0				
						11.0				
									Boring Log B-8 Terminated at a Depth of 11.0 Feet Below Ground Surface Due to Auger Refusal	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-9

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± N/S feet	**Date Started:**	5/15/2020		
Termination Depth:	11.0 feet bgs	**Date Completed:**	5/15/2020		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:** --- | ---	**At Completion:** 9.0 | ---
	Cat Head	**Equipment:**	Mobile B-40	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	PAVEMENT		1" Asphalt, 4" Stone Subbase	
0.5 - 2	S-1		7 - 5 - 4	8	9		FILL		Dark Gray Gravel with Sand, Moist, Debris (FILL)	Debris: Trace Concrete
2 - 4	S-2		8 - 9 - 11 - 10	20	20		RESIDUAL		Brown Sandy Lean Clay, Moist, Very Stiff (CL)	Qu = 2.0 tsf
4 - 6	S-3		9 - 7 - 9 - 11	22	16	5.0			As Above (CL)	
6 - 8	S-4		16 - 19 - 21 - 34	20	40				Brown Sandy Silt, Moist, Hard (ML)	Mottles Qu = 4.0 tsf Stiff Augering @ 7.0 fbgs to 11.0 fbgs
8 - 9.3	S-5		26 - 42 - 50/3	12	92/9		WEATHERED ROCK		Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	
						10.0				
						11.0			Boring Log B-9 Terminated at a Depth of 11.0 Feet Below Ground Surface Due to Auger Refusal	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-10

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.000
Location:	1613 Route 27, Somerset, Somerset County, New Jersey	**Client:**	ARCO/Murray Design Build

Surface Elevation:	± N/S feet	**Date Started:**	5/15/2020		**Water Depth | Elevation (feet bgs) | (feet)**		**Cave-In Depth | Elevation (feet bgs) | (feet)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	5/15/2020				
Proposed Location:	Building	**Logged By:**	MH	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	AD	**At Completion:**	--- | ---	**At Completion:**	--- | ---
	Cat Head	**Equipment:**	CME 55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

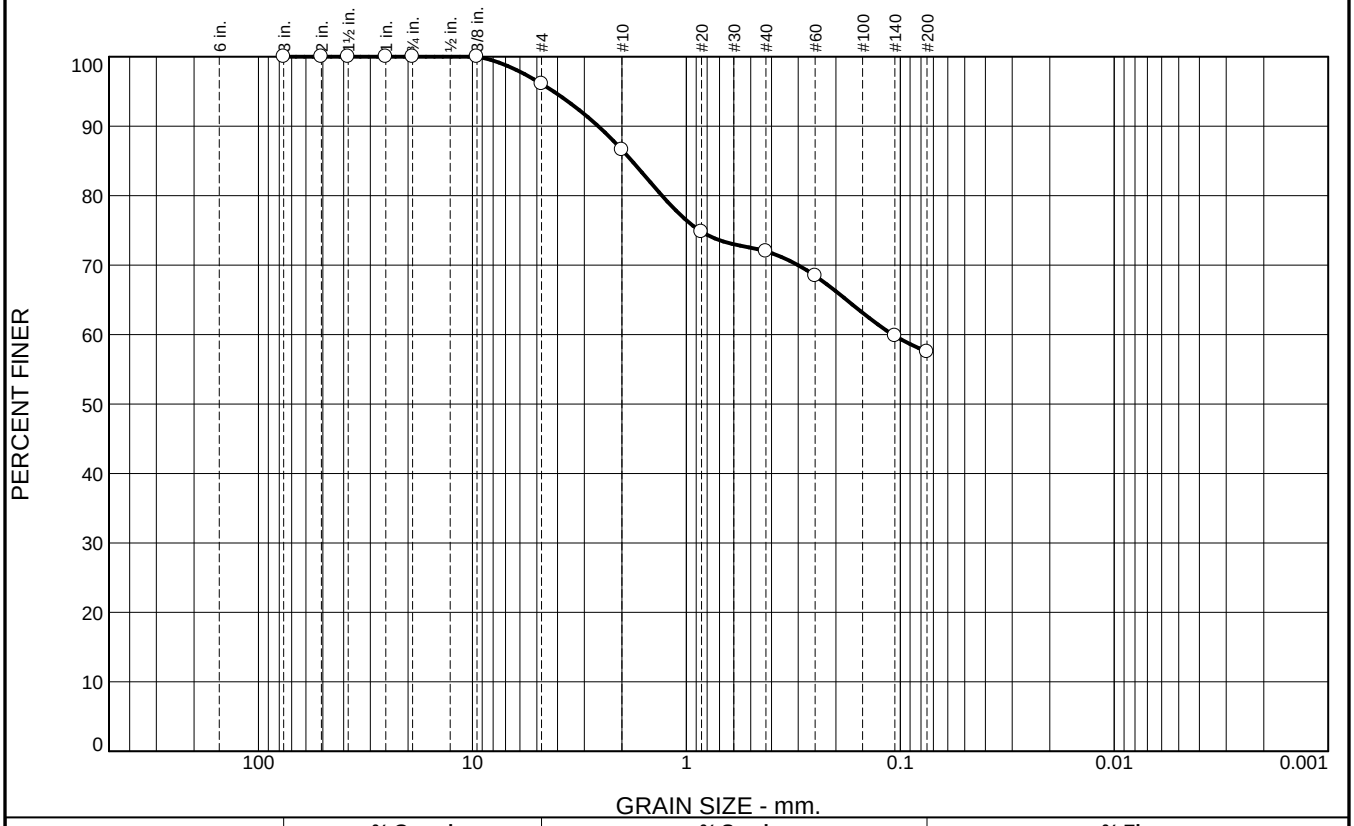
SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	GRAVEL		6" Gravel	
0 - 2	S-1		7 - 6 - 5 - 3	12	11		FILL		Reddish-Brown Silt with Gravel, Moist (FILL)	Apparent Re-Worked Material
2 - 4	S-2		5 - 8 - 11 - 16	20	19		RESIDUAL		Reddish-Brown Lean Clay, Moist, Very Stiff (CL)	Qu = 2.5 tsf
4 - 6	S-3		7 - 11 - 16 - 19	22	27	5.0			As Above, Brown (CL)	Sand Lenses Mottles
						6.0				
6 - 7.6	S-4		20 - 40 - 42 - 50/1	14	82		WEATHERED ROCK		Brown to Reddish-Brown Weathered Rock, Moist, Very Dense (WR)	Stiff Augering @ 6.0 fbgs to 10.0 fbgs
8 - 8.2	S-5		50/2	2	50/2				As Above, Reddish-Brown (WR)	
						10.0			Boring Log B-10 Terminated at a Depth of 10.0 Feet Below Ground Surface Due to Auger Refusal	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.9	9.5	14.6	14.5	57.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	96.1		
#10	86.6		
#20	74.8		
#40	72.0		
#60	68.5		
#140	59.8		
#200	57.5		

* (no specification provided)

Material Description

Sandy Silt

Atterberg Limits

PL= 27 LL= 41 PI= 14

Coefficients

D_{90}= 2.5840 D_{85}= 1.7968 D_{60}= 0.1085
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-6(6)

Remarks

W_n = 34.1 %

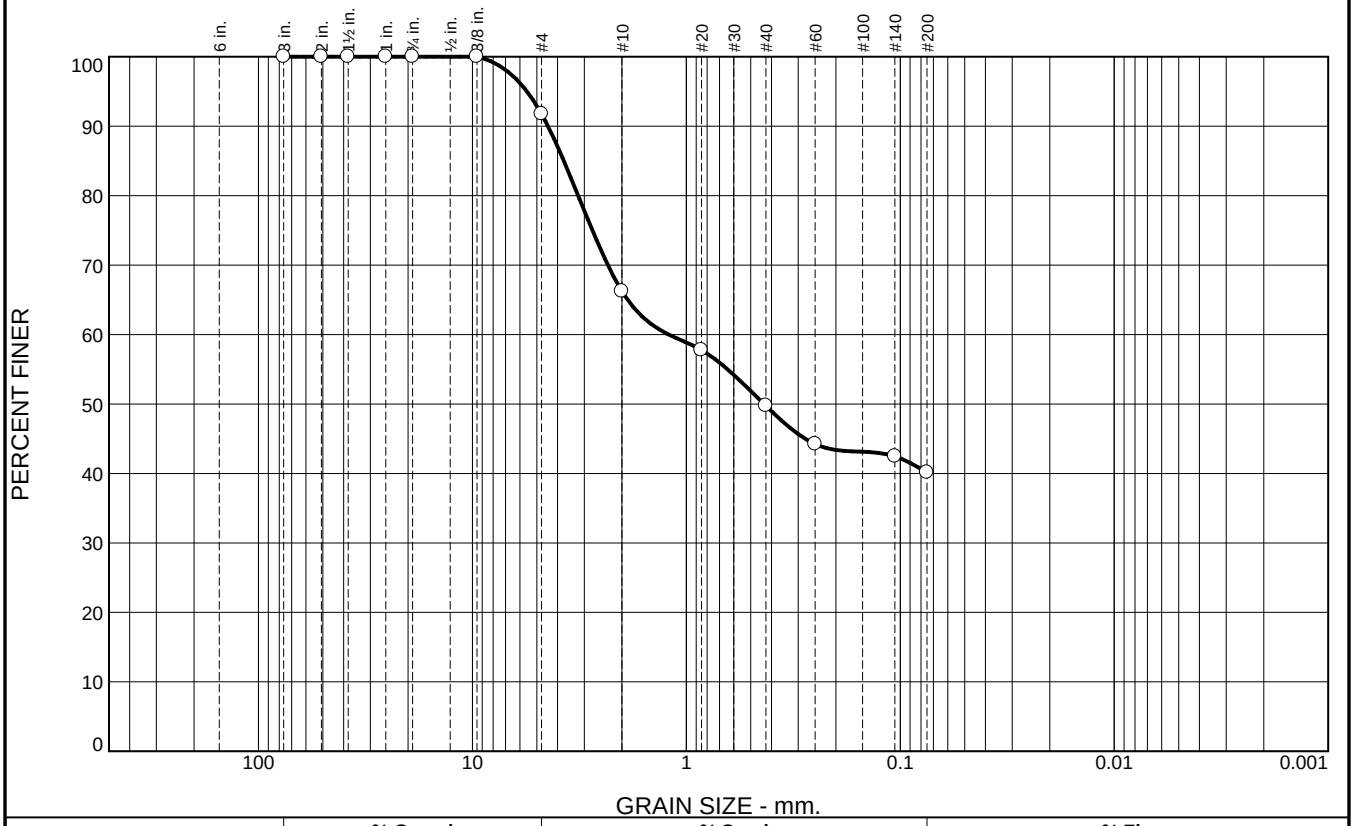
Source of Sample: B-2 **Depth:** 4.0' - 6.0'
Sample Number: S-2

Date: 05/26/2020

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: ARCO/Murray Design Build
Project: Proposed Self-Storage Facility
1613 Route 27, Somerset, Somerset County, New Jersey
Project No: GS2017165.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.3	25.5	16.5	9.6	40.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	91.7		
#10	66.2		
#20	57.8		
#40	49.7		
#60	44.2		
#140	42.5		
#200	40.1		

* (no specification provided)

Material Description

Silty Sand

Atterberg Limits

PL= 30 LL= 42 PI= 12

Coefficients

D_{90}= 4.4346 D_{85}= 3.7393 D_{60}= 1.2088
D_{50}= 0.4334 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-7-5(2)

Remarks

W_n = 26.7 %

Source of Sample: B-8 **Depth:** 4.0' - 6.0'
Sample Number: S-3

Date: 05/26/2020

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: ARCO/Murray Design Build
Project: Proposed Self-Storage Facility
1613 Route 27, Somerset, Somerset County, New Jersey
Project No: GS2017165.000 **Figure**

WHITESTONE ASSOCIATES, INC.

APPENDIX C
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
732.592.2101
whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

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WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
732.592.2101
whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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APPENDIX B-2:
WHITESTONE ASSOCIATES
(SEPTEMBER 15, 2020)

WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
732.592.2101
whitestoneassoc.com

September 15, 2020

via email

ARCO/MURRAY NATIONAL DALLAS, INC.
4849 Greenville Avenue
Suite 1460
Dallas, Texas 75206

Attention: Ms. Rachel Bohac
Project Manager

Regarding: STORMWATER MANAGEMENT AREA EVALUATION
PROPOSED SELF-STORAGE FACILITY
1613 ROUTE 27
SOMERSET, SOMERSET COUNTY, NEW JERSEY
WHITESTONE PROJECT NO.: GS2017165.001

Dear Ms. Bohac:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this *Stormwater Management* (SWM) *Area Evaluation* report in support of the proposed development referenced above. This report is based on the June 26, 2020 *Site Plan* prepared by EAPC Architects & Engineers, correspondence with ARCO/Murray National Dallas, Inc. (ARCO), and Whitestone's experience at the subject site.

1.0 PROJECT DESCRIPTION

The subject property located at 1613 Route 27 in Somerset, Somerset County, New Jersey currently houses an existing plant nursery with a sales building, pavements, landscaping, and utilities. The proposed redevelopment is anticipated to include demolition of the existing site structures and construction of a multi-story self-storage facility with SWM area(s), new pavements, landscaping, and utilities.

Detailed grading information has not been designed at this time. Whitestone assumes the site, with the exception of the SWM areas, will be redeveloped at or near existing site elevations with maximum cuts and fills on the order of one foot to two feet. Whitestone assumes the proposed SWM area(s) will be within four feet below existing grades.

2.0 FIELD EXPLORATION

Field exploration of the project site was conducted by means of five soil profile pits (identified as SPP-1 through SPP-5) performed within accessible portions of the subject site with a rubber-tire backhoe. The locations of the subsurface tests are shown on the *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone geologist who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The profile pits were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet.

Groundwater level observations, where encountered, were recorded during and immediately after the completion of field operations prior to backfilling the test locations. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

3.0 SUMMARY OF FINDINGS

Estimated Seasonal High Groundwater Levels & Infiltration Results: The methods used in determining the estimated seasonal high groundwater level (ESHGW) included evaluating the soil morphology within a test excavation and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soil (mottles). A summary of the estimated seasonal high groundwater observations and infiltration test results associated with this investigation are included in the following table.

PERMEABILITY TEST SUMMARY				
Boring #	**ESHGW (fbgs)**	**USDA Classification @ Test Depth**	**Infiltration Test Results**	
			Depth (fbgs/NAVD 88)	**Rate (in/hour)**
SPP-1	7.0	CLAY	4.0	< 0.2
SPP-2	NE	CLAY	4.0	< 0.2
SPP-3	NE	CLAY	4.0	< 0.2
SPP-4	8.0	CLAY	4.0	< 0.2
SPP-5	NE	CLAY	4.0	< 0.2

USDA - United States Department of Agriculture; NE - Not Encountered; fbgs - Feet Below Ground Surface

Soil Infiltration Rates: Laboratory tube permeameter testing was performed within the profile pits in accordance with the New Jersey *Stormwater Best Management Practices Manual*. Within the samples collected, permeability rates were consistently less than 0.2 inches per hour. Detailed infiltration test results are provided in Appendix B.

4.0 CLOSING

Whitestone appreciates the opportunity to be of continued service to ARCO/Murray National Dallas, Inc. Please contact us with any questions or comments regarding the information herein.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Kyle J. Kopacz, P.E.
Project Manager

Laurence W. Keller, P.E.
Principal, Geotechnical Services

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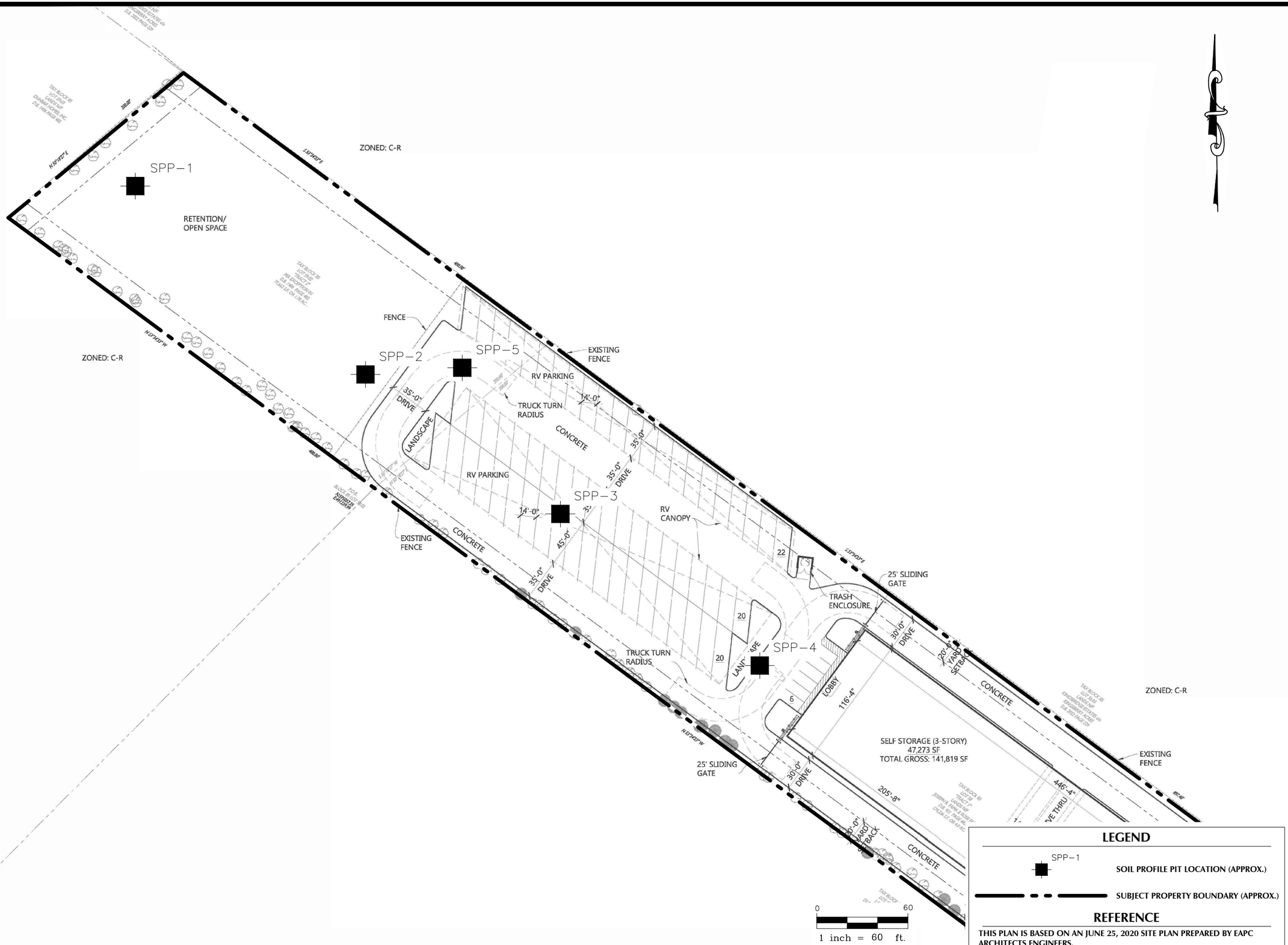
Enclosures

WHITESTONE ASSOCIATES, INC.

FIGURE 1
Test Location Plan



LEGEND

SPP-1 — SOIL PROFILE PIT LOCATION (APPROX.)

SUBJECT PROPERTY BOUNDARY (APPROX.)

REFERENCE

THIS PLAN IS BASED ON AN JUNE 25, 2020 SITE PLAN PREPARED BY EAPC ARCHITECTS ENGINEERS.

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
2430 HIGHWAY 34 BUILDING B, SUITE 101 MANASQUAN, NJ 08736
908.668.7777 WHITESTONEASSOC.COM

DRAWING TITLE: **TEST LOCATION PLAN**

CLIENT: **ARCO/MURRAY DESIGN BUILD**

PROJECT: **PROPOSED WAREHOUSE**
1613 ROUTE 27
SOMERSET, SOMERSET COUNTY, NJ

PROJECT #: **GS2017165.001**

DESIGNED BY:	PROJ. MGR.:
GR	KK
DATE: 6/2/20	FIGURE: 1
SCALE: 1" = 60'	

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WHITESTONE ASSOCIATES, INC.

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-1

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.001
Location:	1613 Route 27; Somerset, Somerset County, NJ	**Client:**	ARCO/Murray National Dallas, Inc.

Surface Elevation:	± NS feet	**Date Started:**	8/31/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	8/31/2020				
Proposed Location:	SWM Basin	**Logged By:**	RL	**During:**	7.0(P)	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	LNR	**At Completion:**	---	---	**At Completion:** 7.0 / ---
Test Method:	Visual Observation	**Rig Type:**	Komatsu	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 1	PAVEMENT	12" Asphalt Millings	
			1.0				
				1 - 6	RESIDUAL	Dark Reddish-Brown (2.5YR 3/3) CLAY; 25% Gravel; Fine Moderate Crumb Structure; Moist; Friable; No Roots; No Mottling	
			2.0				
			3.0				
1 - 6	S-1	BAG				As Above; 30% Gravel, 20% Cobbles	
			4.0				
			5.0				
			6.0				
				6 - 10	WEATHERED ROCK	Dark Reddish-Brown (2.5YR 3/3) Weathered Shale; 30% Boulders, 30% Cobbles, 20% Gravel, No Roots; No Mottling	Perched Water
			7.0 ▽				
6 - 10	S-2	BAG	8.0				
			9.0				
			10.0				
						Soil Profile Pit SPP-1 Terminated at a Depth of 10.0 Feet Below Ground Surface	
			11.0				
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-2

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.001
Location:	1613 Route 27; Somerset, Somerset County, NJ	**Client:**	ARCO/Murray National Dallas, Inc.

Surface Elevation:	± NS feet	**Date Started:**	8/31/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	8/31/2020				
Proposed Location:	SWM Basin	**Logged By:**	RL	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	LNR	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	Komatsu	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
0 - 3	S-1	BAG	1.0 / 2.0 / 3.0	0 - 3	FILL	Yellowish-Brown (10YR 5/4) SAND; 20% Gravel; Fine Moderate Granular Structure; Moist; Friable; Many Medium Roots; No Mottling	Wood Chips and Millings
3 - 8	S-2	BAG	4.0 / 5.0 / 6.0 / 7.0 / 8.0	3 - 8	RESIDUAL	Dark Reddish-Brown (2.5Yr 3/3) CLAY; 25% Gravel; Fine Moderate Crumb Structure; Moist; Friable; No Roots; No Mottling As Above; 30% Gravel, 20% Cobble	
8 - 12	S-3	BAG	9.0 / 10.0 / 11.0 / 12.0	8 - 12	WEATHERED ROCK	Dark Reddish-Brown (2.5YR 3/3) Weathered Shale; 30% Boulders, 40% Cobbles, 10% Gravel; No Roots; No Mottling	
			13.0 / 14.0 / 15.0			Soil Profile Pit SPP-2 Terminated at a Depth of 12.0 Feet Below Ground Surface	

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-3

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.001
Location:	1613 Route 27; Somerset, Somerset County, NJ	**Client:**	ARCO/Murray National Dallas, Inc.

Surface Elevation:	± NS feet	**Date Started:**	8/31/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	8/31/2020				
Proposed Location:	SWM Basin	**Logged By:**	RL	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	LNR	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	Komatsu	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 0.25	PAVEMENT	3" Asphalt Millings	
				0.25 - 8	RESIDUAL	Dark Reddish-Brown (2.5YR 3/3) CLAY; 10% Gravel; Fine Moderate Crumb Structure; Moist; Friable; No Roots; No Mottling	
			1.0				
			2.0				
			3.0			As Above; 25% Gravel	
0.25 - 8	S-1	BAG	4.0				
			5.0			As Above; 20% Gravel, 20% Cobbles	
			6.0				
			7.0 ▽				
			8.0				
				8 - 12	WEATHERED ROCK	Dark Reddish-Brown (2.5YR 3/3) Weathered Shale; 20% Gravel, 30% Cobbles; 30% Boulders; No Roots; No Mottling	
			9.0				
8 - 12	S-2	BAG	10.0				
			11.0				
			12.0				
						Soil Profile Pit SPP-3 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-4

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.001
Location:	1613 Route 27; Somerset, Somerset County, NJ	**Client:**	ARCO/Murray National Dallas, Inc.

Surface Elevation:	± NS feet	**Date Started:**	8/31/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	8/31/2020				
Proposed Location:	SWM Basin	**Logged By:**	RL	**During:**	8.0(P)	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	LNR	**At Completion:**	---	---	**At Completion:** 8.0 / ---
Test Method:	Visual Observation	**Rig Type:**	Komatsu	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 0.5	PAVEMENT	6" Asphalt Millings	
				0.5 - 2	RESIDUAL	Yellowish-Brown (10YR 5/4) SILT; 10% Gravel; Fine Moderate Crumb Structure; Moist; Friable	
0.5 - 2	S-1	BAG	1.0				
			2.0				
				2 - 8		Dark Reddish-Brown (2.5YR 3/3) CLAY; 20% Gravel; Moist; Friable	
			3.0				
			4.0			As Above; 40% Gravel	
2 - 8	S-2	BAG	5.0				
			6.0			As Above; 25% Gravel, 25% Cobbles	
			7.0				
			8.0 ▽				
				8 - 12	WEATHERED ROCK	Dark Reddish-Brown (2.5YR 3/3) Weathered Rock; 30% Boulders, 30% Cobbles, 10% Gravel; No Roots; No Mottling	Perched Water
			9.0				
8 - 12	S-3	BAG	10.0				
			11.0				
			12.0				
						Soil Profile Pit SPP-4 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-5

Project:	Proposed Self-Storage Facility	**WAI Project No.:**	GS2017165.001
Location:	1613 Route 27; Somerset, Somerset County, NJ	**Client:**	ARCO/Murray National Dallas, Inc.

Surface Elevation:	± NS feet	**Date Started:**	8/31/2020	**Water Depth (feet bgs) | Elevation (feet)**			**Estimated Seasonal High Groundwater Depth (feet bgs) | Elevation (feet)**
Termination Depth:	6.0 feet bgs	**Date Completed:**	8/31/2020				
Proposed Location:	SWM Basin	**Logged By:**	RL	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	LNR	**At Completion:**	NE	---	**At Completion:** NE | ---
Test Method:	Visual Observation	**Rig Type:**	Komatsu	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH (feet)		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type					
			0.0				
				0 - 0.25	PAVEMENT	3" Asphalt Millings	
				0.25 - 4	RESIDUAL	Dark Reddish-Brown (2.5YR 3/3) CLAY; 20% Gravel, 20% Cobbles; Fine Moderate Crumb Structure; Moist; Friable; No Roots; No Mottling	
			1.0				
0.25 - 4	S-1	BAG	2.0				
			3.0				2 Tubes @ 3.0 fbgs
			4.0				
				4 - 6	WEATHERED ROCK	Dark Reddish-Brown (2.5YR 3/3) Weathered Shale; 30% Boulders, 30% Cobbles, 20% Gravel; No Roots; No Mottling	
4 - 6	S-2	BAG	5.0				
			6.0				
						Soil Profile Pit SPP-6 Terminated at a Depth of 6.0 Feet Below Ground Surface Due to Bucket Refusal	
			7.0				
			8.0				
			9.0				
			10.0				
			11.0				
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

APPENDIX B
Infiltration Test Results

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-1** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) A Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-1** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) B Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-2** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) A Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-2** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) B Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

    K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

    X None

    _____ Soil/Tube Contact _____Large Gravel _____ Large Roots

    _____ Dry Soil _____Smearing _____ Compaction

    _____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-3** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) A Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-3** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) B Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

    K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

    X None

    _____ Soil/Tube Contact _____Large Gravel _____ Large Roots

    _____ Dry Soil _____Smearing _____ Compaction

    _____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-4** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) A Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-4** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) B Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-5** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) A Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

X None

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: GS2017165.001
Project: Proposed Warehouse
Client: ARCO/Murray National Dallas, Inc.
Lab Tech: MH

Sample ID: **Profile Pit No.:** **SPP-5** **Sample No.:** **T-1** **Depth:** 4.0'

COUNTY/MUNICIPALITY Somerset, NJ BLOCK _____ LOT _____

1. Test Number 1 Replicate (letter) B Date Collected _____

2. Material Tested: _____ Fill X Test in Native Soil

3. Type of Sample: X Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 1.91
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams 0.00

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 86.83

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: X No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 4.99

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
12:00 P.M.	12:00 P.M.	1440.00

***No appreciable movement after 24 hours.**

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 1440.00

    K (in/hr) = 0.00 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

    X None

    _____ Soil/Tube Contact _____Large Gravel _____ Large Roots

    _____ Dry Soil _____Smearing _____ Compaction

    _____ Other - Specify _____

WHITESTONE ASSOCIATES, INC.

APPENDIX C
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

2430 HIGHWAY 34
BUILDING B, SUITE 101
MANASQUAN, NJ 08736
732.592.2101
whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

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GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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APPENDIX C:
INSPECTION CHECKLISTS

APPENDIX C-1:
GENERAL INSPECTION CHECKLIST LOG

INSPECTION CHECKLIST LOG

1. **The responsible party shall report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.**
2. **The maintenance crew should fill out the checklist in the field manual when performing each inspection/maintenance task.**
3. **After the maintenance task is performed, the checklist should be filed in the Maintenance Plan and recorded in the log below.**

Cycle of Inspection	***Stormwater Management Measure No.***	***Checklist No.***	***Date(s) of Inspection***
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

Cycle of Inspection	***Stormwater Management Measure No.***	***Checklist No.***	***Date(s) of Inspection***
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

APPENDIX C-2:
GENERAL PREVENTATIVE MAINTENANCE LOG

PREVENTATIVE MAINTENANCE LOG

MAINTENANCE SCHEDULE	STORMWATER MANAGEMENT MEASURE NO.	PREVENTATIVE MAINTENANCE RECORD NO.	DATE(S) OF MAINTENANCE
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Maintenance work; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

Appendix C-3: General Corrective Maintenance Log

CORRECTIVE MAINTENANCE LOG

Maintenance Schedule	*Stormwater Management Measure No.*	*Corrective Maintenance Record No.*	*Date(s) of Maintenance*
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Maintenance work; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

APPENDIX C-4: *ANNUAL EVALUATION RECORD*

ANNUAL EVALUATION RECORD

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

Evaluator(s)	***Date of Evaluation***	***Decision***
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)