

APPENDIX C

SPECIFICATIONS

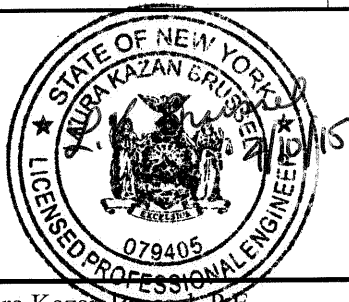
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Onondaga Lake SCA Final Cover Design Report

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SPECIFICATION NO: 01030
SPECIFICATION TITLE: ENVIRONMENTAL PROTECTION
PROJECT NO: 448847
PROJECT TITLE: SCA FINAL COVER DESIGN
CLIENT: HONEYWELL, INC.

				APPROVALS								
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
0	4/10/2015	10	Issued For Agency Approval and Construction	JJH/PLR	SRB/PEB	LKB						
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Laura Kazan Brussel, P.E.
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SECTION 01030**ENVIRONMENTAL PROTECTION****PART 1 GENERAL****1.01 DESCRIPTION**

- A. The Work specified in this Section consists of all labor, equipment, tools, materials, services, supervision and incidentals necessary for environmental pollution control and abatement for the Work as described herein, shown on the Contract Drawings, or as directed by the Engineer. Work in this Section includes, but is not limited to, controlling environmental pollution considering air, water, and land; and managing noise, solid and hazardous waste, and other pollutants.
- B. Related Work specified in other Sections includes, but is not limited to:
 - 1. Section 01300 – Document Submittal Procedure
 - 2. Section 02140 – Construction Water Management
 - 3. Section 02200 – Earthwork
 - 4. Section 02370 – Erosion Control

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State, and Local codes, ordinances, regulations, statutes and standards.

1.03 REFERENCES

- A. New York State Standards and Specifications for Erosion and Sediment Control, (Latest Version)
- B. New York Department of Transportation: Standard Specifications (US Customary), 2009
- C. New York State Department of Environmental Conservation: Draft 6 NYCRR Part 375, Environmental Remediation Programs, 2006
- D. New York State Department of Environmental Conservation: 6 NYCRR Part 360 Regulations
- E. Resource Conservation and Recovery Act (RCRA)
- F. Toxic Substances Control Act (EPA)

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- G. Title 29 Code of Federal Regulations, Part 1910 Occupational Safety and Health Standards – US Department of Labor, OSHA

1.04 DEFINITIONS

- A. Environmental Pollution shall be defined as the presence of chemical, physical, or biological elements or agents which:
1. Adversely affect human health or welfare.
 2. Unfavorably alter ecological balances of importance to human life.
 3. Affect other species of importance to man.
 4. Degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. Prohibited Construction Practices include, but are not limited to the following:
1. For any stream corridor, wetland, surface water or any unspecified location:
 - a. Dumping of spoil material.
 - b. Indiscriminate, arbitrary, or capricious operation of equipment.
 - c. Pumping of silt-laden water from trenches or other excavations.
 - d. Disposal of trees, brush, and other debris.
 2. Permanent or unspecified alteration of the flow line of any stream.
 3. Explosive blasting.
 4. Burning of refuse and debris at the project site.
 5. Disposal of construction water and/or leachate without treatment as per Section 02140 – Construction Water Management.

1.05 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:
1. A SWPPP in accordance with Section 02370 – Erosion Control with a description of and illustration showing anticipated stormwater control and erosion control measures to be implemented during construction. This shall be submitted prior to mobilization to the Site.
 2. Material Safety Data Sheets (MSDS) for all products having MSDSs 10 working days prior to delivery of such product to Site. MSDSs must be maintained and readily available on site.
 3. The Contractor shall be responsible for completing an inspection form for each piece of equipment, tool or bulk recyclable remnant structure or pipe being removed from the Site that required decontamination.
 4. An “Off-Site Disposal Record” shall be included as part of the Final Closeout Report.

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1.06 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature, and location of the Work required conforming to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

PART 2 PRODUCTS

2.01 DECONTAMINATION PRODUCTS

- A. Cleaning products anticipated for use in decontamination include, but are not limited to the following:
1. A pressure washer (or equivalent) furnished and used by the Contractor shall be a high-pressure, low-volume unit from an industry-recognized manufacturer.
 2. The Contractor shall provide miscellaneous tools such as shovels and brushes.
 3. The Contractor shall provide cleaning agents such as non-phosphate detergents for use as necessary.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to commencement of the Work, the Contractor shall meet with the Engineer to develop mutual understanding relative to compliance with these provisions and administration of the environmental pollution control program.
- B. The Contractor shall schedule and conduct all Work in a manner that will minimize the erosion of soils in the area of the Work and shall provide erosion control measures as described in Section 02370 – Erosion Control. All erosion control measures shall be in place and in operating condition in an area prior to any construction activity in that area.
- C. The Contractor shall manage construction water in accordance with Section 02140 – Construction Water Management and sequence and conduct earthwork activities to limit the generation of construction water as appropriate.

3.02 TEMPORARY ENVIRONMENTAL CONTROL FEATURES

- A. The Contractor shall dismantle and remove temporary environmental control features only when permanent control features have been installed and assessed as correctly functioning by the Engineer. Permanent control features shall be incorporated into the

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Project at the earliest practicable time in light of construction scheduling, and shall be in place and functioning upon project completion.

- B. Exclusion Zones, as required, shall be defined and operated as described in 29 CFR 1910.210 Hazardous Waste Operations.

3.03 PROTECTION OF STREAMS AND SURFACE WATERS

- A. The Contractor shall take all precautions to prevent, or reduce to a minimum, any damage to any stream or surface water from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams or surface water.
- B. The Contractor shall take all preventative measures to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards and as approved by the Engineer.
- C. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in a stream or surface water shall not be directly discharged to a stream or surface water. Such waters shall be managed as construction water in accordance with Section 02140 – Construction Water Management.
- D. Stormwater that falls on any portion of exposed geotextile tubes or the Debris Management Area shall be managed as construction water as per Section 02140 – Construction Water Management.

3.04 PROTECTION OF LAND RESOURCES

- A. The Contractor shall restore land resources within the project boundaries and outside the limits of permanent Work to conditions upon completion of construction such that these will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Contract Drawings or as approved by the Engineer.
- B. Outside the work areas indicated on the Contract Drawings, the Contractor shall not de-face, injure, destroy, or remove trees, shrubs, fencing, structures, or other landscape features without prior approval by the Engineer. No ropes, cables, or guy lines shall be fastened to any existing trees, shrubs, fencing, structures or other landscape features for anchorage unless specifically authorized by the Engineer.
- C. Prior to operations, the Contractor shall ensure adequate protection for trees, shrubs, fencing, structures or other landscape features that may possibly be de-faced, bruised, injured or otherwise damaged by the construction equipment or other operations. Monuments and markers shall be similarly protected.

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- D. Any trees, shrubs, fencing, structures or other landscape features scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to their original condition. The Engineer will decide the method of restoration to be used and whether damaged trees shall be treated and healed or removed and disposed of.
- E. The location of the Contractor's support areas shall be approved by the Engineer and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of support area locations. Drawings showing support area locations shall be submitted for approval of the Engineer.
- F. Modification of the Contractor's approved drawings shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction, including disposal areas will be permitted.

3.05 PROTECTION OF AIR QUALITY

A. Dust Control

- 1. The Contractor is responsible for dust control for all excavations, embankments, stockpiles, access roads, backfill, borrow areas and all other work areas.
- 2. An approved method of dust control is sprinkling of water from a water source approved by the Engineer.
- 3. The use of any other stabilization methods may be permitted with approval from the Engineer. Product samples and manufacturer's literature must be submitted to the Engineer in accordance with Section 01300 - Document Submittal Procedure and all other relevant Sections contained in the Specifications. All products that are approved for dust control shall be used in accordance with the manufacturer's instructions.
- 4. Sprinkling must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor shall have sufficient competent equipment to accomplish this. Dust control shall be performed as the Work proceeds and whenever a dust nuisance or hazard occurs, or as determined by the Engineer.

B. Odor Control

- 1. If odors are an issue as determined by the Engineer, the Contractor shall provide an odor control material or an applicable mitigation procedure acceptable to the Engineer and in accordance with the guidance set forth in the 2010 Honeywell Community Health and Safety Plan.

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3.06 NOISE CONTROL

- A. The Contractor shall be aware of all applicable Federal, State, and Local codes, ordinances, regulations, statutes and standards related to noise. The Contractor shall adhere to any local regulations and restrictions regarding the start and stop times of work activities at the site.

3.07 MANAGING WASTE MATERIAL

A. Managing Waste Material Requirements

1. The Contractor shall manage the handling, segregation, stabilization, containment, storage, loading and transportation of all waste materials resulting from the performance of the Work.
2. All waste storage, staging and loading areas shall be in a location determined by the Engineer.
3. Litter, clean construction debris, metal, wood, office trash, etc. or other non-contaminated materials may be disposed of at an approved disposal facility.

B. Waste Segregation

1. The Contractor shall segregate litter, construction debris, hazardous wastes, and non-hazardous wastes based on generator knowledge.
2. The Contractor shall further segregate non-hazardous wastes (contaminated or uncontaminated) in a similar manner.
3. The Contractor shall keep wastes of unknown classification separate from other wastes and manage as if they were hazardous until a waste determination has been made.
4. If wastes cannot be classified based solely on generator knowledge, the Contractor shall collect waste samples as directed by the Engineer.

C. Waste Containers

1. The Contractor shall furnish appropriate containers (metal dumpsters with secure lids or covered roll-off containers) for construction debris and/or uncontaminated non-hazardous waste as required.
2. Waste shall be disposed of at frequent and regular intervals as required to prevent the overfilling of such containers. Place non-hazardous solid wastes, construction debris, and litter in containers in accordance with this specification.
3. The Contractor shall visually inspect all containers of wastes for leaks or damage prior to being loaded for transportation and off-site disposal. Transfer contents of any leaking or damaged container to another container or overpacks and re-inspect prior to loading. Clean up, contain, and label spilled materials for disposal in accordance with the Contract Documents.

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4. Any material that spills from containers shall be immediately cleaned and placed back into the waste containers.

D. Waste Transportation and Disposal

1. Dumpsters shall be emptied when full or as directed by the Engineer. There shall be no liquid allowed in the dumpsters.
2. Honeywell shall agree to the selection of disposal facilities in advance in writing.
3. The Contractor shall dispose of waste oils and petroleum products generated during the Work in a safe and environmentally responsible manner.
4. A Honeywell Representative will sign all waste profile sheets for waste characterization and manifest(s) for off-site waste disposal of all regulated site generated waste.

E. Non-Hazardous Wastes

1. The Contractor shall load, transport, and dispose of non-hazardous wastes generated in performance of the Work.
2. Waste containers shall be "sealed" non-leaking dumpsters, or equivalent; maintained to prevent leakage.
3. Before waste containers become full, the Contractor shall dispose of waste off-site.
4. If required, the Contractor shall dispose of non-hazardous wastes at a permitted off-site facility using a permitted waste transporter.
5. A non-hazardous waste manifest or Bill of Lading, signed by Honeywell or appointed delegate, shall accompany each waste shipment. The original paperwork, stamped received and signed by the disposal facility, shall subsequently be returned to the Engineer.
6. The Contractor shall furnish all paperwork to the Engineer.

F. Hazardous & TSCA Waste

1. Honeywell will contract the transportation and disposal (T&D) of all hazardous wastes requiring off-site disposal directly with the T&D facility. Honeywell will decide who will be responsible for waste characterization.
2. Honeywell will select waste transportation and disposal contractor(s) and issue necessary Purchase Order(s).
3. The Contractor shall:
 - a. Manage hazardous wastes in accordance with RCRA and/or TSCA regulations.
 - b. Place drummed wastes in a lined temporary staging area with berms, aisle space, stacking height, periodic logged inspections, stormwater management, and security in accordance with applicable RCRA regulations for drum management.

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- c. Furnish itemized estimated volumes for Hazardous and TSCA Wastes to be generated by their operations (decontamination waste, used PPE, emergency response waste, etc.).
- d. Place waste materials for off-site disposal in the proper transportation containers, label waste containers, sample and characterize waste, provide temporary storage, prepare waste manifest and coordinate transportation with Honeywell.
- e. Coordinate the management, handling, transport and off-site disposal of hazardous or TSCA regulated wastes resulting from the Work.
- f. Allow seven working days for Honeywell to review and agree to the characterization and manifest documentation prior to scheduling transportation.

3.08 USE OF CHEMICAL PRODUCTS

- A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall be approved by the U.S. EPA or U.S. Department of Agriculture or any other applicable regulatory agency.
- B. The Contractor shall obtain required certifications, permits, and inspections and comply with all Federal, State, Local, and DOT codes, ordinances, regulations, statutes and standards governing transportation, handling, storage, and use of chemical products and residues.
- C. The Contractor shall refer to the pertinent MSDS for information on all chemical products used or present at the Site.

3.09 FUEL AND LUBRICANTS

- A. The Contractor shall comply with all applicable Federal, State, and Local codes, ordinances, regulations, statutes and standards concerning transportation and storage of fuels and lubricants.
- B. Fuel storage area and fuel equipment will be approved by the Engineer prior to installation.
- C. The Contractor shall report spills or leaks from fueling equipment or construction equipment to the Engineer and cleanup as required.
- D. The Engineer will require the Contractor to remove damaged or leaking equipment from Project site.

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3.10 DECONTAMINATION

- A. The Contractor shall properly decontaminate all tools and equipment before removal from site.
- B. The Contractor shall properly decontaminate all supplies and materials before removal from site, or manage as waste materials in accordance with the requirements of this specification.
- C. The Contractor shall use decontamination pads in order to separate exclusion and clean zones.
- D. All decontamination water collected in the decontamination pad shall be managed as construction water as per Section 02140 – Construction Water Management.

[END OF SECTION]

SPECIFICATION NO: 01300

SPECIFICATION TITLE: DOCUMENT SUBMITTAL PROCEDURE

PROJECT NO: 448847

PROJECT TITLE: SCA FINAL COVER DESIGN

CLIENT: HONEYWELL

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SECTION 01300

DOCUMENT SUBMITTAL PROCEDURE

PART 1 GENERAL

1.01 SUMMARY

- A. The purpose of this Section is to define the roles and responsibilities of the Contractor and Engineer in the submittal process and to present the procedures for review, approval, and final disposition of contractor submittals during the construction phase.
- B. This specification applies to all incoming or outgoing documentation originated by the Contractor throughout the duration of the SCA Final Cover Construction Project.

1.02 DEFINITIONS

- A. General definitions:
 - 1. Document- Any technical drawings, specifications, data sheets, manuals, calculations, etc., received from the Contractor including electronic media such as CD-ROM, email file attachments, etc.
 - 2. Submittal Coordinator- Employee of Engineer responsible for the receipt, coordination, and status reporting, of Contractor documentation.
 - 3. Procurement Manager- Employee of Engineer responsible for distributing request for proposal (RFP) and supporting documentation packages.
 - 4. Website Administrator- Employee of Engineer responsible for providing access to the Project Website, assisting with questions and maintaining the Project Website.
 - 5. Prints/Copies- The documents submitted will be distributed for Engineer review.
 - 6. Reproducible- Unbound document available for use in duplication.
 - 7. Electronic Copy- Files and attachments sent electronically via email or uploaded to the Project Website shall be in **PDF, XLS, or DOC** formatting.

1.03 SUBMITTAL REQUIREMENTS

- A. General:
 - 1. Dimensions and calculations are to be in standard units
 - 2. Language Requirements: English
 - 3. All documents must be numbered appropriately
 - 4. Submittals shall include a Document Transmittal Form

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- B. Preliminary drawings and documents to contain sufficient information to enable Engineer to proceed as necessary.

1. Submittals shall be uploaded to the Project Website.

- C. Contractor Project Website:

Parsons “Project Website” or “Website”, also known as the “ParShare Site” is a Microsoft SharePoint website, designed to allow a central storage and collection site for documentation, information, and ideas. The website has been developed to facilitate and maintain deliverables submitted between the Contractor and the Engineer. Documents uploaded by the Contractor will not be accessible by any other group other than the Engineer. If outside parties are required to review the documents, then the files will be transferred appropriately.

1. Project Website Access

- a. The Contractor must receive permission from the Website Administrator to access the Project Website. Prior to receiving access, the Contractor must submit names, and email addresses of individuals who will require access to the website.
- b. Permission will be assigned based on the intended use and activity of the Contractor.
- c. The Contractor will receive an email from the Website Administrator that provides a username and password. Upon receipt of this email, the user will be required to access the website and change their password. Instructions for changing passwords will be forwarded at the time permission is granted.

- D. All submittals shall be labeled with the submittal number and shall be included on the Transmittal (e.g., 1, 2, 3, etc.).

1.04 SUBMITTAL PROCEDURES

- A. The Contractor shall upload the required documents to the Project Website.

1. Project Website and Submittals

- a. The website will be used to transfer documentation between the Contractor and Engineer.
- b. The Contractor will upload the submittal documents to the project website in the proper folder location.
- c. The Contractor will notify the Submittal Coordinator and Construction Manager that a submittal has been uploaded to the project website via email. The email shall contain the submittal title and corresponding submittal number.

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- B. The Submittal Coordinator will distribute the submittal documents to the Engineer for appropriate management, engineering/design, project control, document review, etc.
- C. Following the Engineer document review, the Submittal Coordinator shall return the submittal with the disposition based on the comments.
 - 1. The Submittal Coordinator will upload the submittal response to the Project Website.
 - 2. The Submittal Coordinator will notify the Contractor via email that the submittal has been reviewed.
 - 3. The Engineer will provide a disposition to each reviewed submittal using the following codes:
 - a. No Exceptions
 - b. Exceptions as Noted
 - c. Proceed with Work
 - d. Resubmit
 - e. Submit Certified Prints
 - 4. If comments or revisions are provided by the Engineer, the Submittal Coordinator shall return redlined submittals showing changes and/or comments to the Contractor either electronically or on hardcopy, as appropriate for the document submittal. A document transmittal shall be included identifying disposition and comments.
 - 5. A document transmittal shall be included identifying disposition, comments, and the statement *“Action taken hereon does not supersede requirements of applicable design drawings, specifications, orders, codes or regulations or relieve the Contractor or Supplier from responsibility for errors or omissions.”*
 - 6. The Contractor shall resubmit revised documents when the “Resubmit” disposition is indicated. The Contractor shall not proceed with work unless the “Proceed with Work” disposition is indicated.

1.05 TRANSMITTAL PROCEDURES

- A. The Contractor shall include Document Transmittal Form (Attachment 1) with the submittal.
- B. Document Transmittal Forms will be numbered sequentially and identify document resubmitted as follows:
 - 1. Original Transmittal Number – Example: 01
 - 2. Resubmitted Document Transmittal Number- Example: 01a
 - 3. New Document Submittal- Example: 02

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- C. The transmittal will also include a statement indicating that the document(s) provided for review meet all requirements of the Contract Documents, or will explicitly indicate exceptions and/or substitutions.

1.06 REVIEW PROCEDURE

- A. The Contractor shall be required to submit all documentation in accordance with the agreed dates.
- B. The Engineer will review the documentation within two (2) weeks following the submittal.
- C. The Contractor shall have one (1) week to revise and make any necessary comments. The Contractor may request additional revision time if needed based on the extent of comments. The Engineer must acknowledge and confirm extension in writing to the Contractor.
- D. The Engineer will have one (1) week to review and return any resubmitted documents.
- E. Subsequent reviews and resubmittals will follow the guideline of one (1) week review cycle.

1.07 REQUEST FOR INFORMATION

- A. The Contractor may request additional information/clarification from the Engineer through a Request for Information (RFI) process and submittal of the RFI Form (Attachment 2).
- B. The Contractor shall upload a completed RFI form to the Project Website and notify the Construction Manager and Submittal Coordinator via email.
- C. RFI Forms shall be numbered sequentially
1. Example- RFI-01; RFI-02.

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Attachment 1

Job Title
Submittal Transmittal

To:**From:****Job Number:****Submittal Number:****Date Transmitted to Document Control:****Specification Section/Reference:****Title:****Notes:**

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Attachment 2



REQUEST FOR INFORMATION

Project #: _____ RFI #: _____
 Project Title: _____ Subcontract/PO#: _____
 Engineer: _____ Subcontractor: _____
 Drawing # _____ Spec #: _____

Information:
1. Estimated Cost Impact:
2. Estimated Schedule Impact:
3. Prepared By:
4. Requested Response By:
5. Written Description (attach sketches if applicable):
6. Subcontractor's Solution:
7. Project Engineer's Response:
Attachment Sheets:

Subcontractor: _____ Date: _____

Project Engineer: _____ Date: _____

PARSONS

Rev # 0

Issue Date: March 15, 2011

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[END OF SECTION]

SPECIFICATION NO: 01720

SPECIFICATION TITLE: PROJECT SURVEYING

PROJECT NO: 448847

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CLIENT: HONEYWELL

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SECTION 01720

PROJECT SURVEYING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of all labor, equipment, tools, materials, services, supervision and incidentals necessary to perform all surveying necessary for completion of the Work as described herein, shown on the Contract Drawings, or as directed by the Engineer. Work in this Section includes, but is not limited to:
1. Using recognized engineering and survey practices to:
 - a. Establish elevations, lines, levels and utility locations, slopes and invert elevations.
 - b. Locate and lay out construction features including necessary stakes for cut, fill, placement, and grading operations.
 - c. Verify set-backs and easements.
 2. Confirming drawing dimensions and elevations.
 3. Establishing survey control.
 4. Performing pre-construction, intermediate, and post-construction surveys.
 5. Verifying thickness and elevations of placed materials with those shown on the Contract Drawings or as directed by the Engineer.
 6. Preparing Final Record Survey Drawings of the construction.
- B. Related Work specified in other Sections includes, but is not limited to:
1. Section 01300 – Document Submittal Procedures
 2. Section 02200 – Earthwork
 3. Section 02235 – Protective Soil Layer
 4. Section 02250 – Vegetative Soil Layer
 5. Section 02219 – Waste Grading, Consolidation and Disposal

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards.
- B. Surveying shall be conducted in accordance with Education Law Article 145. Where the Contract Documents require work to be performed by, or under the direction of, a Professional Land Surveyor, (PLS) or a Professional Engineer (PE), that person and firm shall be currently licensed in New York as per Article 145.

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Specification Title	Project Surveying	Date:	04/10/2015

1.03 REFERENCES

- A. Federal Geodetic Control Committee (FGCC) – Standards and Specifications for Geodetic Control Networks, (1984).
- B. US Army Corp of Engineers (USACE) – Engineering and Design – Hydrographic Surveying, (2002).

1.04 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:
 - 1. Name and address of Professional Engineers or Surveyors to be used.
 - 2. Resumes of the Professional Engineers or Surveyors conducting the work at least 10 workdays in advance of survey work.
 - 3. Survey methods and equipment to be used at least 10 workdays in advance of survey work.
 - 4. Electronic survey files in AutoCAD, version 2007 or more recent, or as electronic files in Microsoft Excel, to the Engineer prior to proceeding to the next construction phase.
 - 5. Related surveyor information, calibration certificates, field notes and as-built drawings.
 - 6. Signed and sealed as-built survey in D-size (Final Record Survey Drawings with Letter of Certification) showing final grades and lines.

1.05 QUALITY CONTROL

- A. The following minimum standards are required for:
 - 1. Project Control, as per the Standards and Specifications for Geodetic Control Networks, (1984):
 - a. Horizontal control at Third Order, Class I.
 - b. Vertical control at Third Order.

1.06 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

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Specification Title	Project Surveying	Date:	04/10/2015

PART 2 PRODUCTS (NOT APPLICABLE)**PART 3 EXECUTION****3.01 GENERAL**

- A. Special survey requirements and deliverables such as GPS, data management formatted drawings and figures, etc., will be stipulated in the technical specifications.
- B. The Contractor shall notify the Engineer at least 2 working days in advance of any record survey activities planned.
- C. The survey shall be sequenced in each designated area as appropriate for Work, or as otherwise directed by the Engineer.
- D. Topographic elements shall be collected and reported as three dimensional data within the electronic file surveys as described under Section 01300 – Document Submittal Procedure.
- E. Coordinate systems shall be based on NAD83 datum.
- F. Base elevation shall be referenced to NAVD88.
- G. Protect and maintain all horizontal and vertical control points during construction.
- H. Work done using methods or equipment not agreed to by the Engineer shall be subject to removal and replacement.

3.02 SURVEY CONTROL POINTS

- A. Establish all necessary baselines, horizontal control points, and vertical control benchmarks in order to properly complete construction work and make quantity measurements. Survey control points shall be established such that any point within the job site can accurately be re-established and elevations obtained to the required tolerances at any time during the course of construction. The Surveyor shall tie all baselines, horizontal and vertical control benchmarks into survey information provided on the Contract Drawings.
- B. Survey Control Point Requirements
 - 1. Establish survey control points prior to starting work.
 - 2. Use appropriate offset staking method for grade markers and other survey control points that interfere with the Work.
 - 3. Protect and preserve survey control points during construction.
 - 4. Survey control points shall not be relocated without prior written approval from the Engineer.
 - 5. Promptly report any dislocated, damaged or destroyed survey control point to the Engineer.

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6. Replace dislocated, damaged or destroyed survey control points as per original survey.

C. Survey Monuments (GPS Specs)

1. Unless otherwise specified, the Control Datum shall be horizontal coordinate grid system as per the Construction Drawings and the National American Vertical Datum (NAVD).
2. Reference site survey and reference points to offsite control monuments and record locations of all survey control points, using the Control Datum, on as-built drawings.

D. Record Drawing of Benchmarks and Control Points

1. The Contractor shall provide a Record Drawing of Benchmarks and Control Points to be used for the project at the beginning of survey work and whenever they are altered or added. The Record Drawing shall include both pre-existing and newly installed benchmarks and control points. This Record Drawing shall be signed and sealed by a PLS as permitted or required by NYS Education Law Article 145.

3.03 SURVEY DURING CONSTRUCTION

- A. Perform surveys as needed throughout the progress of the work to determine pay quantities and document work that has been performed. Work shall include, but shall not be limited to, surveys of exposed utilities and top of fill layers (i.e., leveling layer, protective soil layer, and vegetative soil layer).
- B. Do not proceed with placement of an overlying layer, excluding individual lifts of a layer, or with subsequent work phases until the PLS or PE has completed survey measurements and the data have been reviewed by the Engineer.

3.04 FINAL RECORD AS-BUILT SURVEY

- A. As the work progresses, perform a survey to document the condition of the site. The survey shall accurately locate features that are to be shown on the Final Record Survey Drawing. Included in this Final Record Survey will be preparation of as-built sections defining the top of final fill layers as well as any known utilities. The Final Record Survey shall be signed and sealed by a PLS or PE as permitted or required by NYS Education Law Article 145.

[END OF SECTION]

SPECIFICATION NO: 02100**SPECIFICATION TITLE: SITE PREPARATION****PROJECT NO: 448847****PROJECT TITLE: SCA FINAL COVER DESIGN****CLIENT: HONEYWELL**

				APPROVALS								
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
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Specification No.	02100	Page:	2 of 3
Specification Title	Site Preparation	Date:	04/10/2015

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section describes the necessary activities to prepare the site for the installation of the SCA final cover system. This section describes all labor, equipment, tools, materials, services, supervision and incidentals necessary to complete the Work described herein. Work in this Section includes, but is not limited to:
1. Clearing and grubbing, if necessary, to establish access routes, support areas, and other work areas as necessary to complete the Work, or as directed by the Engineer.
 2. Verification of existing benchmarks and control point network. Expansion of SCA survey control point network, if needed.
- B. Related Work specified in other Sections includes, but is not limited to:
1. Section 01720 - Project Surveying
 2. Section 02140 - Construction Water Management
 3. Section 02200 - Earthwork
 4. Section 02219 - Waste Grading, Consolidation, and Disposal
 5. Section 02370 - Erosion Control

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards.

1.03 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Submittal Procedures and as elsewhere specified in this Section:
1. If needed, the Contractor's proposed Limits of Clearing and Grubbing for approval by the Engineer.
 2. If needed, proposed survey control network expansion plans, in accordance with Section 01720 – Project Surveying.

1.04 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between

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the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

- B. This section assumes decommissioning of the dredge operations system will be completed prior to SCA final cover construction.

PART 2 PRODUCTS (NOT APPLICABLE)**PART 3 EXECUTION****3.01 CLEARING AND GRUBBING**

- A. If required, clearing and grubbing activities to take place outside the limits of the SCA will be approved by the Engineer.

3.02 CONSTRUCTION WATER MANAGEMENT

- A. Manage construction water in accordance with Section 02140 - Construction Water Management.

3.03 CONTROL POINT NETWORK EXPANSION

- A. Existing site benchmark and control point network shall be verified in accordance with Section 01720 – Project Surveying.
- B. As necessary, expand SCA survey control point network to properly complete and document construction activities. The survey control network shall be expanded in accordance with Section 01720 – Project Surveying.

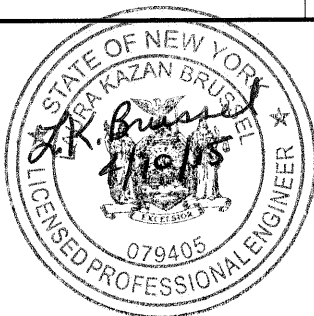
3.04 SITE UTILITIES

- A. The contractor is responsible for marking out utilities and conducting underground utility investigations to ensure all utilities requiring protection are protected throughout construction.

[END OF SECTION]

SPECIFICATION NO: 02140**SPECIFICATION TITLE: CONSTRUCTION WATER MANAGEMENT****PROJECT NO: 448847****PROJECT TITLE: SCA FINAL COVER DESIGN****CLIENT: HONEYWELL**

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Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
0	4/10/2015	5	Issued For Agency Approval and Construction	JJH/PLR	SRB/PEB	LKB						
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Specification No.	02140	Page:	2 of 5
Specification Title	Construction Water Management	Date:	04/10/2015

SECTION 02140

CONSTRUCTION WATER MANAGEMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of all labor, equipment, tools, materials, services, supervision and incidentals necessary to collect, handle and store construction water and leachate as described herein, shown on the Contract Drawings, or as directed by the Engineer. This section does not include information associated with stormwater management. Such information is addressed in the project SWPPP and Section 02370 – Erosion Control. Work in this Section includes, but is not limited to:
1. The Construction Water Management Procedures detailing the collection, handling and storage of all construction water and leachate generated during construction.
 2. Provision of all labor, equipment, tools, materials, services, supervision and incidentals required for the collection, handling and storage of all construction water and leachate in accordance with this Section.
- B. Related Work specified in other Sections includes, but is not limited to:
1. Section 02100 – Site Preparation
 2. Section 02200 – Earthwork
 3. Section 02219 – Waste Grading, Consolidation, and Disposal
 4. Section 02370 – Erosion Control

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards.
- B. The Contractor is to obtain and operate within all applicable Local, State, and Federal permits and requirements. Any and all civil, criminal, and monetary penalties associated with non-compliance in any regard shall be the responsibility of the Contractor.

1.03 REFERENCES

- A. New York State Standards and Specifications for Erosion and Sediment Control, (Blue Book, Latest Version).
- B. New York State Stormwater Management Design Manual, (Latest Version).

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Specification Title	Construction Water Management	Date:	04/10/2015

1.04 DEFINITIONS

A. Construction Water shall be defined as water/liquids that contact contaminated materials, and includes the following:

1. Water which has come in contact with exposed geotextile tubes, contaminated soils, sediments, or debris that have been disturbed by construction-related activities; with the exception of water classified as stormwater as defined in Subpart 1.04.B.

2. Liquids generated during decontamination activities.

B. Stormwater shall be defined as water/liquids that do not contact disturbed contaminated materials, and includes the following:

1. Water incident upon or draining from undisturbed areas. This water shall be diverted as required to prevent contact with the construction operations.
2. If disturbed contaminated materials are covered by clean materials (e.g., soil, geotextile, plastic sheeting) or otherwise stabilized, waters that stand on or flow over/from that surface shall be defined as stormwater.

Stormwater shall be controlled and managed as described in Section 02370 – Erosion Control and in accordance with the SWPPP.

C. Leachate shall be defined as any liquid that passes through the contaminated fill contained within the SCA, including the geotextile tubes and any material within the debris management area.

D. Residual solids shall be defined as solids resulting from the construction water management operations, including sediment accumulated in settling ponds or basins, precipitates and filtered suspended solids. Handling of residual solids shall be addressed in Section 02219 – Waste Grading, Consolidation, and Disposal.

1.05 SUBMITTALS

A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:

1. Quality Control Work Plan.

1.06 QUALITY CONTROL

A. The Contractor shall submit a Quality Control (QC) Work Plan for review. Once instituted, the Contractor shall use the QC Work Plan to ensure that the Work meets the requirements of the Contract Documents.

1.07 PROJECT AND SITE CONDITIONS

A. The Contractor shall carefully examine the site to determine the full extent, nature and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between

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Specification Title	Construction Water Management	Date:	04/10/2015

the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

PART 2 PRODUCTS

2.01 GENERAL

A. Construction Water Management Procedures

1. Contractor shall be responsible for the collection, handling, and storage of all construction water and leachate generated within the limits of the SCA site, and shall do so in accordance with the requirements of this Section. Construction water and leachate shall be routed to an on-site WTP operated by others.
2. The Contractor is responsible for the coordination of transferring construction water and leachate from the SCA to the on-site WTP operated by others.

B. Services, Facilities and Personnel: The Contractor shall provide all means, methods, services, facilities, power, equipment, tools, material, consumables, incidentals, labor and supervision necessary to collect, handle, store, transport and otherwise manage construction water and leachate.

C. Stormwater shall be diverted to drainage features with no further treatment necessary, following the procedures in Section 02370 – Erosion Control and the SWPPP.

PART 3 EXECUTION

3.01 PREPARATION

- A. It shall be the responsibility of the Contractor to investigate and comply with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards governing the collection, handling, and storage of all construction water generated during the execution and completion of the Work. The Contractor shall obtain all required permits, manifests, and approvals required for the collection, handling, and storage of all construction water generated during the execution and completion of the Work.
- B. Construction water shall be managed using equipment compatible with anticipated contaminants which may be present.

3.02 MINIMIZATION OF CONSTRUCTION WATER

- A. The Contractor shall minimize the generation of construction water and associated residual solids. Methods to minimize generation of construction water may include, but are not limited to:
1. Erection of temporary berms or construction of temporary ditches.
 2. Use of low permeability tarpaulins, geotextiles, or other suitable means to cover exposed contaminated areas and materials.

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3. A layer of uncontaminated soil as daily cover to cover exposed contaminated areas and materials.
4. Installation of 3-inch interim uncontaminated soil cover on a temporary basis in areas to be capped.
5. Limiting the amount of exposed contaminated areas.
6. Grading to control run-on and run-off.
7. Engineering controls on construction activities to minimize contact of personnel and equipment with contaminated areas, thus minimizing the amount of decontamination or other methods required.

[END OF SECTION]

SPECIFICATION NO: **SECTION 02141**

SPECIFICATION TITLE: **GAS MANAGEMENT SYSTEM**

PROJECT NO: **448847**

PROJECT TITLE: **ONONDAGA LAKE SCA FINAL DESIGN**

CLIENT: **HONEYWELL, INC.**

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	05-04-2016	11	For Agency Approval and Construction	RW	SB	JFB
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Specification Title	Gas Management System	Date:	4 May 2016

SECTION 02141

GAS MANAGEMENT SYSTEM

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Section describes the materials, installation, and testing requirements to perform the installation, quality control, and maintenance of the gas management system for the final cover system of the Sediment Consolidation Area (SCA).

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:
 - 1. Section 01030 Environmental Protection
 - 2. Section 01300 Document Submittal Procedures
 - 3. Section 01720 Project Surveying
 - 4. Section 02100 Site Preparation
 - 5. Section 02200 Earthwork
 - 6. Section 02235 Protective Soil Layer
 - 7. Section 02250 Vegetative Soil Layer
 - 8. Section 02710 Geotextile
 - 9. Section 02735 Geocomposite Drainage Layer
 - 10. Section 02740 Geomembrane Cover

1.03 REFERENCES

- A. Latest version of the American Society for Testing and Materials (ASTM) standards:
 - 1. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.
 - 2. ASTM D 696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer.
 - 3. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - 4. ASTM D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

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5. ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
6. ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
7. ASTM D 1525 Standard Test Method for Vicat Softening Temperature of Plastics.
8. ASTM D 1603 Standard Test Method for Carbon Black Content in Olefin Plastics.
9. ASTM D 1693 Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
10. ASTM D 2240 Standard Test Method for Rubber Property—Durometer Hardness.
11. ASTM D 2513 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
12. ASTM D 3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DRPR) Based on Controlled Outside Diameter.
13. ASTM D 3350 Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
14. ASTM F 714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDRPR) Based on Outside Diameter.
15. ASTM F 1473 Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins.

- B. PPI TR-3 – Policies and Procedures for Developing Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials or Pipe.
- C. PPI TR-4 – PPI Listing of Hydrostatic Design Bases (HDB), Pressure Design Bases (PDB) and Minimum Required Strengths (MRS) for Thermoplastic Piping Materials.

1.04 SUBMITTALS

- A. Submit the following to the Engineer for review in accordance with Section 01300 – Document Submittal Procedure, not less than 14 calendar days prior to shipment.
 1. A list of materials to be furnished with the names of the suppliers and proposed delivery dates of the materials to the Site;
 2. Documentation demonstrating that the Manufacturer has adequate quality control procedures to ensure that fabrication of the High Density Polyethylene (HDPE) pipe complies with the requirements of this Section.

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3. Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used.
 4. Minimum Manufacturer-certifiable values and corresponding test methods for HDPE material properties listed in Table 1; submit values that are specific to the resin used in manufacture.
 5. Material safety data sheet (MSDS) for HDPE.
 6. Geocomposite: Refer to Section 02735 – Geocomposite Drainage Layer.
 7. Geotextile: Refer to Section 02710 – Geotextile.
 8. Gravel: Sieve analysis report.
- B. Submit copies of quality control certificates issued by the resin supplier, including the production dates and origin of the resin used to manufacture the HDPE products for the SCA Final Cover and certification that no reclaimed polymer is added to the resin during manufacture of the HDPE products for this Project to the Engineer for review not less than 14 calendar days prior to shipment.
- C. Submit to the Engineer for review not less than 14 calendar days prior to installation of material covered by this Section, Manufacturer's written certification of compliance of the material with this Section. Include in this certification of compliance a final inspection and written record of the inspection. The inspection shall include the following for HDPE pipes, fittings, caps, and appurtenances:
1. dimensional check;
 2. material quality check;
 3. weld quality; and
 4. hydrostatic testing and/or leak check.
- D. Submit to the Engineer not less than 14 calendar days prior to commencement of work described in this Section, a list of equipment and materials; description of construction means, methods, and techniques; and other required information for installation of the components of the gas management system, including but not limited to HDPE pipes, geocomposite, geotextile, and gravel.

1.05 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide as-built revisions to the SCA Final Cover Contract Drawings in accordance with Section 01300 – Document Submittal Procedures.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the installed gas management system.

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1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the gas management system will be monitored as part of the final cover installation and as required in the CQA Plan.
- B. The Contractor shall be aware of the activities required of the Engineer by the CQA Plan and shall account for these activities in the construction schedule.
- C. The Contractor shall correct all deficiencies and nonconformances identified by the Engineer at no additional cost to the Owner.
- D. Construction quality control is the responsibility of the Contractor. The Engineer will inspect and approve the Contractor's field quality control measures.
- E. HDPE pipes, reducers, fittings, caps, and appurtenances shall be rejected for failure to conform to Specifications or the following:
 - 1. Fractures or cracks passing through pipe wall. Pipes within one shipment shall be rejected if defects exist in more than one percent of shipment or delivery.
 - 2. Cracks sufficient to impair strength, durability or serviceability of pipe.
 - 3. Defects indicating improper proportioning, mixing, and molding.
 - 4. Damaged ends, where such damage prevents making satisfactory joint.
- F. Acceptance of reducers, fittings, caps, stubs, or other specifically fabricated HDPE sections shall be based on visual inspection at job site and documentation of conformance to these Specifications.
- G. CQA of the geotextile and geocomposite material shall be performed as required in the CQA Plan.

PART 2 – PRODUCTS

2.01 HDPE VENT PIPE

- A. Furnish 4-inch diameter HDPE standard dimension ratio of 17 (SDR 17) vent pipe. Perforations of HDPE vent pipe shall be factory-drilled as shown on the Contract Drawings.
- B. Materials used for the manufacture of polyethylene pipe shall meet all industry standards. In general, pipes utilized for the gas management system shall conform with ASTM D 2513. ASTM F 714 or ASTM D 3035 may be used based on the approval of the Engineer.

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- C. Polyethylene compounds utilized in the manufacture of products furnished under this specification shall have a grade PE34, as defined in ASTM D 3350. The Contractor shall furnish HDPE piping material having properties that comply with the required values shown in Table 1.
- D. Polyethylene compounds utilized in the manufacture of products shall have a Plastic Pipe Institute (PPI) recommended hydrostatic design basis (HDB) of 1,600 psi at a temperature of 73.4°F and 800 psi at a temperature of 140°F. Hydrostatic Design Stress (HDS) shall be 800 psi at a temperature of 73.4°F and 400 psi at a temperature of 140°F. Material shall be listed in the name of the pipe and fitting manufacturer.
- E. PPI material listing in the name of the resin supplier is not acceptable in meeting this requirement.
- F. The pipes shall be homogeneous throughout and free from visible cracks, holes (except for the designed perforated portion), foreign inclusions or other injurious defects. The pipes shall be as uniform as commercially practical in color, opacity, density and other physical properties.
- G. The nominal inside diameter of the pipes shall be true to the specified size in accordance with ASTM D 2513.
- H. Pipes, fittings, and appurtenances should be produced by the same manufacturer from identical materials meeting the requirements of this specification.

2.02 GEOCOMPOSITE

- A. Furnish shop-fabricated minimum 4.5-ft wide and 250-mil thick double-sided geocomposite strips for the gas management system. Properties of the geocomposite material shall be in accordance with Section 02735 – Geocomposite Drainage Layer.

2.03 GEOTEXTILE

- A. A geotextile cushion layer shall be installed above the leveling layer soil prior to placement of the geomembrane cover.. Properties of the geotextile material shall be in accordance with Section 02710 – Geotextile.

2.04 GRAVEL

- A. Gravel layer shall be a non-calcareous washed 1- to 2-inch diameter round rock or washed #4 round gravel, approved by the Engineer. Gravel shall not impair flow to perforations/slots.

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- B. Gravel shall be substantially free from organic materials, loam, wood, trash and other objectionable materials.

2.05 MANUFACTURER'S QUALITY ASSURANCE / CONTROL

- A. The HDPE pipes and fittings manufacturer shall have an established quality assurance program responsible for inspecting incoming and outgoing materials.
- B. The HDPE pipes and fittings manufacturer shall have an established quality assurance program responsible for assuring the long term performance of materials and products.
- C. The HDPE pipes and fittings manufacturer shall maintain permanent quality control and quality assurance records.
- D. The geocomposite manufacturer quality assurance program and records shall be in accordance with Section 02735 – Geocomposite Drainage Layer.
- E. The geotextile manufacturer quality assurance program and records shall be in accordance with Section 02710 – Geotextile.

2.06 LABELING

- A. Each standard and random length of HDPE pipe in compliance with this Specification shall be clearly marked with the following information:
 - 1. ASTM Standard Designation
 - 2. Manufacturer's Name
 - 3. Pipe Size and Sizing System
 - 4. Class & Profile Number
 - 5. Production Code
 - 6. Standard Dimension Ratio
 - 7. Manufacturing Standard Reference
 - 8. Manufactured Date

2.07 TRANSPORTATION, HANDLING, AND STORAGE

- A. Deliver all products for the gas management system to the Site at least 14 calendar days prior to the planned installation date.
- B. The HDPE pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport by commercial carrier. When delivered, a receiving inspection shall be performed by the Contractor, and any shipping damage reported to the pipe and fittings manufacturer. Pipe and fittings shall be

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handled, installed, and tested in accordance with manufacturer's recommendations, and the requirements of this specification.

- C. Transportation, handling, and storage of the geocomposite material shall be in accordance with Section 02735 – Geocomposite Drainage Layer.
- D. Transportation, handling, and storage of the geotextile material shall be in accordance with Section 02710 – Geotextile.

PART 3 – EXECUTION

3.01 FAMILIARIZATION

- A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section.
- B. Inspection:
 - 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.
 - 2. If the Contractor has any concerns regarding the installed work of other Sections, the Contractor shall immediately notify the Engineer in writing. Failure to inform the Engineer in writing or continuance of installation of the geocomposite will be construed as the Contractor's acceptance of the related work of all other Sections.

3.02 HANDLING AND PLACEMENT - HDPE VENT PIPES

- A. Deliver HDPE pipes to the Site at least 14 calendar days prior to the planned installation date.
- B. Provide proper handling and storage of HDPE pipes, reducers, and caps at the Site. Protect materials from excessive heat and cold, dirt, moisture, cutting, and other damaging or deleterious conditions. Provide additional storage methods required by the Manufacturer.
- C. The exterior and interior surface of the pipes shall be free of gouges and scratches. Replace HDPE pipes that become gouged, twisted, or crimped. Remove damaged pipes from the Site.
- D. Install the HDPE vent pipes within a vertical tolerance of ± 1 inch and in accordance with details presented in the Contract Drawings.

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3.03 HANDLING AND PLACEMENT - GEOCOMPOSITE

- A. Deliver geocomposite strips to the Site at least 14 calendar days prior to the planned installation date.
- B. Install the geocomposite strips in accordance with Section 02735 – Geocomposite Drainage Layer. The geocomposite strips shall be installed to create a smooth surface on to which the geomembrane liner shall be deployed over. If geocomposite strips are not prefabricated, trimmed edges of the geocomposite strips shall be (i) wrapped with a 1 foot wide geotextile cushion; (ii) cut in a manner that avoids sharp edges; or (iii) protruding geonet strands shall be ground off. The edges of non-prefabricated strips with excessive geotextile shall be (i) continuously folded under the panel; (ii) cut off; or (iii) the upper geotextile component of the strip shall be heat tacked to the underlying geotextile cushion. Cutting of the geocomposite shall be conducted in an orderly manner to ensure all of the cutting utensils are managed properly and that no cutting will occur on or near the geomembrane liner.
- C. The seaming requirements in Section 02735 – Geocomposite Drainage Layer, Part 3.03 shall be followed for end-to-end seams only for geocomposite strips. No side-by-side seam down the slope shall be permitted (i.e., strips shall be of one continuous width).

3.04 HANDLING AND PLACEMENT - GEOTEXTILE

- A. Deliver geotextile wraps to the Site at least 14 calendar days prior to the planned installation date.
- B. Install the geotextile in accordance with Section 02710 – Geotextile.

3.05 GEOMEMBRANE COVER PENETRATION

- A. Perform penetrations through the geomembrane cover in accordance with details presented in the Contract Drawings and seaming and welding requirements presented in Section 02740 – Geomembrane Cover.
- B. Geomembrane seams and welds shall be tested and quality controlled in accordance with the requirements presented in Technical Specifications Section 02740.

3.06 SURVEY CONTROL

- A. Survey the installed gas management system for preparing the as-built layout drawing in accordance with Section 01720 – Project Surveying.

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3.07 PROTECTION OF WORK

- A. The Contractor shall protect all prior work and all materials and completed work of other Sections.
- B. In the event of damage or uneven geomembrane surfaces, the Contractor shall make all repairs or replacements necessary to be in full compliance with the Contract Documents.

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TABLE 1.REQUIRED HDPE PIPING PROPERTIES FOR VENT

Property	Unit	Test Procedure	Value
Material designation	-	ASTM/PPI	-
PPI material listing	-	PPI TR-4	PE 3408
Density	g/cm ³	ASTM D 1505	> 0.941
Melt index (190 °C / 2.16 kg)	g/10 min	ASTM D 1238	< 0.15
Flexural modulus	psi	ASTM D 790	110,000 – 160,000
Tensile strength at yield	psi	ASTM D 638	3,000 – 3,500
Environmental slow crack resistance (ESCR)	hours	ASTM D 1693 (f0, C) or F 1473 (PENT)	> 5,000 (for D 1693) > 10 (for F 1473)
UV stabilizer	% carbon black	ASTM D 1603	2 - 3
Brittleness temperature	°F	ASTM D 746	< -180
Vicat softening temperature	°F	ASTM D 1525	255
Thermal expansion coefficient	in/in/°F	ASTM D 696	< 12 x 10 ⁻⁵
Hardness	Shore D	ASTM D 2240	> 64

[END OF SECTION]

SPECIFICATION NO: SECTION 02200

SPECIFICATION TITLE: EARTHWORK

PROJECT NO: 448847

PROJECT TITLE: ONONDAGA LAKE SCA CLOSURE

CLIENT: HONEYWELL, INC.

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	04-10-2015	17	For Agency Approval and Construction	RW	SB	JFB
1	05-04-2016	18	For Agency Approval and Construction	RW	SB	JFB
<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR: <div><input type="checkbox"/> In-house Review <input type="checkbox"/> Client Review/Approval <input type="checkbox"/> Information Only</div> <div><input type="checkbox"/> Bid <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Other</div>			
<input type="checkbox"/> Revised Pages Only						
<input type="checkbox"/> Issued this Revision						



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SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, supervision, and incidentals necessary to perform all excavation, backfilling, and grading necessary for completion of the work shown on the SCA Final Cover Contract Drawings and as specified herein. The work shall include, but is not necessarily limited to: site preparation, dewatering, excavation, relocating, screening, stockpiling, preparing and/or hauling soils for proper disposal offsite or reuse onsite, subgrade preparation and grading, provision of imported fills, placement and compaction of leveling layer, survey control associated with earthwork, appurtenant work completed in accordance with the SCA Final Cover Contract Drawings and SCA Final Cover Technical Specifications, and all related work, as directed by the Engineer.
- B. All soil fill placed as a part of this project, including leveling layer in the SCA, diversion berms, and interception berms, shall be considered as leveling layer material and shall be placed, tested, and documented in accordance with the requirement of this Section unless specifically approved by the Engineer.
- C. The protective soil layer and vegetative soil layer are not considered part of the leveling layer.
- D. All granular material (gravel) to be placed to fill the bottom portion of the east and west sump areas in accordance with the Project Drawings.
- E. Use of riprap to: i) protect the final cover; ii) discharge non-erosive flows into the perimeter channels through a rock outlet protection apron; iii) create an armored, drivable spillway; iv) discharge non-erosive flows into the forebays through a rock outlet protection apron; v) create filter berm; and vi) discharge non-erosive flows into the basins through a rock outlet protection apron.
- F. All excavation, trenching, sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR PART 1926.650 Subpart P).

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:

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1. Section 01030 Environmental Protection
2. Section 01300 Document Submittal Procedures
3. Section 01720 Project Surveying
4. Section 02100 Site Preparation
5. Section 02140 Construction Water Management
6. Section 02219 Waste Grading and Consolidation
7. Section 02235 Protective Soil Layer
8. Section 02250 Vegetative Soil Layer
9. Section 02370 Erosion Control
10. Section 02735 Geocomposite Drainage Layer
11. Section 02740 Geomembrane Cover

1.03 REFERENCES

A. Latest version of American Society for Testing and Materials (ASTM) Standards:

1. ASTM D422 Standard Test Method for Particle Size Analysis of Soils.
2. ASTM D698 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
5. ASTM D2487 Standard Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
6. ASTM D2974 Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
7. ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
8. ASTM D5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
9. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
10. ASTM D 2434 Standard Test Method for Permeability of Granular Soils (Constant Head).
11. ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

B. Latest version of New York State Department of Environmental Conservation (NYSDEC) Regulations, Division of Environmental Remediation (DER)-10, Appendix 5 "Allowable Constituent Levels for Imported Fill or Soil".

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- C. New York State Department of Environmental Conservation, “Standards and Specifications for Erosion and Sediment Control”, New York State, Department of Environmental Conservation, Division of Water, August 2005.

1.04 SUBMITTALS

- A. The Contractor shall submit the following information to Engineer for review and approval in accordance with Section 01300 – Submittal Procedures and as elsewhere specified in this Section 14 calendar days prior to initiating earthwork activities:
1. List of equipment proposed for the earthwork;
 2. Proposed offsite borrow source(s);
 3. Dewatering methods and techniques;
 4. Quality Control Work Plan;
 5. Dust control equipment and procedures;
 6. Methods for supporting trenches, backfilling, soil placement, soil compaction, grading, and stormwater control;
 7. A written plan, as part of the Quality Control Work Plan, describing proposed cold weather placement and compaction methods and the weather parameters for which cold weather operations are proposed. This plan shall include protection of the work in accordance with requirements of this specification as well as measures to be taken for placement, compaction, and protection of the leveling layer under construction during freezing conditions. Protective measures may include, but are not limited to, the use of thermal blankets or a sacrificial soil layer.
 8. Coordination of survey requirements for the earthwork;
 9. Locations of on-site temporary soil stockpile areas;
 10. Coordination of earthwork activities with surface-water management and erosion and sediment control measures; and
 11. Schedule for earthwork activities.
- B. The Contractor shall be responsible for the adequacy and safety of the methods.
- C. Validated analytical test results as specified herein shall be submitted to the Engineer for review within two (2) working days of receipt of results. The Contractor shall not deliver material to the site prior to submission and approval by the Engineer of the geotechnical and analytical chemistry test results.

1.05 CONSTRUCTION QUALITY CONTROL

- A. The Contractor shall submit a Quality Control (QC) Work Plan for review to the Engineer. Once instituted, the Contractor shall use the QC Work Plan to ensure

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that the Work performed under the contract meets the requirements of the Contract Documents.

B. The Contractor shall submit the name of a qualified Independent Testing Laboratory (ITL) to the Engineer for review.

1. The Contractor shall submit to the Engineer for approval, the company name, address, and qualifications of the selected ITL proposed for use at the project. Included in this submittal will be the names and qualifications of the individuals who are proposed for assignment to the site. The Engineer reserves the right to request other information regarding the qualifications of the ITL for use in the evaluation process.

C. Sampling

1. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to document material property compliance with the specifications.
2. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to certify and document that imported material meets the allowable analytical compound concentrations and properties specified in this Section. These samples will be collected and transported in compliance with the QC Workplan. The Engineer reserves the right to observe sampling and testing of the materials. The Contractor shall provide at least 24-hours notice of a sampling event to the Engineer.
3. Representative samples of each specific material type from each specific material source will be obtained by compositing at least five randomly selected individual samples of approximately equal weight. The total composite sample mass shall be at least the minimum size required to conduct all of the required material property and analytical chemistry tests for that material type. Each of the individual samples will be obtained from within the boundaries of the material mass that the composite sample represents.
4. Contractor quality control samples may be obtained from in situ samples for pre-approval of a dedicated borrow source area. The sampling methodology and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.
5. Contractor quality control samples may also be obtained from dedicated stockpiles or storage/transportation vessels. The sampling methodology and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.

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D. Sample Frequency

1. Each imported fill material type shall be tested at the following batch sizes (Note: Testing conducted for the Onondaga Lake portfolio may be considered with respect to sample frequency if originating from the same source.):
 - a. For the first 25,000 cubic yards of each fill type from a specific fill source, a representative composite sample will be obtained from each 2,500 cubic yards (in-place volume) batch or part thereof.
 - b. If ten consecutive acceptable test results have been obtained on samples representing the first 25,000 cubic yards or greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 5,000 cubic yards for the subsequent material deliveries.
 - c. If ten consecutive test results have been obtained on samples representing the next 50,000 cubic yards or greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 10,000 cubic yards for the subsequent material deliveries.

E. Analytical Chemistry Testing

1. These samples will be sent to an Analytical Chemistry Testing Laboratory (ACTL) selected by the Engineer. Each composite sample for each material shall be tested for the compounds in Appendix 5 of DER-10. All test results for materials below the geomembrane liner shall be below the Commercial cleanup objective concentrations provided in Appendix 5, with exceptions (including materials identified for beneficial reuse) as approved by NYSDEC. Leveling layer placed above the liner shall meet the same analytical criteria as the protective soil layer (Section 02235). Failure of a single compound test result shall mean that the entire material batch will be rejected unless specifically accepted on a test-by-test basis in writing by the Engineer.

F. Material Property Testing

1. Each composite sample shall be tested for material properties as defined in the specific specification section or sub-section for that material type.

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G. General

1. No imported materials shall be delivered to the project site before the required material property and analytical chemistry testing for that batch has been provided to the Engineer and written approval received from the Engineer. Unapproved material shall be removed from the site at the Contractor's expense.
2. Contractor shall be responsible for repairing or reconstructing the deficiencies at his own expense to meet this specification and other Contract Documents.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The Engineer shall conduct quality assurance sampling on materials delivered to the site.
 1. The Contractor shall provide access and support to the delivered materials in order for representative sampling and testing to be conducted.
 2. The Engineer shall have the right to visit the borrow source at any time during borrow pit working hours to observe mining, manufacturing, stockpiling or loading operations.

1.07 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide a clearly marked-up set of Contract Drawings showing all field changes, additions, deletions, and/or corrections.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the top surface of placed leveling layer.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Leveling layer soil is defined as placed and compacted soil, as required herein, to achieve grade elevations shown on the SCA Final Cover Contract Drawings.
- B. Soil materials used for the leveling layer shall consist of relatively homogeneous natural soils free of materials, which, due to nature or size, are deleterious to the intended use. Unless otherwise specified herein, leveling layer soil shall classify as SC, SM, ML, CL, GM, GC, or GW according to the Unified Soil Classification System (per ASTM D 2487) or combinations of these materials. Classification shall be based on the results of soil conformance tests.

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- C. Material evaluation of available borrow sources will be conducted and appropriate placement procedures will be developed by the Contractor, including lift thicknesses and compaction effort, to meet the strength and density requirements of the design, prior to leveling layer soil placement. Based on geomembrane puncture testing results summarized in the *Geomembrane Puncture and Interface Direct Shear Testing Results Summary Memorandum* dated December 23, 2015, an 8 oz/sy geotextile cushion layer will be placed on the leveling layer to provide puncture protection for the geomembrane. The leveling layer shall have a relatively flush surface that is consistent with the surface tested in the geomembrane puncture tests shown in Figure 1.
- D. The Contractor shall perform the following material property tests, prior to material being delivered to the site, at the frequency specified in Section 1.05:
1. Grain size (ASTM D422 or ASTM C136)
 2. Moisture (ASTM D2216)
 3. Standard Proctor (ASTM D698)
 4. Atterberg Limits (ASTM D4318)
 5. Organic Content (ASTM D2974)
 6. Interface Direct Shear (ASTM D 5321), 1 test per source, only required for material that will be used in the top six inches of leveling layer beneath the final cover geomembrane.
 7. Hydraulic Conductivity (ASTM D 2434) for gravel drainage material to be placed in the sump areas.
- E. These control tests will be performed at each visual or textural change in source material, or as directed by the Engineer. Test results shall be submitted to the Engineer in accordance with Part 1.04.
- F. Approximately the top six inches of soil used in the leveling layer shall meet the minimum required peak and residual internal/interface friction angles shown in Figures 2, 3, 4, and 5 when tested as a layered sandwich representing the side slope cover system of the SCA (i.e., Leveling Layer, Geotextile Cushion Layer, Geomembrane Cover, Geocomposite Drainage Layer, Protective Soil Layer, and Vegetative Soil Layer) in accordance with ASTM D 5321. The sandwich or each interface shall be tested using a minimum 12-in by 12-in shear box at 100, 240, 480 psf at a minimum shear rate of 0.04 in./min. Soil shall be compacted to minimum 90 percent of the maximum dry density as determined by the standard Proctor (ASTM D 698) at as-received water content. Geosynthetic interfaces shall be wetted. Alternate interface friction test conditions may be allowed based on approval of the Design Engineer. The Engineer may accept the Contractor's interface friction test results or perform independent interface friction tests.

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- G. The gravel drainage layer material to be used to fill the sump areas shall be reasonably free of thin, flat, or elongated pieces, shall contain no organic matter, or soft friable particles, and shall not contain visible asbestos or hydrocarbons. The material shall be classified as GW or GP in accordance with the Unified Soil Classification System (USCS) per ASTM D 2487 and shall have 100% passing the 4" sieve, less than 5% passing the #4 sieve, and less than 3% passing the #200 sieve. Alternate gravel gradations may be allowed based on approval of the Design Engineer. The required gradation shall be obtained by screening or blending processes as may be necessary. Crushing may be allowed based on approval by the Engineer. The drainage layer material shall have a minimum hydraulic conductivity of 10 centimeters per second (cm/s) based on laboratory permeability testing conducted in accordance with ASTM D 2434.
- H. Riprap stone shall be composed of a well-graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d50 size listed in the engineering Contract Drawings. A well-graded mixture is defined as a mixture composed primarily of larger stone sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the stones. Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5. Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have exposed steel or reinforcing bars.

2.02 EQUIPMENT

- A. Contractor shall furnish equipment to perform the scope of work described in this specification, including excavation, hauling, placement, spreading, and compacting leveling layer soil.

PART 3 – EXECUTION

3.01 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Material not immediately used as leveling layer soil shall be stockpiled in areas approved by Engineer.
- B. The Contractor shall be fully responsible for: (i) providing safe and adequate stockpile management procedures and erosion and sediment control measures; (ii) stabilizing stockpiles that will remain out of active use for an extended period of time; and (iii) correcting any deficiencies that may arise.

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3.02 SITE PREPARATION

- A. Contractor shall coordinate the work such that required inspections and testing of work that will be covered up by the placement of leveling layer will be complete prior to placement of the leveling layer.
- B. The Contractor shall construct staging and stockpile areas in approved areas if needed.
- C. The Contractor shall construct temporary haul roads and drainage structures as required for the Contractor to access the staging areas and soil stockpiles.
- D. Locate monitoring wells, piezometers, utilities, and other subsurface structures in the work area. Protect and maintain or abandon these structures and utilities during the excavation and grading activities in accordance with the notes on the SCA Final Cover Contract Drawings.
- E. Prior to earthwork activity, the Contractor shall prepare work areas in accordance with Section 02100 – Site Preparation.
- F. Prior to the start of construction, and prior to contacting underground utility locating service, Contractor shall mark and stake existing subsurface piping or structures in the vicinity of work area, based on as-built record drawings for the SCA liner construction, SCA basin construction, SCA instrumentation installation, and other recent projects. These subsurface structures include, but are not limited to, leachate culverts, instrumentation cables, dewatering pipes, and any other near-surface underground features of similar nature.
- G. Prior to the start of construction, notify the appropriate organizations and have underground utilities staked or marked. Utilities include, but are not limited to water, gas, electric, telephone, cable, storm sewer, sanitary sewers, laterals, and services.
- H. If locations of underground utilities or other structures indicate a possible interference, or points of connection to existing facilities need to be identified, perform exploratory excavations to determine the utility's location and elevation. Provide the utility owner with results from exploratory excavations for review. Allow the Engineer sufficient time to review exploratory excavation results and evaluate if changes are required to the Contract Documents prior to the start of construction.

3.03 SITE GRADING

- A. Perform earthwork to the lines and grades as shown on the SCA Final Cover Contract Drawings.

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- B. In work areas where water ponding is observed, Contractor shall implement measures to remove the water.

3.04 MATERIAL PLACEMENT

- A. Prior to performing work described in this specification, install and maintain surface water management and erosion and sedimentation control measures in accordance with Section 02140 – Construction Water Management and Section 02370 – Erosion Control.
- B. Use leveling layer material that meets the material requirements of this Section. Place leveling layer material to the limits and grades shown on the SCA Final Cover Contract Drawings.
- C. Place leveling layer material on surfaces that are free of debris, branches, mud or other deleterious materials.
- D. Material evaluation of available borrow sources will be conducted and appropriate placement procedures will be developed prior to placement of the material in the SCA.
- E. Remove visible rock particles such that adequate compaction can be achieved.
- F. Fill slopes steeper than 3H:1V shall be constructed by overfilling beyond the planned finished fill surface and cutting the slope back to expose properly compacted leveling layer soil.
- G. The maximum acceptable soil clod size is 3”, unless otherwise established as part of the development of placement procedures. Reduce clod size by discing, raking, tracking with a dozer, or other approved means.
- H. The Contractor shall be responsible to follow standard means and measures for moisture conditioning the fill soil for uniformly compacting the fill soil material to the compaction requirement.
- I. For leveling layer soil that will be placed over the gravel drainage layer, a geotextile shall be placed prior to construction. The equipment used to spread and compact the leveling layer over the gravel drainage layer or the geotextile tubes shall be low ground pressure (LGP) equipment, with a maximum ground pressure in accordance with the following table:

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Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Soil Above Gravel Drainage Layer or Geotextile Tubes (in.)
<5	<12
<10	18
<20	24
≥20	36

- J. Replace and rework materials that become unsuitable or unstable as a result of work during inclement weather.
- K. Rework or remove and replace leveling layer soil that does not meet the compaction requirements of this Section.
- L. Decontaminate equipment used to place leveling layer soil that comes in contact with leachate from the geotextile tubes.
- M. Perforations in the top of leveling layer resulting from survey stakes or other activities shall be backfilled by the Contractor with clean on-site soil.
- N. The gravel drainage layer material to be placed in the sump areas shall be delivered as a uniform mixture and shall be placed to limit segregation of materials and the formation of pockets of coarse and fine materials. Drainage layer material shall be placed in loose lift thicknesses of one foot or greater to the lines, thicknesses and grades shown on the drawings and as approved by Engineer. The thickness of the Drainage Layer at any location shall be measured perpendicular to the plane of the slope at each location. Due to the compressible nature of the foundation, a strict conformance with the design elevations is not required. Drainage layer material should be placed in coordination with the Engineer.
- O. The finished surface of the leveling layer shall be inspected prior to installation of the geotextile cushion layer to confirm that the leveling layer surface is relatively flush and consistent with surface tested in geomembrane puncture testing. The finished leveling layer surface will be approved by the Engineer and geomembrane installer before the geotextile cushion layer is placed.

3.05 SURVEY CONTROL

- A. Survey the limits and elevations of completed prepared subgrade and top of finished fill surface in accordance with Section 01720 – Project Surveying. The final elevations of the leveling layer shall be verified by survey to achieve the final grades per the Contract Drawings prior to placement of overlying layers.

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Individual lift thicknesses shall be measured, tracked, and managed to achieve the final grades per Contract Drawings.

- B. Provide As-Built drawings that include all field changes, additions, deletions, and/or corrections clearly marked in accordance with Section 01300 – Document Submittal Procedures.
- C. The riprap for the outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

3.06 TOLERANCES

- A. Measure, track, and manage lift thicknesses using field procedures during material placement and construct the finished surface of leveling layer to achieve the grades and slopes as indicated on the SCA Final Cover Contract Drawings to allow for even drainage.

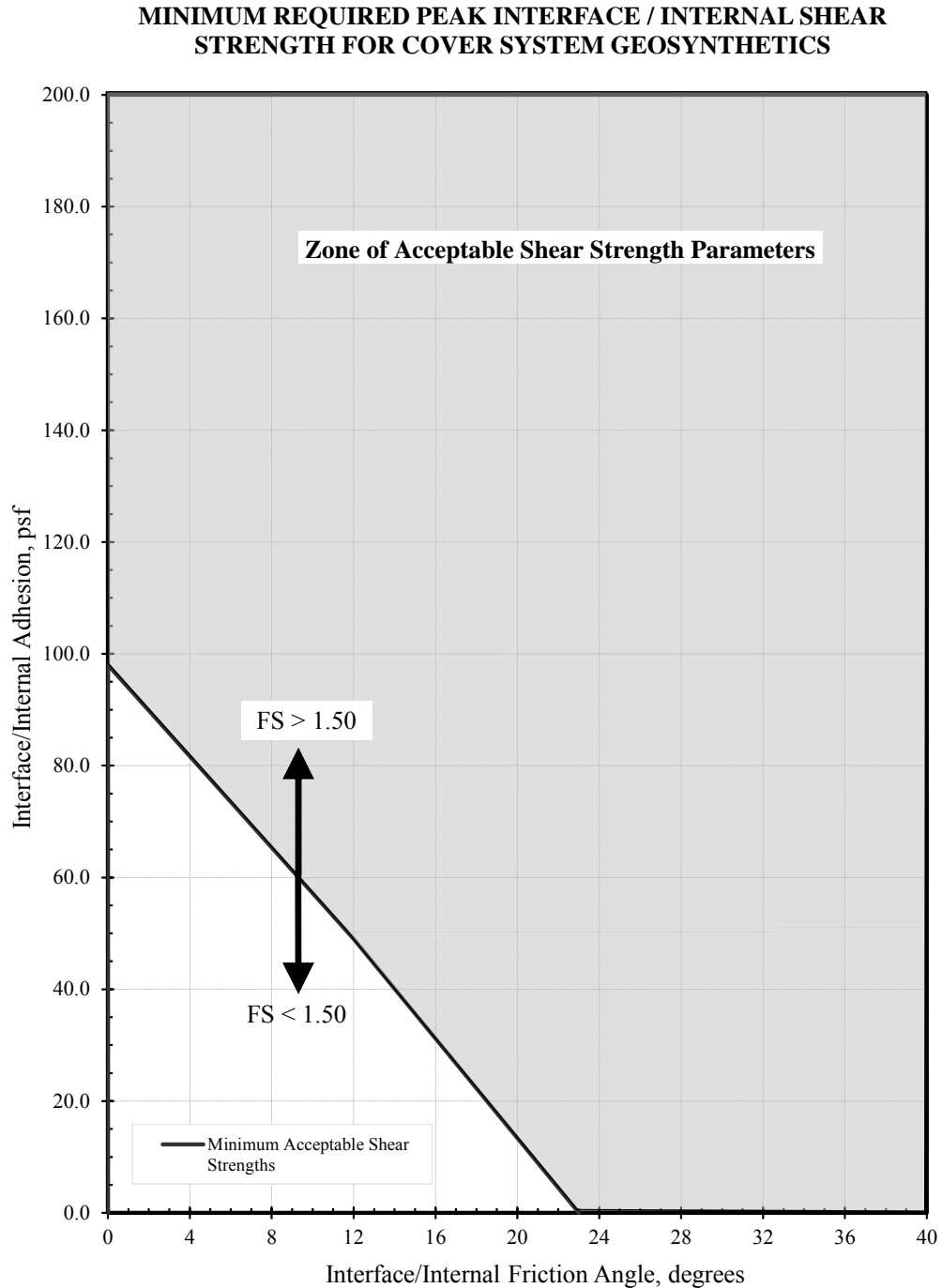
Project No. Title:	448847 Onondaga Lake SCA Final Cover	Revision:	1
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Figure 1: Photos of Compacted Leveling Layer Soil Surface used in Geomembrane Puncture Tests



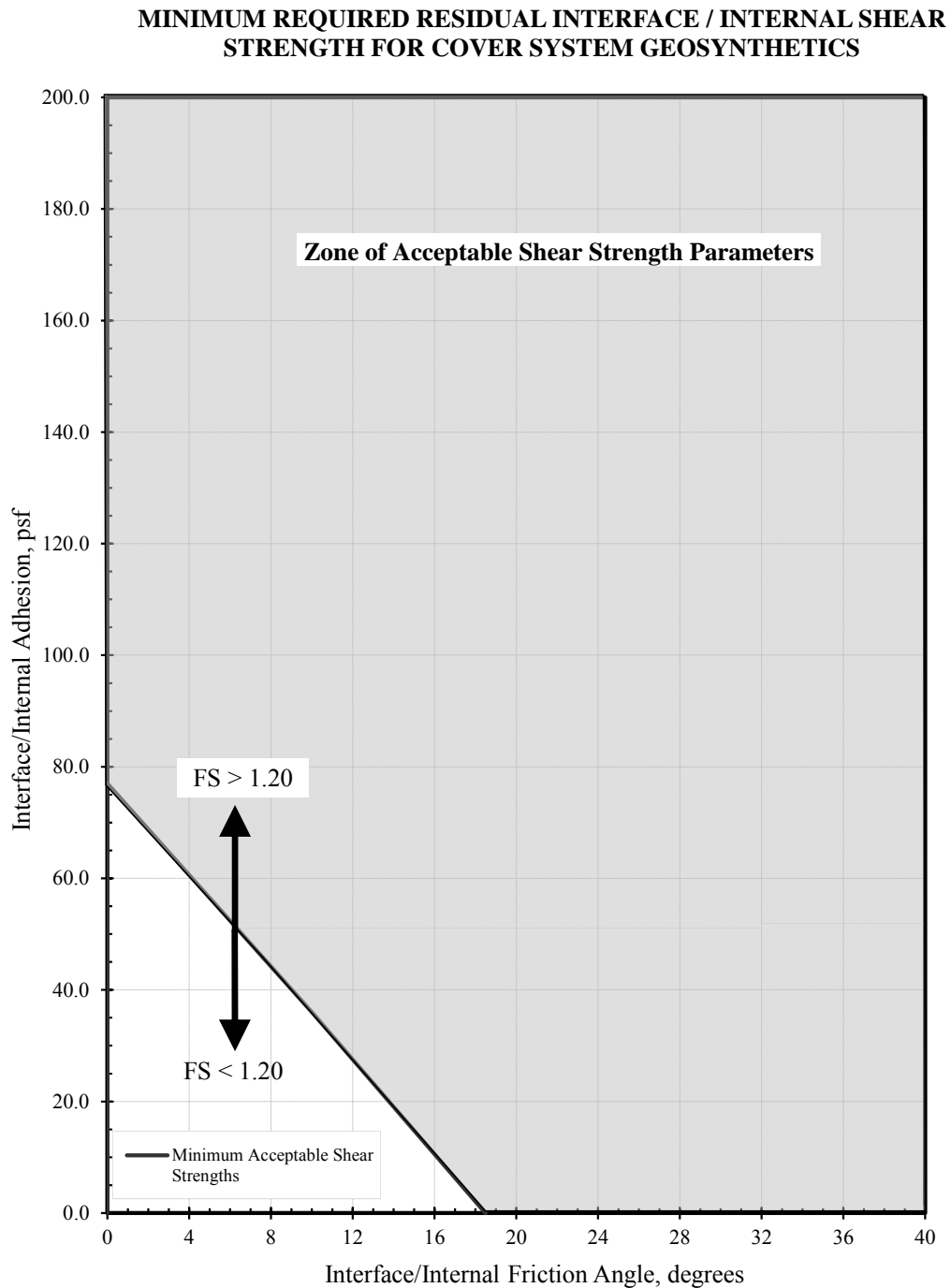
Project No. Title:	448847 Onondaga Lake SCA Final Cover	Revision:	1
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Figure 2: Minimum Required Peak Interface/Internal Shear Strength Parameters for Cover System Components on Main Deck Side Slopes



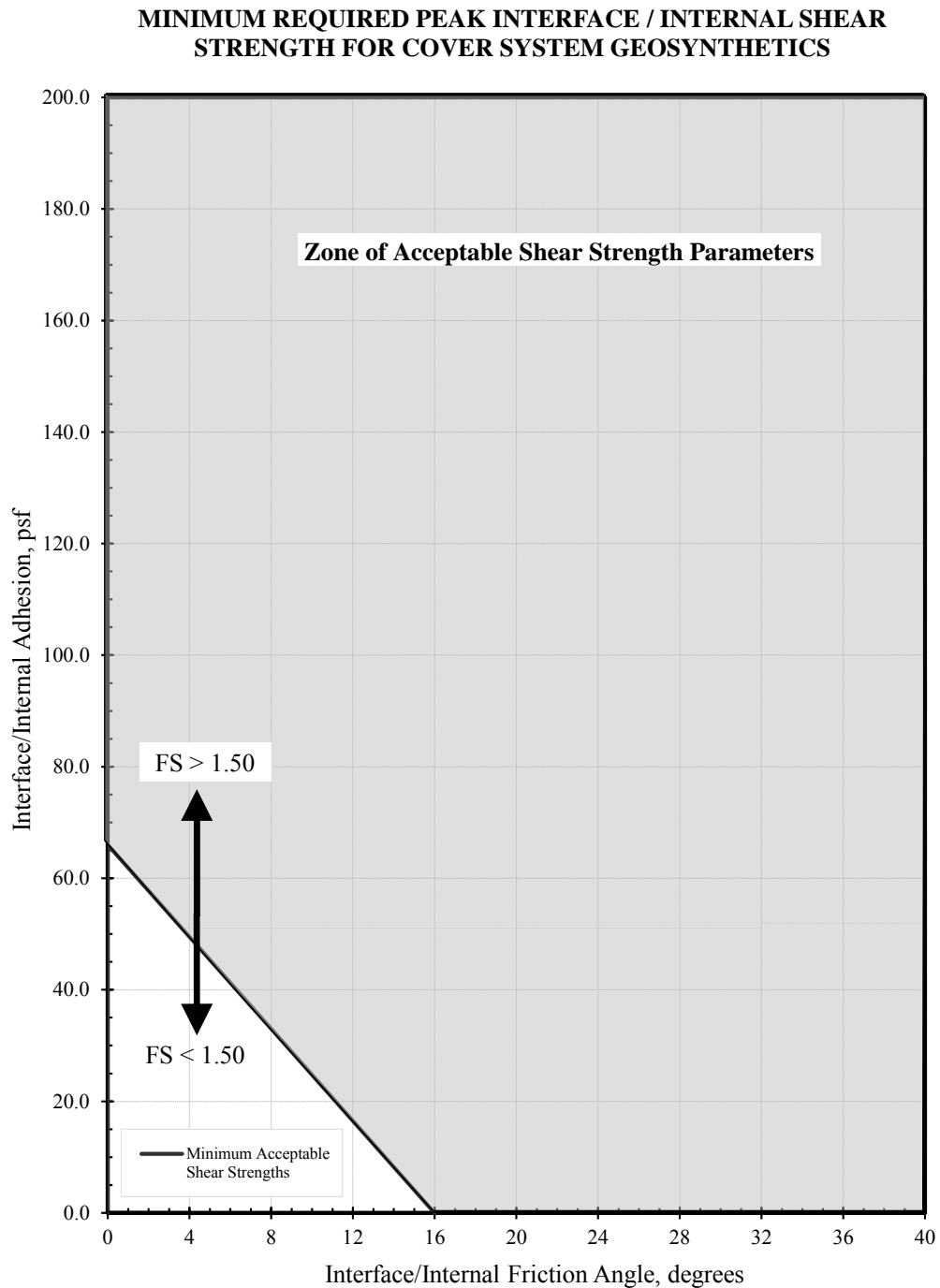
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Figure 3: Minimum Required Residual Interface/Internal Shear Strength Parameters for Cover System Components on Main Deck Side Slopes



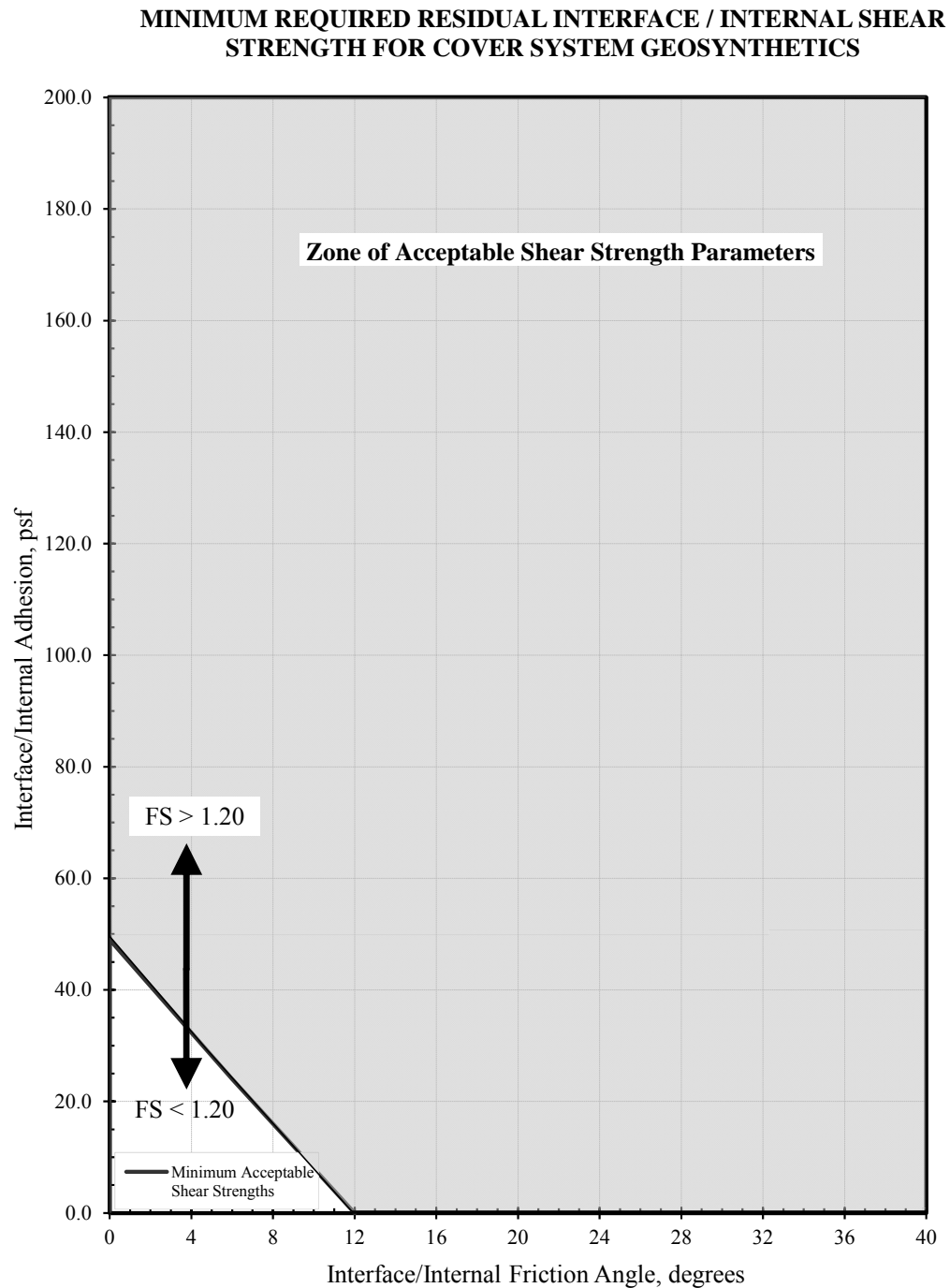
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Figure 4: Minimum Required Peak Interface/Internal Shear Strength Parameters for Cover System Components on Top Deck Side Slopes



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Figure 5: Minimum Required Residual Interface/Internal Shear Strength Parameters for Cover System Components on Top Deck Side Slopes



[END OF SECTION]

SPECIFICATION NO: 02219**SPECIFICATION TITLE: WASTE GRADING, CONSOLIDATION AND DISPOSAL****PROJECT NO: 448847****PROJECT TITLE: SCA FINAL COVER DESIGN****CLIENT: HONEYWELL**

				APPROVALS								
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
0	4/10/2015	4	Issued For Agency Approval and Construction	JJH/PLR	SRB/PEB	LKB						
<input checked="" type="checkbox"/> Entire Specification Issued this Revision <input type="checkbox"/> Revised Pages Only Issued this Revision			SPECIFICATION ISSUED FOR: <table><tr><td><input type="checkbox"/> In-house Review</td><td><input type="checkbox"/> Bid</td></tr><tr><td><input type="checkbox"/> Client Review/Approval</td><td><input checked="" type="checkbox"/> Construction</td></tr><tr><td><input type="checkbox"/> Information Only</td><td><input type="checkbox"/> Other</td></tr></table>				<input type="checkbox"/> In-house Review	<input type="checkbox"/> Bid	<input type="checkbox"/> Client Review/Approval	<input checked="" type="checkbox"/> Construction	<input type="checkbox"/> Information Only	<input type="checkbox"/> Other
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Specification No.	02219	Page:	2 of 4
Specification Title	Waste Grading, Consolidation and Disposal	Date:	04/10/2015

SECTION 02219

WASTE GRADING, CONSOLIDATION AND DISPOSAL

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of the labor, equipment, tools, materials, services, supervision and incidentals necessary to perform the surface grading, re-location, consolidation and disposal of waste (e.g., contaminated or potentially contaminated sediments, soils, waste and debris that is not contained within the geotextile tubes) necessary for completion of the Work as described herein, shown on the Contract Drawings, or directed by the Engineer. Work in this Section includes, but is not limited to:
1. Relocating, screening (if necessary), stockpiling, preparing and/or hauling soil/sediment and other waste.
 2. Consolidation and grading of waste materials within the SCA.
 3. Handling and disposal of construction water residual solids.
 4. Off-site disposal, if required.
- B. Related Work specified in other Sections includes, but is not limited to:
1. Section 01030 – Environmental Protection
 2. Section 01300 – Document Submittal Procedure
 3. Section 02100 – Site Preparation
 4. Section 02140 – Construction Water Management
 5. Section 02200 – Earthwork
 6. Section 02370 – Erosion Control

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State, and Local codes, ordinances, regulations, statutes, and standards.
- B. All excavation, trenching, sheeting, bracing and related work shall comply with the requirements of Title 29 Code of Federal Regulations, Part 1926.650-652, (Subpart P - Excavations), OSHA Safety and Health Regulations for Construction.

1.03 REFERENCES

- A. United States Environmental Protection Agency (EPA Method 9095, SW-846; USEPA 1991h) – Paint Filter Test.
- B. Title 29 Code of Federal Regulations, Part 1926.650-652, (Subpart P - Excavations), OSHA Safety and Health Regulations for Construction Employment.

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1.04 DEFINITIONS

- A. Waste is defined as contaminated or potentially contaminated soil, sediment, or other material that is in the SCA but not contained within the geotextile tubes. The subgrade of areas outside the SCA but within Wastebed 13 is composed of a material known as "Solvay Waste." This material shall be defined and handled separately from the above definition of waste. Materials that come into contact with spilled or tracked waste such that they require removal shall also be considered waste.
- B. Residual solids are defined as any solids associated with construction water.

1.05 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:
 - 1. Submit as part of the Project Safety, Health and Environment Plan (PSHEP), a contingency plan in the event hazardous materials (e.g., drums, etc.) are encountered during excavation.

1.06 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 GENERAL

- A. Establish exclusion zones for work areas in accordance with the PSHEP.
- B. Perform excavation, and on-site transportation in a manner that prevents migration of contaminants to clean areas. Keep varying contaminant types and concentrations segregated as necessary for consolidation or disposal.
- C. Conduct grading and excavation operations, if necessary, to provide continuous drainage and to prevent ponding. Direct surface water away from excavation areas in accordance with the site SWPPP and Section 02370 – Erosion Control.
- D. Manage construction water in accordance with Section 02140 - Construction Water Management. Sequence and conduct excavation, consolidation and disposal activities to limit the generation of construction water as appropriate.
- E. Provide stormwater and erosion control measures prior to and throughout all excavation, consolidation and disposal activities in accordance with Section 02370 - Erosion Control.

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- F. Provide oil absorbent pads and/or booms as needed to contain and collect oil sheens that may emanate from the excavation areas.
- G. Stop work immediately and notify the Engineer at anytime during the completion of work if unanticipated sources of contamination are encountered. Do not proceed with removal of such materials without prior approval from the Engineer, unless an emergency situation requiring immediate action exists.
- H. Decontaminate equipment used for excavation or grading of waste materials prior to re-use on clean material outside the SCA limits or above the geomembrane. Construction water generated from these shall be managed in accordance with Section 02140 – Construction Water Management.
- I. Manage and dispose of waste material, if necessary, in accordance with Section – 01030 Environmental Protection.

3.02 SURFACE GRADING OF DEBRIS MANAGEMENT AREA

- A. Surface of the Debris Management Area shall be graded to the lines and grades or as otherwise shown on the Contract Drawings. Do not over-excavate any area laterally or vertically without prior approval from the Engineer.

3.03 REMOVAL OF RESIDUAL SEDIMENTS FROM LEACHATE COLLECTION BASINS

- A. Acceptable methods of managing residual solids generated by the Contractor's management of construction water are limited to:
 - 1. On-site disposal, which includes the collection, dewatering and placement under the SCA cover area in accordance with this Section. Removal of residual solids and placement within the SCA cover area shall be conducted in accordance with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards. Residual solids resulting from this method must meet all requirements for placement at the SCA cover area.
 - 2. Off-site disposal, if necessary shall be conducted in accordance with Section 01030 – Environmental Protection.
 - 3. Other methods may be proposed by the contractor and will require approval from the Engineer prior to implementation.

[END OF SECTION]

SPECIFICATION NO: SECTION 02235

SPECIFICATION TITLE: PROTECTIVE SOIL LAYER

PROJECT NO: 448847

PROJECT TITLE: ONONDAGA LAKE SCA FINAL COVER

CLIENT: HONEYWELL, INC.

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	05-04-2016	15	For Agency Approval and Construction	RW	SB	JFB
<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR: <div><input type="checkbox"/> In-house Review <input type="checkbox"/> Client Review/Approval <input type="checkbox"/> Information Only</div> <div><input type="checkbox"/> Bid <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Other</div>			
<input type="checkbox"/> Revised Pages Only Issued this Revision						



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SECTION 02235

PROTECTIVE SOIL LAYER

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work covered in this Section consists of the placement of a Protective Soil Layer as part of the final cover system for the Sediment Consolidation Area (SCA). This layer shall be placed directly on the final cover geocomposite drainage layer placed over the final cover geomembrane on the SCA in accordance with the SCA Final Cover Project Specifications and SCA Final Cover Contract Drawings. The Contractor shall furnish all labor, materials, equipment, supervision and incidentals necessary to perform the scope of work.

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:
1. Section 01030 Environmental Protection
 2. Section 01300 Document Submittal Procedures
 3. Section 01720 Project Surveying
 4. Section 02140 Construction Water Management
 5. Section 02141 Gas Management System
 6. Section 02200 Earthwork
 7. Section 02250 Vegetative Soil Layer
 8. Section 02370 Erosion Control
 9. Section 02735 Geocomposite Drainage Layer
 10. Section 02740 Geomembrane Cover

1.03 REFERENCES

- A. Latest version of American Society for Testing and Materials (ASTM) standards:
1. ASTM D 422 Standard Test Method for Particle Size Analysis of Soils.
 2. ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 3. ASTM D 2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 4. ASTM D 2974 Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

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5. ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 6. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
- B. Latest version of New York State Department of Environmental Conservation (NYSDEC) Regulations, Division of Environmental Remediation (DER)-10, Appendix 5 “Allowable Constituent Levels for Imported Fill or Soil”.

1.04 SUBMITTALS

- A. The Contractor shall submit the following information to Engineer for review and approval in accordance with Section 01300 – Submittal Procedures and as elsewhere specified in this Section 14 calendar days prior to initiating Protective Soil Layer activities:
1. List of equipment proposed for the earthwork;
 2. Proposed offsite borrow source(s);
 3. Dust control equipment and procedures;
 4. Quality Control Work Plan;
 5. Methods for Protective Soil Layer placement, compaction, grading, and stormwater control;
 6. A written plan, as part of the Quality Control Work Plan, describing proposed cold weather placement and compaction methods and the weather parameters for which cold weather operations are proposed. This plan shall include protection of the work in accordance with requirements of this specification as well as measures to be taken for placement, compaction, and protection of the Protective Soil Layer under construction during freezing conditions. Protective measures may include, but are not limited to, the use of thermal blankets or a sacrificial soil layer.
 7. Coordination of survey requirements for Protective Soil Layer placement;
 8. Locations of on-site temporary soil stockpile areas;
 9. Coordination of construction activities with surface water management and erosion and sedimentation control measures; and
 10. Schedule for construction activities.
- B. The Contractor shall be responsible for the adequacy and safety of the methods.
- C. Validated analytical test results as specified herein shall be submitted to the Engineer for review within two (2) working days of receipt of results. The Contractor shall not deliver material to the site prior to submission and approval by the Engineer of the geotechnical and analytical chemistry test results.

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1.05 CONSTRUCTION QUALITY CONTROL

- A. The Contractor shall submit a Quality Control (QC) Work Plan for review to the Engineer. Once instituted, the Contractor shall use the QC Work Plan to ensure that the Work performed under the contract meets the requirements of the Contract Documents.
- B. The Contractor shall submit the name of a qualified Independent Testing Laboratory (ITL) to the Engineer for review.
 - 1. The Contractor shall submit to the Engineer for approval, the company name, address, and qualifications of the selected ITL proposed for use at the project. Included in this submittal will be the names and qualifications of the individuals who are proposed for assignment to the site. The Engineer reserves the right to request other information regarding the qualifications of the ITL for use in the evaluation process.
- C. Sampling
 - 1. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to document material property compliance with the specifications.
 - 2. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to certify and document that imported material meets the allowable analytical compound concentrations and properties specified in this Section. These samples will be collected and transported in compliance with the QC Work Plan. The Engineer reserves the right to observe sampling and testing of the materials. The Contractor shall provide at least 24-hours notice of a sampling event to the Engineer.
 - 3. Representative samples of each specific material type from each specific material source will be obtained by compositing at least five randomly selected individual samples of approximately equal weight. The total composite sample mass shall be at least the minimum size required to conduct all of the required material property and analytical chemistry tests for that material type. Each of the individual samples will be obtained from within the boundaries of the material mass that the composite sample represents.
 - 4. Contractor quality control samples may be obtained from in situ samples for pre-approval of a dedicated borrow source area. The sampling methodology and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.
 - 5. Contractor quality control samples may also be obtained from dedicated stockpiles or storage/transportation vessels. The sampling methodology

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and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.

D. Sample Frequency

1. Each imported fill material type shall be tested at a batch size (Note: Testing conducted for the Onondaga Lake portfolio may be considered with respect to sample frequency if originating from the same source.):
 - a. A representative composite sample will be obtained from each 10,000 cubic yards (in-place volume) batch for materials that are consistent with leveling layer material taken from the same borrow pit.
 - b. A representative composite sample will be obtained at the following batch sizes for materials taken from a new borrow source:
 - i. For the first 25,000 cubic yards of each fill type from a specific fill source, a representative composite sample will be obtained from each 2,500 cubic yards (in-place volume) batch or part thereof.
 - ii. If ten consecutive acceptable test results have been obtained on samples representing the first 25,000 cubic yards or greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 5,000 cubic yards for the subsequent material deliveries.
 - iii. If ten consecutive test results have been obtained on samples representing the next 50,000 cubic yards or greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 10,000 cubic yards for the subsequent material deliveries.

E. Analytical Chemistry Testing

1. These samples will be sent to an Analytical Chemistry Testing Laboratory (ACTL) selected by the Engineer. Each composite sample for each material shall be tested for the compounds in Appendix 5 of DER-10. All test results shall be below the Unrestricted Use cleanup objective concentrations provided in this appendix, with exceptions as approved by

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NYSDEC. Failure of a single compound test result shall mean that the entire material batch will be rejected unless specifically accepted on a test-by-test basis in writing by the Engineer.

F. Material Property Testing

1. Each composite sample shall be tested for material properties as defined in the Section 2.01.

G. General

1. No imported materials shall be delivered to the project site before the required material property and analytical chemistry testing for that batch has been provided to the Engineer and written approval received from the Engineer. Unapproved material shall be removed from the site at the Contractor's expense.
2. Contractor shall be responsible for repairing or reconstructing the deficiencies at his own expense to meet this specification and other Contract Documents.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The Engineer shall conduct quality assurance sampling on materials delivered to the site.
 1. The Contractor shall provide access and support to the delivered materials in order for representative sampling and testing to be conducted.
 2. The Engineer shall have the right to visit the borrow source at any time during borrow pit working hours to observe mining, manufacturing, stockpiling or loading operations.

1.07 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide clearly marked-up set of contract drawings showing all field changes, additions, deletions, and/or corrections.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the top surface of placed Protective Soil Layer.

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PART 2 – PRODUCTS

2.01 MATERIAL FOR PROTECTIVE SOIL LAYER

- A. The Protective Soil Layer shall be free of any metals, roots, vegetation, trees, stumps, concrete, construction debris, foreign objects, mud, ice, organic matter, or other deleterious material as approved by the Engineer.
- B. The Protective Soil Layer shall not have particles classified as either very angular or angular unless adequate puncture protection is provided for the geomembrane as demonstrated through geomembrane puncture testing.
- C. Material evaluation of available borrow sources will be conducted and appropriate placement procedures will be developed by the Contractor to meet the requirements presented in Part 3.04. The Protective Soil Layer material shall be comparable to the material used for the geomembrane puncture testing summarized in the *Geomembrane Puncture and interface Direct Shear Testing Results Summary Memorandum* dated December 23, 2015 and the top of the leveling layer (see Earthwork Specification Section 02200, Part 2.01C). The geocomposite that is designed for drainage in the cover system will also function as a cushioning layer that will provide puncture protection for the geomembrane.
- D. The Protective Soil Layer shall classify as GC, SC, SM, ML, or CL according to the Unified Soil Classification System (per ASTM D 2487) or combinations of these materials. Classification shall be based on the results of soil conformance tests.
- E. The Contractor shall perform the following material property tests, prior to the material being delivered on site, at the frequency specified in Section 1.05:
 - 1. Grain size and stone angularity (ASTM D 422);
 - 2. Moisture (ASTM D 2216);
 - 3. Atterberg Limits (ASTM D 4318);
 - 4. Organic Content (ASTM D 2974); and
 - 5. Interface Direct Shear (ASTM D 5321), 1 test per source.
- F. The Protective Soil Layer material shall meet the minimum required peak and residual internal/interface friction angles shown in Figures 1, 2, 3, and 4 of this specification when tested as a layered sandwich representing the top deck side slope and main deck side slope cover systems (Leveling Soil Layer, Geotextile Cushion Layer, Geomembrane Cover, Geocomposite Drainage Layer, Protective Soil Layer, and Vegetative Soil Layer) in accordance with ASTM D 5321. The sandwich test or each interface shall be tested using a minimum 12-inch by 12-inch shear box at 100, 240, and 480 psf at a minimum shear rate of 0.04 in./min.

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Soil shall be compacted to minimum 90 percent of the maximum dry density as determined by the standard Proctor (ASTM D 698) at as-received water content. Geosynthetic interfaces shall be wetted. Alternate interface friction test conditions may be allowed based on approval of the Design Engineer. The Engineer may accept the Contractor's interface friction test results or perform independent interface friction tests.

- G. The quality control tests will be performed at each visual or textural change in source material, or as directed by the Engineer. Test results shall be submitted to the Engineer in accordance with Part 1.04.
- H. Construction water for moisture conditioning Protective Soil Layer material shall be obtained from an on-site water source approved by the Engineer.

2.02 EQUIPMENT

- A. Contractor shall furnish equipment to perform the scope of work described in this specification, including haul, place, spread, and compact the Protective Soil Layer.

PART 3 – EXECUTION

3.01 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Material not immediately used as Protective Soil Layer shall be stockpiled in areas approved by Engineer.
- B. The Contractor shall be fully responsible for: (i) providing safe and adequate stockpile management procedures and erosion and sediment control measures; (ii) stabilizing stockpiles that will remain out of active use for an extended period of time; and (iii) correcting any deficiencies that may arise.

3.02 SITE PREPARATION

- A. Contractor shall coordinate the work such that required inspections and testing of work that will be covered up by the placement of the Protective Soil Layer will be complete prior to placement of the Protective Soil Layer.
- B. The Contractor shall construct staging and stockpile areas in approved areas if needed.
- C. The Contractor shall construct temporary haul roads and drainage structures as required for the Contractor to access the staging areas and soil stockpiles.

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3.03 SITE GRADING

- A. Construct Protective Soil Layer to the lines and grades as shown on the SCA Final Cover Contract Drawings.
- B. In work areas where water ponding is observed, Contractor shall implement measures to remove the water.

3.04 MATERIAL PLACEMENT

- A. Prior to performing work described in this specifications, install and maintain surface water management and erosion and sedimentation control measures in accordance with Section 02140 – Construction Water Management and Section 02370 – Erosion Control.
- B. Construct the Protective Soil Layer to the limits and grades shown on the SCA Final Cover Contract Drawings. The thickness of the Protective Soil Layer at any location shall be measured either manually at a minimum frequency of four (4) measurements per acre, or by survey to demonstrate the minimum thickness has been placed.
- C. Do not place frozen Protective Soil Layer nor place Protective Soil Layer on frozen ground/sub-base or frozen previous lift. Do not place or compact Protective Soil Layer at temperature below 32 degrees Fahrenheit (°F) unless otherwise authorized in writing by the Engineer.
- D. If the Protective Soil Layer material freezes after compaction, remove the frozen material, scarify the remaining unfrozen material, and replace and re-compact the material in accordance with this specification prior to placing the next lift of material. Do not reuse frozen material until it has thawed and has been conditioned to the moisture content requirements described in this specification.
- E. Do not place Protective Soil Layer during periods of precipitation. Placement of material during misting or drizzle shall be at the Contractor's risk and the Contractor shall be responsible to repair and/or rework any damaged portions of the placed Protective Soil Layer, including cleanup of any erosion.
- F. The Protective Soil Layer shall be placed directly on top of the previously placed geocomposite layer as shown on the SCA Final Cover Contract Drawings. The Protective Soil Layer shall be placed using a low ground-pressure dozer in accordance with the ground pressure requirements of this Section. The Protective Soil Layer shall be placed with minimal drop height and then carefully spread using equipment and procedures that will not cause damage or rutting to the

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underlying geocomposite and geomembrane. Tracked equipment shall operate only over previously placed soil material.

- G. Do not drive equipment directly on the previously placed geosynthetics. Do not use equipment to place, spread, reduce clod size, or compact the Protective Soil Layer that produces ground pressures exceeding the requirements listed below.
- H. There are no moisture or dry unit weight requirements for the Protective Soil Layer. The moisture content shall be within a range that provides a material that can be readily spread and compacted by track using low ground pressure equipment.
- I. Contractor shall be responsible for protecting the Protective Soil Layer from being washed out during rain events.
- J. The equipment used to spread and compact the Protective Soil Layer shall be low ground pressure (LGP) equipment, with a maximum ground pressure in accordance with the following table:

Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Soil Above Geomembrane (in.)
<5	12
<10	18
<20	24
≥20	36

- K. Perforations in the top of Protective Soil Layer resulting from survey stakes or other activities shall be backfilled by the Contractor with clean on-site soil.

3.05 SURVEY CONTROL

- A. Survey the limits and elevations of completed prepared top of Protective Soil Layer surface in accordance with Section 01720 – Project Surveying. The thickness of the Protective Soil Layer and final elevations shall be verified by survey to achieve the final grades per the Contract Drawings prior to placement of overlying layers. Individual lift thicknesses shall be measured, tracked, and managed through plates or other types of devices (e.g., traffic cones) to achieve the final grades and minimum thickness per Contract Drawings.
- B. Provide As-Built drawings that include all field changes, additions, deletions, and/or corrections clearly marked in accordance with Section 01300 – Document Submittal Procedures.

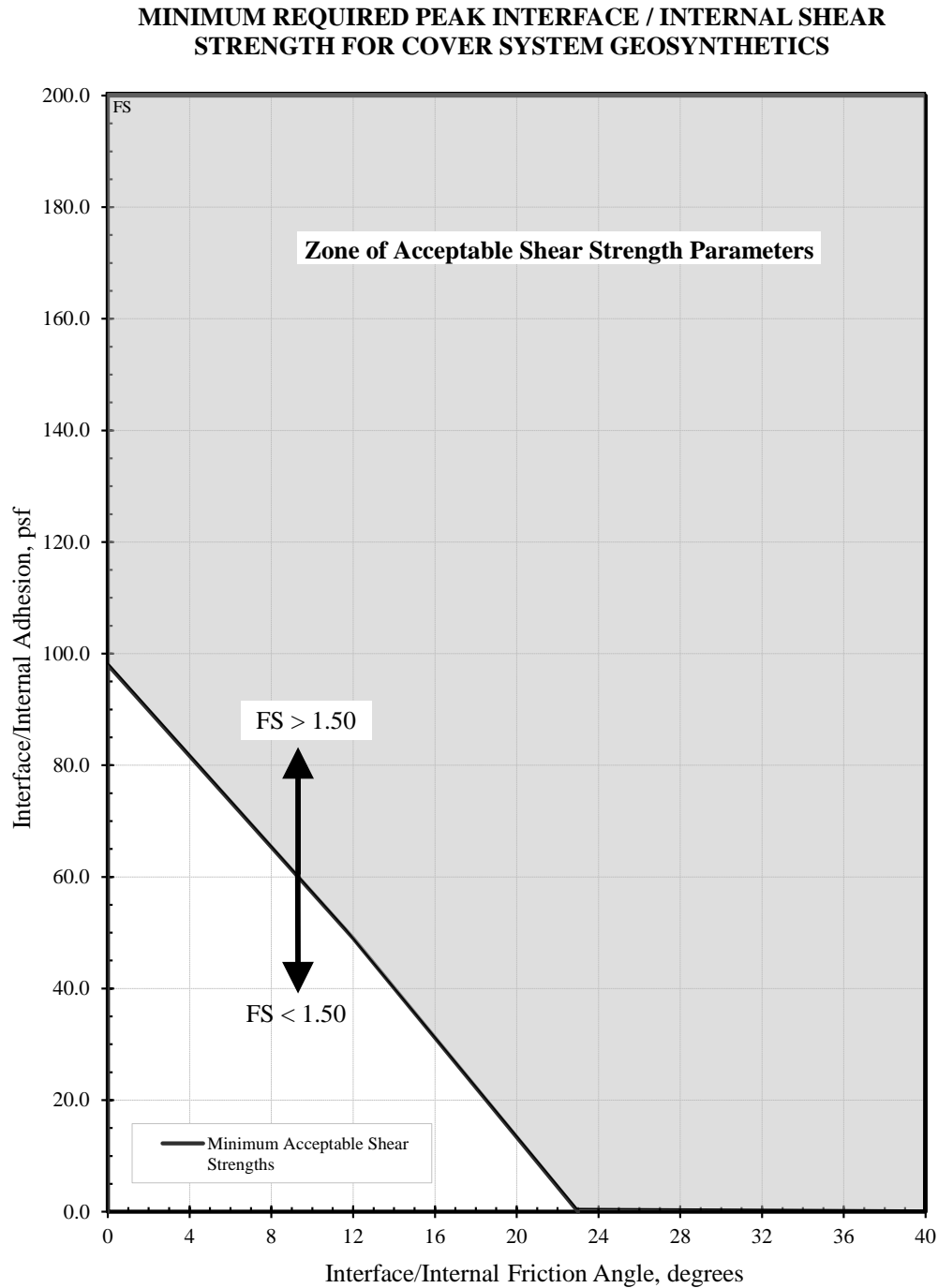
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3.06 TOLERANCES

- A. Measure, track, and manage lift thicknesses through plates or other types of devices (e.g., traffic cones) during material placement and construct the finished surface of Protective Soil Layer to provide the minimum thickness and achieve the grades and slopes to allow for even drainage as indicated on the SCA Final Cover Contract Drawings.

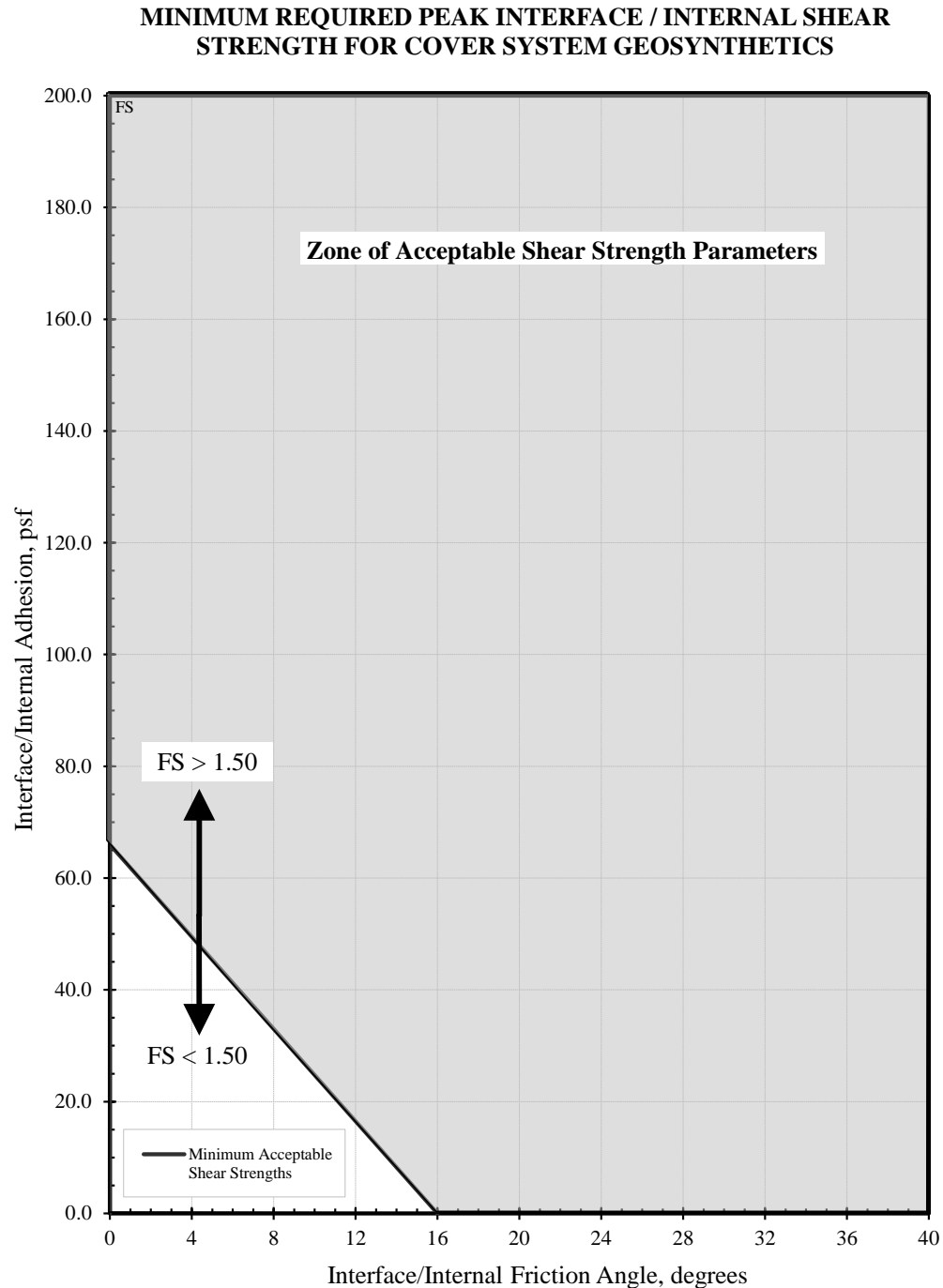
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Figure 1: Minimum Required Peak Interface/Internal Shear Strength Parameters for Cover System Components on Main Deck Side Slopes



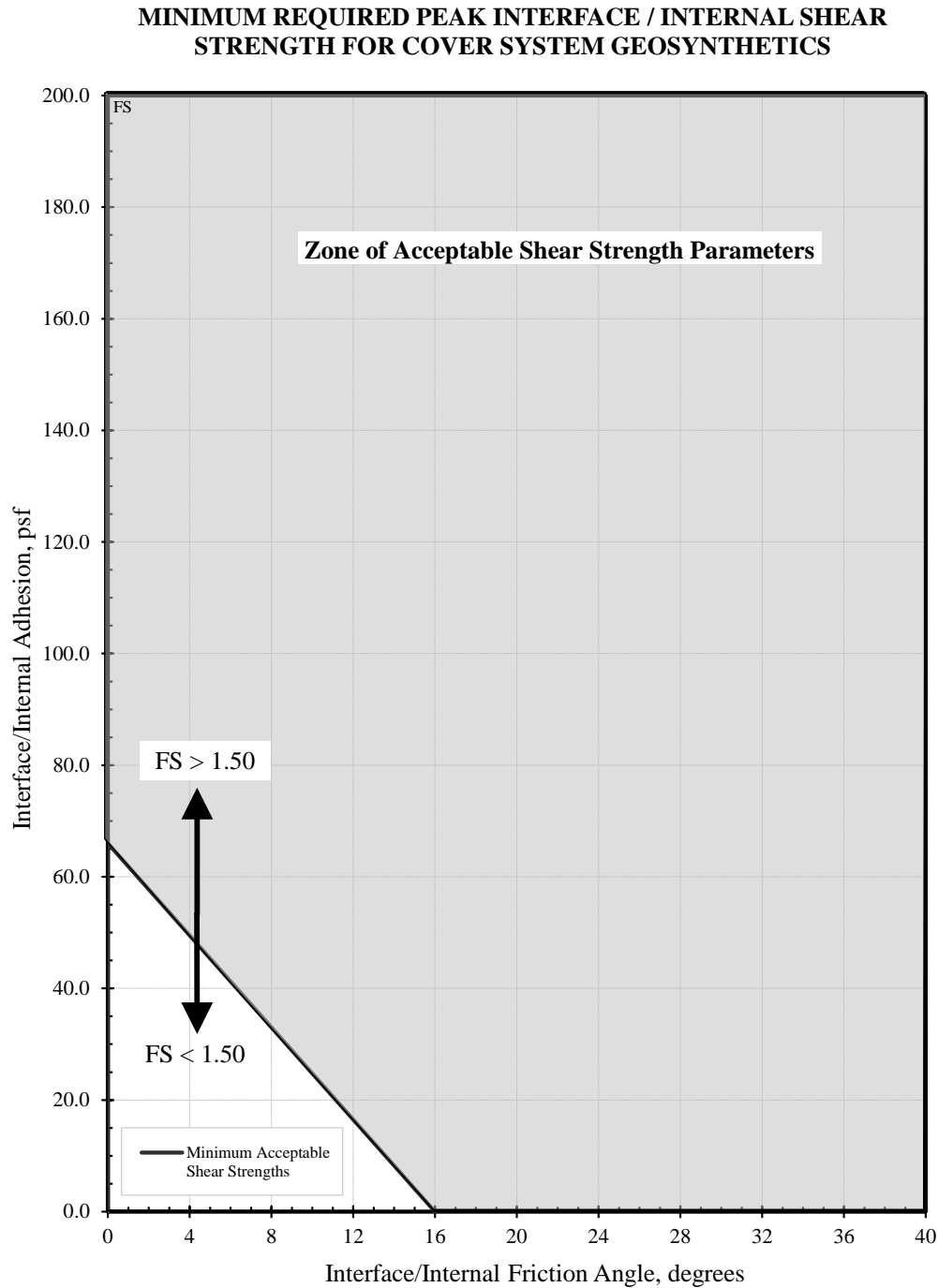
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Figure 2: Minimum Required Residual Interface/Internal Shear Strength Parameters for Cover System Components on Main Deck Side Slopes



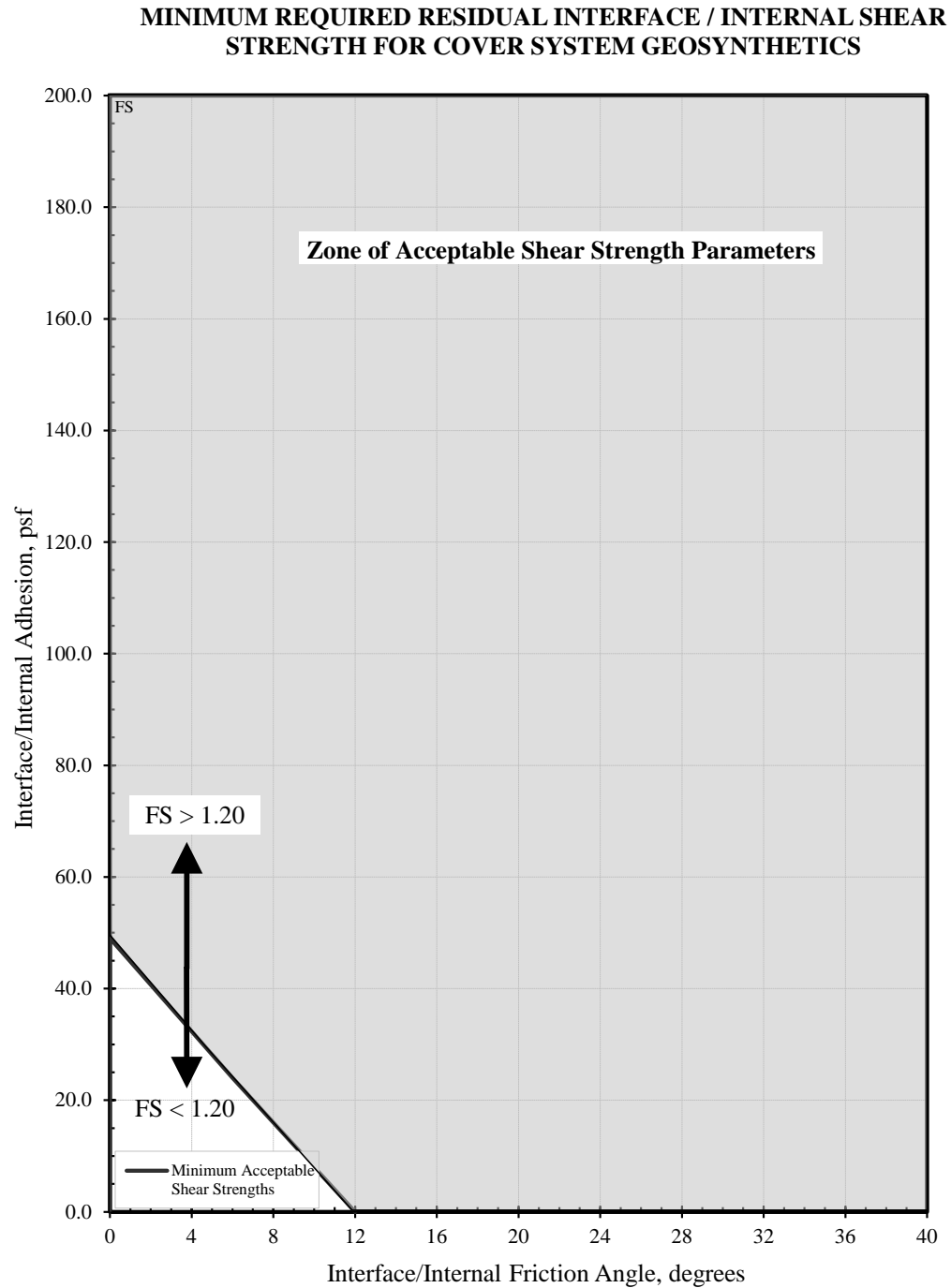
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Figure 3: Minimum Required Peak Interface/Internal Shear Strength Parameters for Cover System Components on Top Deck Side Slopes



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Figure 4: Minimum Required Residual Interface/Internal Shear Strength Parameters for Cover System Components on Top Deck Side Slopes



[END OF SECTION]

SPECIFICATION NO: **SECTION 02250**

SPECIFICATION TITLE: **VEGETATIVE SOIL LAYER**

PROJECT NO: **448847**

PROJECT TITLE: **ONONDAGA LAKE SCA FINAL COVER**

CLIENT: **HONEYWELL, INC.**

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	05-04-2016	10	For Agency Approval and Construction	RW	SB	JFB
<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR:			
Revised Pages Only						
<input type="checkbox"/> Issued this Revision						
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			<input type="checkbox"/> Other			



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SECTION 02250 VEGETATIVE SOIL LAYER

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work covered in this Section consists of the placement of a Vegetative Soil Layer as part of the final cover system for the Sediment Consolidation Area (SCA). This layer shall be placed on top of the Protective Soil Layer in accordance with the SCA Final Cover Project Specifications and SCA Final Cover Contract Drawings. The Contractor shall furnish all labor, materials, equipment, supervision, and incidentals necessary to perform the scope of work.

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:
1. Section 01030 Environmental Protection
 2. Section 01300 Document Submittal Procedures
 3. Section 01720 Project Surveying
 4. Section 02140 Construction Water Management
 5. Section 02200 Earthwork
 6. Section 02235 Protective Soil Layer
 7. Section 02370 Erosion Control
 8. Section 02910 Seeding and Rolled Erosion Control Product

1.03 REFERENCES

- A. Latest version of American Society for Testing and Materials (ASTM) standards:
1. ASTM D 422 Standard Test Method for Particle Size Analysis of Soils
 2. ASTM D 2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
 3. ASTM D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 4. ASTM D 2974 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 5. ASTM D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 6. ASTM D 4972 Standard Test Method for pH of Soils.

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- B. Latest version of New York State Department of Environmental Conservation (NYSDEC) Regulations, Division of Environmental Remediation (DER)-10, Appendix 5 “Allowable Constituent Levels for Imported Fill or Soil”.
- C. Latest version of New York Department of Transportation (NYSDOT) Standard Specifications (US Customary).
- D. Rules and Regulations of the Secretary of Agriculture, Part 201 – Federal Seed Act.
- E. United States Department of Agriculture (USDA) Soil Texture Classes.

1.04 SUBMITTALS

- A. The Contractor shall submit the following information to Engineer for review and approval in accordance with Section 01300 – Submittal Procedures and as elsewhere specified in this Section 14 calendar days prior to initiating Vegetative Soil Layer activities:
 - 1. List of equipment proposed for the earthwork;
 - 2. Proposed offsite borrow source(s);
 - 3. Dust control equipment and procedures;
 - 4. Quality Control Work Plan;
 - 5. Methods for Vegetative Soil Layer placement, grading, and stormwater control;
 - 6. A written plan, as part of the Quality Control Work Plan, describing proposed cold weather placement and compaction methods and the weather parameters for which cold weather operations are proposed. This plan shall include protection of the work in accordance with requirements of this specification as well as measures to be taken for placement, compaction, and protection of the Vegetative Soil Layer under construction during freezing conditions. Protective measures may include, but are not limited to, the use of thermal blankets or a sacrificial soil layer;
 - 7. Coordination of survey requirements for Vegetative Soil Layer placement;
 - 8. Locations of on-site temporary soil stockpile areas;
 - 9. Coordination of construction activities with surface-water management and erosion and sedimentation control measures; and
 - 10. Schedule of the proposed sequence of placement and grading of Vegetative Soil Layer and construction activities.
- B. Additional submittals may be required based on the selected vegetation type. The Contractor shall be responsible for the adequacy and safety of the methods.

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- C. Validated analytical test results as specified herein shall be submitted to the Engineer for review within two (2) working days of receipt of results. The Contractor shall not deliver material to the site prior to submission and approval by the Engineer of the geotechnical and analytical chemistry test results.

1.05 CONSTRUCTION QUALITY CONTROL

- A. The Contractor shall submit a Quality Control (QC) Work Plan for review to the Engineer. Once instituted, the Contractor shall use the QC Work Plan to ensure that the Work performed under the contract meets the requirements of the Contract Documents.
- B. Before proceeding with placement and grading of Vegetative Soil Layer, the Contractor shall check and verify dimensions and quantities and shall immediately inform the Engineer of any discrepancies between the Construction Drawings and actual conditions. No placement and grading of Vegetative Soil Layer shall be performed in an area where a discrepancy exists until approval by the Engineer has been provided.
- C. The Contractor shall submit the name of a qualified Independent Testing Laboratory (ITL) to the Engineer for review.
1. The Contractor shall submit to the Engineer for approval, the company name, address, and qualifications of the selected ITL proposed for use at the project. Included in this submittal will be the names and qualifications of the individuals who are proposed for assignment to the site. The Engineer reserves the right to request other information regarding the qualifications of the ITL for use in the evaluation process.
- D. Sampling
1. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to document material property compliance with the specifications.
 2. The Contractor shall be responsible for collecting samples and conducting tests using a qualified ITL to certify and document that imported material meets the allowable analytical compound concentrations and properties specified in this Section. These samples will be collected and transported in compliance with the QC Work Plan. The Engineer reserves the right to observe sampling and testing of the materials. The Contractor shall provide at least 24-hours notice of a sampling event to the Engineer.
 3. Representative samples of each specific material type from each specific material source will be obtained by compositing at least five randomly selected individual samples of approximately equal weight. The total

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composite sample mass shall be at least the minimum size required to conduct all of the required material property and analytical chemistry tests for that material type. Each of the individual samples will be obtained from within the boundaries of the material mass that the composite sample represents.

4. Contractor quality control samples may be obtained from in situ samples for pre-approval of a dedicated borrow source area. The sampling methodology and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.
5. Contractor quality control samples may also be obtained from dedicated stockpiles or storage/transportation vessels. The sampling methodology and means for assuring the material dedication to the project shall be submitted to the Engineer for approval prior to the commencement of sampling.

E. Sample Frequency

1. Each imported fill material type shall be tested at the following batch sizes (Note: Testing conducted for the Onondaga Lake portfolio may be considered with respect to sample frequency if originating from the same source.):
 - a. A representative composite sample will be obtained from each 10,000 cubic yards (in-place volume) batch for materials that are consistent with leveling layer material taken from the same borrow pit.
 - b. A representative composite sample will be obtained at the following batch sizes for materials taken from a new borrow source:
 - i. For the first 25,000 cubic yards of each fill type from a specific fill source, a representative composite sample will be obtained from each 2,500 cubic yards (in-place volume) batch or part thereof.
 - ii. If ten consecutive acceptable test results have been obtained on samples representing the first 25,000 cubic yards or greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 5,000 cubic yards for the subsequent material deliveries.
 - iii. If ten consecutive test results have been obtained on samples representing the next 50,000 cubic yards or

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greater of each fill type and the material continues to be from the same fill source with consistent appearance and source area or process, then the batch size can be increased to 10,000 cubic yards for the subsequent material deliveries.

F. Analytical Chemistry Testing

1. These samples will be sent to an Analytical Chemistry Testing Laboratory (ACTL) selected by the Engineer. Each composite sample for each material shall be tested for the compounds in Appendix 5 of DER-10. All test results shall be below the Unrestricted Use cleanup objective concentrations provided in this appendix, with exceptions as approved by NYSDEC. Failure of a single compound test result shall mean that the entire material batch will be rejected unless specifically accepted on a test-by-test basis in writing by the Engineer.

G. Material Property Testing

1. Each composite sample shall be tested for material properties as defined in Section 2.01.

H. General

1. No imported materials shall be delivered to the project site before the required material property and analytical chemistry testing for that batch has been provided to the Engineer and written approval received from the Engineer. Unapproved material shall be removed from the site at the Contractor's expense.
2. Contractor shall be responsible for repairing or reconstructing the deficiencies at his own expense to meet this specification and other Contract Documents.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A.** The Engineer shall conduct quality assurance sampling on materials delivered to the site.
1. The Contractor shall provide access and support to the delivered materials in order for representative sampling and testing to be conducted.
 2. The Engineer shall have the right to visit the borrow source at any time during borrow pit working hours to observe mining, manufacturing, stockpiling or loading operations.

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1.07 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide clearly marked-up set of contract drawings showing all field changes, additions, deletions, and/or corrections.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the top surface of placed Vegetative Soil Layer.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Honeywell is currently conducting an ongoing study to establish the preferred soil substrate (i.e., Vegetative Soil Layer) to grow native grasses on the SCA final cover. The study consists of planting and observing the plant growth in a variety of substrates including on-site borrow area material, sand, topsoil, a bank run sand and gravel, and/or combinations thereof. Preliminary results from vegetative test plots conducted during the 2015 growing season were used to select the composition of the Vegetative Soil Layer described in Sections 2.01B through D below. Additional vegetative test plot evaluations will be performed during the 2016 growing season to further evaluate the performance of native grasses on the SCA final cover. Adjustments to the Vegetative Soil Layer material described in Sections 2.01B through D below may be required as a result of this study, as approved by the Engineer and NYSDEC.
- B. The Vegetative Soil Layer shall consist of soil that shall be capable of sustaining healthy plant life and be reasonably free of subsoil, heavy or stiff clay, brush, roots, weeds, other objectionable plant matter, foreign material, stones and any other materials unsuitable or harmful for plant growth. Soil as delivered to the site or stockpiled shall meet the following requirements:
 - 1. Soil mixture of 60% borrow material, 30% sand, and 10% topsoil;
 - 2. Topsoil used in the soil mixture shall be obtained from the on-site borrow area or be off-site material that meets the requirements of NYSDOT 713-01. Analytical testing shall be performed on off-site material;
 - 3. Regardless of the pH of the topsoil, the pH of the soil mixture shall be in the range recommended by the seed supplier;
 - 4. Contains no nuisance weeds including seeds, stems or rhizomes of Purple Loosestrife, Phragmites, Japanese Knotweed or any plants on the Federal Noxious Weeds list.

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- C. An average 2-inch layer and no less than 1-inch of compost shall be spread over the Vegetative Soil Layer. The compost shall meet the requirements of NYSDOT 713-015 Type C.
- D. The Vegetative Soil Layer shall not have particles classified as either very angular or angular.
- E. Material evaluation of available borrow sources will be conducted and appropriate placement procedures will be developed by the Contractor.

2.02 EQUIPMENT

- A. Contractor shall furnish equipment to perform the scope of work described in this specification, including haul, place, and spread the Vegetative Soil Layer.

PART 3 – EXECUTION

3.01 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Material not immediately used as Vegetative Soil Layer shall be stockpiled in areas approved by Engineer.
- B. The Contractor shall be fully responsible for: (i) providing safe and adequate stockpile management procedures and erosion and sediment control measures; (ii) stabilizing stockpiles that will remain out of active use for an extended period of time; and (iii) correcting any deficiencies that may arise.

3.02 SITE PREPARATION

- A. Contractor shall coordinate the work such that required inspections and testing of work that will be covered up by the placement of vegetative soil will be complete prior to placement of the vegetative soil.
- B. The Contractor shall construct staging and stockpile areas in approved areas if needed.
- C. The Contractor shall construct temporary haul roads and drainage structures as required for the Contractor to access the staging areas and soil stockpiles.

3.03 SITE GRADING

- A. Construct Vegetative Soil Layer to the lines and grades as shown on the SCA Final Cover Contract Drawings.
- B. In work areas where water ponding is observed, Contractor shall implement measures to remove the water.

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3.04 MATERIAL PLACEMENT

- A. Prior to performing work described in this specification, install and maintain surface water management and erosion and sedimentation control measures in accordance with Section 02140 – Construction Water Management and Section 02370 – Erosion Control.
- B. Construct the Vegetative Soil Layer to the limits and grades shown on the SCA Final Cover Contract Drawings. The Vegetative Soil Layer shall be constructed in a layered sequence consisting of the borrow material followed by sand and topsoil. The three layers shall be disked to combine the three materials and achieve an in-place constructed minimum thickness of 6 inches. The thickness of the Vegetative Soil Layer at any location shall be measured either manually at a minimum frequency of four (4) measurements per acre, or by survey to demonstrate the minimum thickness has been placed.
- C. Do not place frozen Vegetative Soil Layer nor place Vegetative Soil Layer on frozen ground/sub-base or frozen previous lift. Do not place or compact Vegetative Soil Layer at temperature below 32 degrees Fahrenheit (°F) unless otherwise authorized in writing by the Engineer.
- D. If the Vegetative Soil Layer material freezes after compaction, remove the frozen material, scarify the remaining unfrozen material, and replace and re-compact the material in accordance with this specification prior to placing the next lift of material. Do not reuse frozen material until it has thawed and has been conditioned to the moisture content requirements described in this specification.
- E. The Vegetative Soil Layer shall be placed directly on top of the previously placed Protective Soil Layer as shown on the Contract Drawings. The Vegetative Soil Layer shall be placed using a low ground-pressure dozer in accordance with the ground pressure requirements of this Section.
- F. The Contractor shall be responsible for protecting the Vegetative Soil Layer from being washed out during rain events.
- G. The equipment used to spread the Vegetative Soil Layer shall be low ground pressure (LGP) equipment, with a maximum ground pressure of less than 20 pounds per square inch (psi). Non-LGP equipment with maximum ground pressure equal to or greater than 20 psi traversing areas where geosynthetics are present shall be restricted to areas with a minimum soil thickness of three (3) feet over the geosynthetics.

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- H. Turning of equipment while operating in areas of the engineered final cover system where geosynthetics are present shall be gradual to minimize twisting forces transmitted to the geosynthetics.
- I. The Contractor shall take additional precautions to ensure no damage to the underlying geosynthetics occurs. If damage is observed by the Contractor, the damage shall be brought to the attention of the Engineer.
- J. The Contractor shall protect all objects penetrating the Vegetative Soil Layer layer and repair damages to these objects.
- K. The Contractor shall be responsible for maintenance activities, including but not limited to, irrigation and placement of additional amendments (e.g., fertilizer, compost, etc.) to the Vegetative Soil Layer to fully establish vegetation on the SCA final cover.

3.05 SURVEY CONTROL

- A. Survey the limits and elevations of completed top of Vegetative Soil Layer in accordance with Section 01720 – Project Surveying. The final elevation of the Vegetative Soil Layer shall be verified by survey to achieve the final grades per the Contract Drawings prior to placement of overlying layers. Individual lift thicknesses shall be measured, tracked, and managed through plates or other types of devices (e.g., traffic cones) to achieve the final grades and minimum thickness per Contract Drawings.
- B. Provide As-Built drawings that include all field changes, additions, deletions and/or corrections clearly marked in accordance with Section 01300 – Document Submittal Procedures.

3.06 TOLERANCES

- A. Measure, track, and manage lift thicknesses through plates or other types of devices (e.g., traffic cones) during material placement and construct the finished surface of Vegetative Soil Layer to provide the minimum thickness and achieve the grades and slopes to allow for even drainage as indicated on the SCA Final Cover Contract Drawings.

[END OF SECTION]

SPECIFICATION NO: 02370**SPECIFICATION TITLE: EROSION CONTROL****PROJECT NO: 448847****PROJECT TITLE: SCA FINAL COVER DESIGN****CLIENT: HONEYWELL**

				APPROVALS								
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
0	4/10/2015	4	Issued For Agency Approval and Construction	JJH/PLR	SRB/PEB	LKB						
<input checked="" type="checkbox"/> Entire Specification Issued this Revision <input type="checkbox"/> Revised Pages Only Issued this Revision			SPECIFICATION ISSUED FOR: <table><tr><td><input type="checkbox"/> In-house Review</td><td><input type="checkbox"/> Bid</td></tr><tr><td><input type="checkbox"/> Client Review/Approval</td><td><input checked="" type="checkbox"/> Construction</td></tr><tr><td><input type="checkbox"/> Information Only</td><td><input type="checkbox"/> Other</td></tr></table>				<input type="checkbox"/> In-house Review	<input type="checkbox"/> Bid	<input type="checkbox"/> Client Review/Approval	<input checked="" type="checkbox"/> Construction	<input type="checkbox"/> Information Only	<input type="checkbox"/> Other
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SECTION 02370

EROSION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Work specified in this Section consists of the labor, equipment, tools, materials and services needed to manage stormwater and provide and maintain erosion control measures prior to and throughout construction as described herein, shown on the Contract Drawings or as directed by the Engineer. All Work in this Section will be carried out in accordance with an approved SWPPP. Work in this Section includes, but is not limited to:
1. Coordination with the Engineer regarding USEPA and NYSDEC requests pertaining to erosion and sedimentation control.
 2. Installation and maintenance of temporary and permanent sedimentation and erosion control measures.
 3. Control of erosion from stockpiles.
 4. Inspection of erosion control measures during and after rainfall.
 5. Repair of failed sedimentation and erosion control measures.
 6. Removal and disposal of sediment deposits in a manner that does not result in additional erosion or pollution.
 7. Removal of temporary erosion control measures once construction and permanent stabilization are complete.
- B. Related Work specified in other Sections includes, but is not limited to:
1. Section 01300 – Document Submittal Procedure
 2. Section 02140 – Construction Water Management
 3. Section 02200 – Earthwork
 4. Section 02219 – Waste Grading, Consolidation and Disposal

1.02 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State, and Local codes, ordinances, regulations, statutes and standards.
- B. Observe government policy established by United States Environmental Protection Agency (USEPA).
- C. Conform to all erosion and sedimentation control policies and procedures established by the State of New York.
- D. Inspect and repair existing erosion and sediment control measures as necessary before any final cover construction activities begin. Temporary erosion and sediment control measures shall be maintained throughout the construction, and shall not be

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removed until permanent cover is completely established and stabilized, with no visible unstable rills or erosion, subject to the approval of the Engineer.

- E. Temporary erosion and sediment control measures are a dynamic project element. The Contractor shall install, maintain, and modify control measures as required by changing remedial construction needs over time.
- F. The Contractor shall plan and execute the Work to minimize routing of stormwater over disturbed areas in order to minimize erosion and sedimentation to the extent practicable. Similarly, the control measures shall minimize, to the extent practicable, the flow of stormwater over ground such that rills or unplanned ditches are not formed.

1.03 REFERENCES

- A. New York Department of Transportation. Standard Specifications (US Customary Latest Version).
- B. New York State Standards and Specifications for Erosion and Sediment Control, (Blue Book, Latest Version).

1.04 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:
 - 1. Product Data - Provide product data for each component to be used in erosion and sediment control prior to delivery and implementation at the Site.

1.05 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature, and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Erosion control materials shall meet the requirements of New York State Standards and Specifications for Erosion and Sediment Control (Blue Book, Latest Version).

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The Contractor shall provide all means, methods, services, facilities, power, equipment, tools, material, consumables, incidentals, labor and supervision necessary to manage stormwater and implement and maintain erosion and sedimentation control measures to effectively minimize erosion and sedimentation.

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- B. Construction, including but not limited to clearing, grubbing, earthwork and excavations, shall be conducted in such a manner as to minimize erosion and sedimentation.
- C. Install erosion and sedimentation control products in accordance with manufacturers' recommendations.
- D. Erosion and sedimentation control measures shall be inspected by the Contractor daily. Repairs shall be made as soon as practical.
- E. Employ, construct and maintain all temporary erosion and sediment control measures in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (Blue Book, Latest Version).

3.02 COMPONENTS

- A. Erosion control components shall be installed, inspected and maintained in accordance with the New York State Standards and Specifications for Erosion and Sediment Control (Blue Book, Latest Version).

3.03 SPECIAL CONDITIONS

- A. Prohibited construction practices include, but are not limited to the following:
 - 1. Dumping of spoil material into any stream corridor, wetland, surface water, unspecified locations or any location not expressly approved by the Engineer.
 - 2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridor, wetland, surface water or other location. All equipment operation in water bodies or wetlands shall be in accordance with the Contract Documents.
 - 3. Pumping of silt-laden water from trenches or other excavations into any stream corridor, wetland or surface waters, or location not expressly approved by the Engineer.
 - 4. Disposal of trees, brush and other debris in any stream corridor, wetland, surface water, or location not expressly approved by the Engineer.
 - 5. Permanent or unspecified alteration of the flowpath of any stream not shown on the Contract Drawings or expressly approved by the Engineer.
 - 6. On or off-site burning of construction project debris.

3.04 ADJUSTMENT OF PRACTICES

- A. If the planned measures do not result in effective control of erosion and sediment runoff, the Contractor shall immediately adjust the program and/or institute additional measures in order to eliminate excessive erosion and sediment runoff.
- B. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor.

[END OF SECTION]

SPECIFICATION NO: SECTION 02710

SPECIFICATION TITLE: GEOTEXTILE

PROJECT NO: 448847

PROJECT TITLE: ONONDAGA LAKE SCA FINAL COVER

CLIENT: HONEYWELL, INC.

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	04-10-2015	8	For Agency Approval and Construction	RW	SB	JFB
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<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR: <div><input type="checkbox"/> In-house Review <input type="checkbox"/> Client Review/Approval <input type="checkbox"/> Information Only</div> <div><input type="checkbox"/> Bid <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Other</div>			
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SECTION 02710

GEOTEXTILE

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Section describes the materials, installation, and testing requirements to perform the installation, quality control, and maintenance of the geotextile for the final cover system of the Sediment Consolidation Area (SCA).

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:

1. Section 01030 Environmental Protection
2. Section 01300 Document Submittal Procedures
3. Section 01720 Project Surveying
4. Section 02100 Site Preparation
5. Section 02235 Protective Soil Layer
6. Section 02200 Earthwork
9. Section 02250 Vegetative Soil Layer
7. Section 02735 Geocomposite Drainage Layer
8. Section 02740 Geomembrane Cover

1.03 REFERENCES

- A. Latest version of American Society for Testing and Materials (ASTM) Standards:

1. ASTM D 4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus.
2. ASTM D 4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
3. ASTM D 4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
4. ASTM D 4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
5. ASTM D 4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

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6. ASTM D 5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
7. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
8. ASTM D 5514 Standard Test Method for Large Scale Hydrostatic Puncture Testing of Geosynthetics.
9. ASTM D 6193 Standard Practice for Stitches and Seams.
10. ASTM D 6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products using a 50-mm Probe.

1.04 SUBMITTALS

- A. Submit the following to the Engineer for review not less than 14 calendar days prior to shipment.
 1. Geotextile Manufacturer and product name.
 2. Certification of minimum average roll values and the corresponding test procedures for all geotextile properties listed in Table 1.
 3. Projected geotextile delivery dates.
 4. Manufacturer quality control tests and manufacturer certifications per Section 2.02.
- B. Submit manufacturing quality control certificates for each roll of geotextile as specified in this Section to the Engineer for review at least 14 calendar days prior to geotextile shipment. This documentation must be reviewed and approved by the Engineer to satisfy the requirements of these specifications prior to transporting any geotextile to the site.

1.05 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide as-built revisions to the SCA Final Cover Contract Drawings in accordance with Section 01300 – Document Submittal Procedures.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the placed geotextiles.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of geotextiles will be monitored by the Engineer as required in the CQA Plan.

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- B. The Engineer will perform material conformance testing of the geotextiles.
- C. The Contractor shall be aware of the activities required of the Engineer by the CQA Plan and shall account for these activities in the construction schedule.
- D. The Contractor shall correct all deficiencies and nonconformances identified by the Engineer at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 GEOTEXTILE

- A. Furnish geotextile products with minimum average roll values (95 percent lower confidence limit) meeting or exceeding the required property values in Table 1.
- B. Furnish geotextiles that are manufactured from first quality polymers, with not more than 20 percent reclaimed polymer used in production.
- C. Furnish polymeric threads for stitching that are ultra-violet (UV) light stabilized to at least the same requirements as the geotextile to be sewn. Furnish polyester or polypropylene threads that have a minimum size of 2,000 denier.
- D. Furnish geotextile material that meets the minimum required peak and residual internal/interface friction angles shown in Section 02235: Protective Soil Layer when tested as a layered sandwich representing the cover system of the SCA (leveling layer, geotextile cushion layer, 40-mil LLDPE geomembrane cover, geocomposite drainage layer, and protective soil layer) in accordance with ASTM D 5321. This test shall be performed at the frequency specified in Section 02235.

2.02 MANUFACTURING QUALITY CONTROL

- A. Sample and test the geotextile to demonstrate that the material conforms to the requirements of this Section.
- B. Perform manufacturing quality control tests to demonstrate that the geotextile properties conform to the values specified in Table 1. Perform as a minimum, the following manufacturing quality control tests at a minimum frequency of either one per lot or as shown in the below table, whichever is more frequent:

Test	Procedure	Frequency (min)
Mass per unit area	ASTM D 5261	one per 90,000 ft ²
Grab strength	ASTM D 4632	one per 90,000 ft ²
Tear strength	ASTM D 4533	one per 90,000 ft ²

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Puncture strength	ASTM D 6241	one per 90,000 ft ²
UV resistance	ASTM D 4355	one per formulation

- C. Submit quality control certificates signed by the geotextile Manufacturer quality control manager. Certificates shall state that the material is resistant to UV exposure and that the geotextiles are continuously inspected and are needle-free. The quality control certificates shall also include: lot, batch, and roll number and identification; and results of manufacturing quality control tests including description of test methods used.
- D. Do not supply any geotextile roll that does not comply with the manufacturing quality control requirements.
- E. If a geotextile sample fails to meet the quality control requirements of this Section, sample and test rolls manufactured at the same time or in the same lot as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply failing rolls.

2.03 PACKAGING AND LABELING

- A. Supply geotextiles in rolls wrapped in relatively impermeable and opaque protective wrapping. Wrapping which becomes torn or damaged shall be repaired with similar materials.
- B. Mark or tag geotextile rolls in accordance with ASTM D 4873 with the following information:
 - 1. manufacturer's name;
 - 2. product identification;
 - 3. lot or batch number;
 - 4. roll number; and
 - 5. roll dimensions.
- C. Geotextile rolls not labeled in accordance with this Section or on which labels are illegible shall be rejected and replaced by the Contractor at no additional cost to the Owner.

2.04 HANDLING AND STORAGE

- A. Protect geotextiles from sunlight, moisture, excessive heat or cold, puncture, mud, dirt, and dust or other damaging or deleterious conditions. Follow all geotextile manufacturer recommendations for handling and storage.

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- B. Store geotextile rolls on pallets or other elevated structures. Do not store geotextile rolls directly on the ground.
- C. Outdoor storage of rolls shall not exceed the manufacturer's recommendation or longer than 6 months, whichever is less.

PART 3 – EXECUTION

3.01 PLACEMENT

- A. Handle geotextiles so as to ensure they are not damaged in any way.
- B. Take necessary precautions to prevent damage to underlying layers including rutting during placement of the geotextiles.
- C. After unwrapping the geotextiles from their opaque cover, do not leave them exposed for a period in excess of 14 calendar days.
- D. If white colored geotextiles are used, take precautions against "snow blindness" of personnel. Precautions against "snow blindness" include wearing sunglasses and avoiding exposure for long periods of time.
- E. Anchor or weight geotextile with sandbags, or the equivalent, to prevent damage from wind. Install sandbags during placement and maintain them until overlying material is placed. Geotextiles installed on slopes shall have a minimum 10 feet runout from the crest of the sideslopes, as shown on the drawings.
- F. Place geotextile cushion over leveling layer soil prior to placement of the geomembrane cover as indicated on the SCA Contract Drawings.
- G. No geotextiles shall be placed onto an area which has been softened by precipitation or which has excessively cracked due to desiccation. The leveling soil layer surface shall be observed daily to evaluate the effects of desiccation cracking and/or softening on the integrity of the subgrade.H. Examine the geotextile surface after installation to ensure that no potentially harmful foreign objects are present. Remove any such objects and replace any damaged geotextiles at no additional cost to the Owner.

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3.02 SEAMS AND OVERLAPS

- A. Seams shall continuously overlap a minimum of 6 inches and sew geotextiles (i.e., spot sewing is not allowed) using a "single prayer" seam. Sew seams using Stitch Type 401 as per ASTM D 6193. When overlapped, the geotextile panels need to be shingled in the direction of placement of the overlaying layer to prevent the geotextile from peeling as the overlaying layer is placed. Overlaps (without seams) shall be at least 3 feet long.
- B. Do not install horizontal seams on slopes that are steeper than 10 horizontal to 1 vertical. Seams shall be along, not across, the slopes.
- C. All geotextiles should be placed with all seams up to facilitate inspection and repair.

3.03 REPAIR

- A. Repair any holes or tears in the geotextiles using a patch made from the same geotextile material. Extend geotextile patches a minimum of 1 foot or 1.5 times the size of the hole or tear, whichever is greater, beyond the damaged area. Sew geotextile patches into place no closer than 1 inch from any panel edge. Should any tear exceed 50 percent of the width of the roll, remove, and replace that roll at no additional cost to the Owner.
- B. Remove any soil or other material that may have penetrated the torn geotextiles.

3.04 PLACEMENT OF SOIL AND AGGREGATE MATERIALS

- A. Place soil materials on top of geotextiles in such a manner as to ensure that:
 - 1. the geotextiles and the underlying materials are not damaged; and
 - 2. slippage does not occur between the geotextile and the underlying layers during placement.
- B. Spread soil on top of the geotextile to cause the soil to cascade over the geotextile rather than be shoved across the geotextile.
- C. Equipment placing soil and aggregate material on geotextile shall be as approved by the Engineer.
- D. Place geotextile over the existing Gravel Drainage Layer prior to placement of leveling layer soil, geomembrane cover, or protective layer soil as indicated on the SCA Contract Drawings.

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TABLE 1. REQUIRED PROPERTY VALUES FOR GEOTEXTILE

PROPERTIES	QUALIFIER	UNITS	SPECIFIED ⁽¹⁾ VALUES	TEST METHOD
Type				
nonwoven needle-punched				(-)
Polymer composition	minimum	%	95 polypropylene or polyester by weight	(-)
Mass per unit area	minimum	oz/yd ²	8 (geotextile cushion) 10 (drainage features)	ASTM D 5261
Mechanical Requirements				
Grab strength	minimum	lb	225 (8 oz/yd ²) 230 (10 oz/yd ²)	ASTM D 4632 ⁽³⁾
Tear strength	minimum	lb	85 (8 oz/yd ²) 95 (10 oz/yd ²)	ASTM D 4533 ⁽⁴⁾
Puncture strength	minimum	lb	600 (8 oz/yd ²) 700 (10 oz/yd ²)	ASTM D 6241 ⁽⁵⁾
Interface Friction Testing	minimum		See Note (2)	ASTM D 5321
Durability				
Ultraviolet Resistance	minimum	%	70	ASTM D 4355

Notes:

- (1) All values represent minimum average roll values (MARV).
- (2) The required peak and residual shear strength parameters are included in a figure as part of Section 02235 – Protective Soil Layer.
- (3) Minimum of values measured in machine and cross machine directions with 1 inch clamp on Constant Rate of Extension (CRE) machine.
- (4) Minimum value measured in machine and cross machine direction.
- (5) Tension testing machine with a 1.75-inch diameter ring clamp, the steel ball being replaced with 0.31-inch diameter solid steel cylinder with flat tip centered within the ring clamp.
- (6)

mm	=	millimeter
%	=	percent
oz/yd ²	=	ounce per square yard
sec	=	second
lb	=	pound
psi	=	pound per square inch

[END OF SECTION]

SPECIFICATION NO: **SECTION 02735**

SPECIFICATION TITLE: **GEOCOMPOSITE DRAINAGE LAYER**

PROJECT NO: **448847**

PROJECT TITLE: **ONONDAGA LAKE SCA FINAL COVER**

CLIENT: **HONEYWELL, INC.**

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	05-04-2016	11	For Agency Approval and Construction	RW	SB	JFB
<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR:			
<input type="checkbox"/> Revised Pages Only Issued this Revision						
			<input type="checkbox"/> In-house Review			
			<input type="checkbox"/> Client Review/Approval			
			<input type="checkbox"/> Information Only			
			<input type="checkbox"/> Bid			
			<input checked="" type="checkbox"/> Construction			
			<input type="checkbox"/> Other			



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SECTION 02735

GEOCOMPOSITE DRAINAGE LAYER

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section describes the materials, installation, and testing requirements to perform the installation, quality control, and maintenance of the geocomposite drainage layer for the surface water management and gas management systems of the final cover system of the Sediment Consolidation Area (SCA).

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:
 - 1. Section 01030 Environmental Protection
 - 2. Section 01300 Document Submittal Procedures
 - 3. Section 01720 Project Surveying
 - 4. Section 02100 Site Preparation
 - 5. Section 02235 Protective Soil Layer
 - 6. Section 02200 Earthwork
 - 7. Section 02250 Vegetative Soil Layer
 - 8. Section 02710 Geotextile
 - 9. Section 02740 Geomembrane Cover

1.03 REFERENCES

- A. Latest version of American Society for Testing and Materials (ASTM) standards:
 - 1. ASTM D 792. Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 1. ASTM D 1505. Standard Test Method for Density of Plastics by the Density-Gradient Technique.
 - 2. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.
 - 3. ASTM D 4218. Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by Muffle-Furnace Technique.

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4. ASTM D 4491. Standard Test Method for Water Permeability of Geotextiles by Permittivity.
5. ASTM D 4533. Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
6. ASTM D 4632. Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
7. ASTM D 4716. Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
8. ASTM D 4751. Standard Test Method for Determining Apparent Opening Size of a Geotextile.
9. ASTM D 4833. Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
10. ASTM D 4873. Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
11. ASTM D 5199. Standard Method for Measuring Nominal Thickness of Geosynthetics.
12. ASTM D 5261. Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.
13. ASTM D 6241. Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products using a 50-mm Probe.
14. ASTM D 7005. Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.

1.04 SUBMITTALS

- A. Submit the following to the Engineer for review not less than 14 calendar days prior to shipment.
 1. Geocomposite Manufacturer and product name.
 2. Certification of minimum average roll values and the corresponding test procedures for all geocomposite properties listed in Table 1.
 3. Projected geocomposite delivery dates.
 4. Manufacturer quality control tests and manufacturer certifications per Section 2.02.
- B. This documentation must be reviewed and approved by the Engineer to satisfy the requirements of these specifications prior to transporting any geocomposite to the site.

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1.05 AS-BUILT DOCUMENTATION

- A. The Contractor shall provide as-built revisions to the SCA Final Cover Contract Drawings in accordance with Section 01300 – Document Submittal Procedures.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the placed geocomposite.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geocomposite drainage layer will be monitored as required in the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be aware of the activities required of the Engineer by the CQA Plan and shall account for these activities in the construction schedule.
- C. The Contractor shall correct all deficiencies and nonconformances identified by the Engineer at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GEOCOMPOSITE

- A. The geocomposite shall be composed of a high density polyethylene (HDPE) drainage net (geonet) with a nonwoven, needle-punched geotextile:
 - (1) bonded to each side of the geonet (i.e., double-sided) on the main deck side slopes (i.e., 4 horizontal to 1 vertical (4H:1V) and 3.33H:1V slopes); and
 - (2) bonded to one side of the geonet (i.e., single-sided) on the top deck side slopes (i.e., slopes equal to or less than 4H:1V).

The geotextile shall not be glued or bonded to the geonet in any manner other than heat bonding. Along edges, six inches of the geotextile shall not be heat bonded to the geonet to allow connection in the field.

- B. Furnish geocomposite having properties that comply with the required property values shown in Table 1. The Manufacturer shall provide test results for these procedures, as well as certification that the materials meet or exceed the specified values.
- C. During shipment and storage, the geocomposite shall be protected from mud, dirt, dust, cutting, or other damaging or deleterious conditions.

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2.02 MANUFACTURING QUALITY CONTROL

- A. Sample and test the geocomposite to demonstrate that the material conforms to the requirements of this Section.
- B. Perform manufacturing quality control tests to demonstrate that the geocomposite properties conform to the values specified in Table 1. Perform as a minimum, the following manufacturing quality control tests at a minimum frequency of either one per lot or as shown in the below table, whichever is more frequent:

Test	Procedure	Frequency (min)
<u>Geonet</u>		
Polymer Density	ASTM D 792 ASTM D 1505	one per 90,000 ft ²
Thickness	ASTM D 5199	one per 90,000 ft ²
Carbon Black	ASTM D 1603 or ASTM D 4218	one per 90,000 ft ²
<u>Geotextile</u>		
Mass per unit area	ASTM D 5261	one per 90,000 ft ²
Apparent opening size	ASTM D 4751	one per 90,000 ft ²
Permittivity	ASTM D 4491	one per 90,000 ft ²
Grab strength	ASTM D 4632	one per 90,000 ft ²
Tear strength	ASTM D 4533	one per 90,000 ft ²
Puncture strength	ASTM D 6241	one per 90,000 ft ²
<u>Geocomposite</u>		
Hydraulic Transmissivity	ASTM D 4716	one per 90,000 ft ²
Peel strength	ASTM D 7005	one per 90,000 ft ²

- C. Submit quality control certificates signed by the geocomposite Manufacturer quality control manager. Certificates shall state that the material is resistant to UV exposure and that the geocomposites are continuously inspected and are needle-free. The quality control certificates shall also include: lot, batch, and roll number and identification; and results of manufacturing quality control tests including description of test methods used.

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- D. Do not supply any geocomposite roll that does not comply with the manufacturing quality control requirements.
- E. If a geocomposite sample fails to meet the quality control requirements of this Section, sample and test rolls manufactured at the same time or in the same lot as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply failing rolls.

2.04 PACKING AND LABELING

- A. Supply geocomposite in rolls wrapped in relatively impermeable and opaque protective wrapping. Wrapping which becomes torn or damaged shall be repaired with similar materials.
- B. Mark or tag geocomposite rolls in accordance with ASTM D 4873 with the following information:
 - 1. manufacturer's name;
 - 2. product identification;
 - 3. lot or batch number;
 - 4. roll number; and
 - 5. roll dimensions.
- C. Geocomposite rolls not labeled in accordance with this Section or on which labels are illegible shall be rejected and replaced.

2.05 HANDLING AND STORAGE

- A. Protect geocomposite from sunlight, moisture, excessive heat or cold, puncture, mud, dirt, and dust or other damaging or deleterious conditions. Follow all geocomposite manufacturer recommendations for handling and storage.
- B. Store geocomposite rolls on pallets or other elevated structures. Do not store geocomposite rolls directly on the ground.
- C. Outdoor storage of rolls shall not exceed the manufacturer's recommendation or longer than 6 months, whichever is less.

PART 3 EXECUTION

3.01 FAMILIARIZATION

- A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section.

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B. Inspection:

1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.
2. If the Contractor has any concerns regarding the installed work of other Sections, the Contractor shall immediately notify the Engineer in writing. Failure to inform the Engineer in writing or continuance of installation of the geocomposite drainage layer will be construed as the Contractor's acceptance of the related work of all other Sections.

3.02 HANDLING AND PLACEMENT

- A. The geocomposite shall be handled in such a manner as to ensure the geocomposite is not damaged in any way.
- B. Necessary precautions shall be taken to prevent damage to underlying layers during placement of the geocomposite drainage layer.
- C. The geocomposite shall only be cut using Manufacturer's recommended procedures.
- D. Anchor or weight geocomposite with sandbags, or the equivalent, to prevent damage from wind. Install sandbags during placement and maintain them until overlying material is placed. Geocomposite drainage layer installed on slopes shall be anchored securely at the top of the slope with the designed minimum run-out distance as shown on the Contract Drawings, or in a suitably designed anchor trench.
- E. Care shall be taken during placement of geocomposite drainage layer not to entrap dirt or excessive dust in the geocomposite drainage layer that could cause clogging of the drainage system, and/or stones that could damage the adjacent geosynthetic.
- F. Unless otherwise specified, geocomposites shall not be welded to the geomembrane cover.
- G. The geocomposite drainage layer shall be positioned by hand after being unrolled to minimize wrinkles.
- H. Tools and sandbags shall not be left on, in, or under the geocomposite drainage layer.

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- I. After unwrapping the geocomposite from its opaque cover, the geocomposite shall not be left exposed for a period in excess of 30 days, unless if approved by the Engineer.

3.03 SEAMS AND OVERLAPS

- A. The components of the geocomposite (i.e., geotextile - geonet - and geotextile) are not to be bonded together at the edges of the rolls. Each component shall be secured or seamed to the like component at overlaps.
- B. Geonet Components:
 1. The geonet components shall be overlapped by at least 4 inches along the slope and at least 12 inches along end-to-end seams. These overlaps shall be secured by tying.
 2. Tying shall be achieved by plastic fasteners or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices shall not be used.
 3. Tying shall be every 5 feet along the slope, every 2 feet on end-to-end seams.
 4. End-to-end seams shall be staggered and shall not be allowed on slopes steeper than 4 horizontal to 1 vertical.
- C. Geotextile Components:
 1. The top layers of geotextiles shall be continuously sewn (i.e., spot sewing or thermal bonding is only allowed for repairs). The top layers of geotextiles shall be overlapped a minimum of 6 inches prior to seaming.
 2. To the extent practical, installing horizontal seams shall be avoided. If it is not practical to avoid horizontal seams on the side slopes, then the horizontal seams shall be discontinuous (i.e., staggered) between adjacent panels.
 3. Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile component, shall be used for all sewing. The seams shall be sewn using Stitch Type 401. The seam type shall be Federal Standard Type SSN-1.

3.04 REPAIR

- A. If the geonet is undamaged but the geotextile is damaged, the damaged area shall be repaired as follows:
 1. remove damaged geotextile;

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2. cut patch of new geotextile to provide minimum 12-inch overlap in all directions; and
 3. thermally bond geotextile patch to existing geocomposite.
- B. All seams that have no geotextile flaps available for sewing shall have a geotextile patch, extending 1-ft beyond the edges of the panel, thermally bonded.
- C. Any holes or tears in the geocomposite drainage layer shall be repaired by removing the damaged portion of the geonet, placing a patch extending 0.5 ft beyond the edges of the hole or tear. The patch shall be secured by tying fasteners through the bottom geotextile and the geonet of the patch, and through the panel. The patch shall be secured every 6 inches with approved tying devices. A geotextile patch shall be heat sealed to the top of the geocomposite drainage layer needing repair. If the hole or tear width across the panel is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be joined in accordance with this Section.

3.05 PRODUCT PROTECTION

- A. All means necessary shall be used to protect prior work and materials and completed work of other Sections.

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TABLE 1. REQUIRED PROPERTY VALUES FOR GEOCOMPOSITE

PROPERTIES	QUALIFIER	UNITS	SPECIFIED VALUES⁽¹⁾	TEST METHOD
<i>Geonet Component:</i> Polymer composition	Minimum	%	95% polyethylene by weight	---
Polymer density	Minimum	g/cm ³	0.935	ASTM D 792 (Method B) or ASTM D 1505
Carbon black content	Range	%	2 - 3	ASTM D 1603 or D 4218
Nominal thickness (double-sided)	Minimum	mils	250	ASTM D 5199
Nominal thickness (single-sided)	Minimum	mils	200	ASTM D 5199
<i>Geotextile Components:</i> Type	None	none	needlepunched nonwoven	---
Polymer composition	Minimum	%	95 polyester or polypropylene	---
Mass per unit area	Minimum	oz/yd ²	8	ASTM D 5261
Apparent opening size	Maximum	mm	0 ₉₅ ≤ 0.21 mm	ASTM D 4751
Permittivity	Minimum	sec ⁻¹	0.9	ASTM D 4491
Grab strength	Minimum	lb	190	ASTM D 4632 ⁽²⁾
Tear strength	Minimum	lb	75	ASTM D 4533 ⁽²⁾
Puncture strength	Minimum	lb	575 lb	ASTM D 6241 ⁽³⁾
<i>Geocomposite</i> Transmissivity (double-sided)	Minimum	m ² /s	5 × 10 ⁻⁴	ASTM D 4716 ⁽⁴⁾
Transmissivity (single-sided)	Minimum	m ² /s	1 × 10 ⁻³	ASTM D 4716 ⁽⁴⁾
Peel strength	Minimum	lb/in	0.5 (min) 1.0 (average)	ASTM D 7005

Notes: (1) All values represent minimum average roll values (i.e., any roll in a lot should meet or exceed the values in this table).

(2) Minimum value measured in machine and cross machine direction.

(3) Constant-rate-of extension (CRE) testing machine with a 5.9-in. internal diameter concentric plate clamp and 1.9-in. flat diameter plunger centered within the ring clamp.

(4) The transmissivity is the hydraulic transmissivity of the geocomposite drainage layer measured using water at 68°F with a gradient of 0.01 for a single-sided geocomposite or 0.33 for a double-

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sided geocomposite, under a compressive stress of not less than 240 psf with the site-specific boundary conditions of the protective cover soil interface on the upper geotextile and the selected geomembrane against the lower geotextile.

(5) %	=	percent	mils	=	milli inches
g/cm ³	=	gram per cubic centimeter	lb	=	pound
oz/yd ²	=	ounces per square yard	sec	=	seconds
mm	=	millimeter	lbs/in.	=	pounds per inch
m ² /s	=	square meter per second.			

[END OF SECTION]

SPECIFICATION NO: SECTION 02740

SPECIFICATION TITLE: GEOMEMBRANE COVER

PROJECT NO: 448847

PROJECT TITLE: ONONDAGA LAKE SCA FINAL COVER

CLIENT: HONEYWELL, INC.

				APPROVALS		
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved
0	05-04-16	20	For Agency Approval and Construction	RW	SB	JFB
<input checked="" type="checkbox"/> Entire Specification Issued this Revision			SPECIFICATION ISSUED FOR:			
<input type="checkbox"/> Revised Pages Only						
<input type="checkbox"/> Issued this Revision						
			<input type="checkbox"/> In-house Review			
			<input type="checkbox"/> Client Review/Approval			
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			<input type="checkbox"/> Bid			
			<input checked="" type="checkbox"/> Construction			
			<input type="checkbox"/> Other			



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SECTION 02740

GEOMEMBRANE COVER

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work covered in this Section consists of the installation of a 40-mil linear low-density polyethylene (LLDPE) geomembrane cover. This geomembrane cover shall be placed in accordance with the SCA Final Cover Project Specifications and SCA Final Cover Contract Drawings. The LLDPE geomembrane shall be textured on both sides in the 3.33 horizontal to 1 vertical (3.33H:1V) and 4H:1V side slope areas (i.e., main and top decks) of the SCA final cover. A smooth or textured geomembrane may be used in the gently sloping final cover areas less than 4H:1V. The Contractor shall furnish all labor, materials, equipment, supervision, and incidentals necessary to perform the scope of work.
- B. All geomembrane material placed as a part of this project shall be placed, tested, and documented in accordance with this Section unless specifically approved by the Engineer.

1.02 RELATED WORK

- A. Other work that is related to the work in this section includes, but is not limited to:
 - 1. Section 01030 Environmental Protection
 - 2. Section 01300 Document Submittal Procedures
 - 3. Section 01720 Project Surveying
 - 4. Section 02100 Site Preparation
 - 5. Section 02235 Protective Soil Layer
 - 6. Section 02200 Earthwork
 - 7. Section 02250 Vegetative Soil Layer
 - 8. Section 02710 Geotextile
 - 9. Section 02735 Geocomposite Drainage Layer

1.03 REFERENCES

- A. Latest version of the American Society for Testing and Materials (ASTM) standards:

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1. ASTM D 792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
2. ASTM D 1004 Standard Test Method of Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
3. ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
4. ASTM D 1505 Standard Test Methods for Density of Plastics by the Density-Gradient Technique.
5. ASTM D 1603 Standard Test Method for Carbon Black Content in Olefin Plastics.
6. ASTM D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry.
7. ASTM D 4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
8. ASTM D 4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
9. ASTM D 5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
10. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
11. ASTM D 5596 Standard Test Method for Microscopic Examination the Dispersion of Carbon Black in Polyolefin Geosynthetics.
12. ASTM D 5994 Standard Test Method for Measuring the Core Thickness of Textured Geomembrane.
13. ASTM D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
14. ASTM D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
15. ASTM D 7466 Standard Test Method for Measuring the Asperity Height of Textured Geomembrane.
16. GRI GM 9 Cold Weather Seaming of Geomembranes.

1.04 SUBMITTALS

- A. Submit the following information to the Engineer for review not less than 14 calendar days prior to use for all geomembrane furnished.
 1. Geomembrane manufacturer capabilities, including daily production capacity available for this contract and manufacturing quality control procedures.

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2. A list of 10 completed facilities for which the Manufacturer has manufactured a minimum total of 10,000,000 square feet of polyethylene geomembrane. Provide the following information for each facility:
 - a. Name, location, purpose of facility, and date of installation;
 - b. Names of owner, project manager, design engineer, and installer; and
 - c. Thickness and surface area of geomembrane provided.
 3. Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin used.
 4. Certification of minimum average roll values (95 percent lower confidence limit) for physical, mechanical, and environmental properties and the corresponding test procedures for the geomembrane properties listed in Table 1 for the 40-mil final cover geomembrane. Submit values that are specific to the resin used in manufacturing of the geomembrane.
 5. Certification that LLDPE welding rod is compatible with the specifications and consists of the same resin as the geomembrane.
 6. Manufacturer warranty as specified in this Section.
- B. Submit the following documentation on the resin used to manufacture any geomembranes to the Engineer for review not less than 14 calendar days prior to geomembrane use:
1. Copies of quality control certificates issued by the resin supplier including the production dates and origin of the resin used to manufacture the geomembrane for this Contract.
 2. Results of tests conducted by the Manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the project.
 3. Certification that no reclaimed polymer is added to the resin during the manufacturing of the geomembrane to be used for this project except as allowed by this specification.
- C. Submit to the Engineer for review the following documentation on geomembrane roll production at least 5 calendar days prior to transporting any geomembrane to the site.
1. Manufacturing certificates for each shift's production of geomembrane, signed by the Manufacturer quality control manager.
 2. Certificate shall include roll numbers and identification, sampling procedures and results of Manufacturer quality control tests, including descriptions of the test methods used (the Manufacturer quality control tests to be performed are given in Part 2 of this Section).
 3. Cold weather seaming procedures (including manufacturer specifications), which should follow the standards of GRI GM 9.

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D. Submit the following information from the Installer to the Engineer for review at least 14 calendar days prior to mobilization of the Installer to the site.

1. Layout drawings showing the installation layout identifying geomembrane panel configurations, dimensions, details, locations of seams, as well as any variance or additional details which deviate from the SCA Final Cover Contract Drawings. The layout drawings shall be adequate for use as a construction plan and shall include dimensions, details, etc. The layout drawings, as modified and/or approved by the Engineer, shall become part of the contract.
2. Installation schedule.
3. Copy of Installer's letter of approval or license by the Manufacturer.
4. Installation capabilities, including information on equipment proposed for this project, average daily production anticipated for this project and quality control procedures to include quality control organization.
5. A list of 10 completed facilities for which the Installer has installed a minimum of 5,000,000 square feet of polyethylene geomembrane. The following information shall be provided for each facility:
 - a. Name and purpose of the facility, its location, and installation dates;
 - b. Names of owner, project manager, and geomembrane manufacturer;
 - c. Name and qualifications of the supervisor of the installation crew;
 - d. Thickness and surface area of installed geomembrane;
 - e. Type of seaming and type of seaming apparatus used; and
 - f. Duration of installation.
6. Resumes of the Installer Superintendent and quality control chief to be assigned to this project, including dates and duration of employment.
7. Resumes of all personnel who will perform seaming operations on this project, including dates and duration of employment.
8. Evidence that the installation crew has the following experience.
 - a. The foreman shall have supervised the installation of a minimum of 50 acres of comparable geosynthetic systems, on a minimum of 5 different projects.
 - b. At least one seamer shall have experience seaming a minimum of 500,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Seamers with such experience will be designated "master seamers" and shall provide direct supervision over less experienced seamers.
 - c. All other seaming personnel shall have seamed at least 100,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Personnel who have seamed less than 100,000 square feet of seams shall be allowed to seam only under the direct supervision of the master seamer or Superintendent.

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- E. Submit a Certificate of Calibration less than 12 months old for the field tensiometer to the Engineer for review at least 14 days prior to geomembrane cover placement. Tensiometer shall be calibrated within one year of date of test. Calibration shall be traceable to national or industry recognized standards where possible.
- F. Submit subgrade acceptance certificates, signed by the Installer, for each area to be covered by the geomembrane prior to geomembrane cover placement in that area.
- G. Within 14 calendar days of completion of the geomembrane cover installation, submit a one-year installation warranty to the Engineer.

1.05 AS-BUILT DOCUMENTATION

- A. The Contractor shall submit as-built revisions to the SCA Final Cover Contract Drawings in accordance with Section 01300 – Document Submittal Procedures.
- B. In addition to preparation of as-built revisions to the SCA Final Cover Contract Drawings, the Contractor shall provide as-built documentation for the placed geomembrane cover.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The construction of the geomembrane cover will be monitored as required in the CQA Plan.
- B. The Engineer will perform material conformance testing of geomembrane materials and installation quality assurance testing of the geomembrane cover seams, as required in the CQA Plan.
- C. The Contractor shall be aware of the activities required of the Engineer by the CQA Plan and shall account for these activities in the construction schedule.
- D. The Contractor shall correct all deficiencies and nonconformances identified by the Engineer at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 RESIN

- A. Provide geomembrane manufactured from new, first-quality polyethylene resin. Do not add reclaimed polymer to the resin. The use of polymer recycled during the manufacturing process is permitted if performed with appropriate cleanliness and if the recycled polymer during the manufacturing process does not exceed 10

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percent by weight of the total polymer weight. The percentage of recycled polymer shall not affect the quality of the finished product.

B. Use LLDPE resin having the following properties:

1. Formulated Sheet Density: 0.939 g/ml maximum (ASTM D792 Method B or ASTM D1505)
2. Resin Specific Gravity: 0.926 g/ml minimum (ASTM D792 Method B or ASTM D1505).
3. Melt Flow Index: 1.0 g/10 min., maximum (manufacturer certification)

2.02 GEOMEMBRANE COVER PROPERTIES

A. The Contractor shall furnish LLDPE geomembrane having properties that comply with the required values shown in Table 1 for 40-mil LLDPE geomembrane cover.

B. The 40-mil LLDPE geomembrane cover material shall meet the minimum required peak and residual internal/interface friction angles shown in Section 02235: Protective Soil Layer when tested as a layered sandwich representing the final cover system of the SCA (leveling layer, geotextile cushion layer, 40-mil LLDPE geomembrane, geocomposite drainage layer, protective soil layer, and vegetative layer) in accordance with ASTM D 5321. This test shall be performed at the frequency specified in Section 02235.

D. In addition, furnish geomembrane material that:

1. contains a maximum of 1 percent by weight of additives, fillers, or extenders not including carbon black;
2. does not have striations, pinholes, bubbles, blisters, nodules, undispersed raw materials, or any sign of contamination by foreign matter on the surface or in the interior; and
3. is manufactured in a single layer (thinner layers shall not be welded together to produce the final required thickness).

2.03 MANUFACTURING QUALITY CONTROL

A. Resin:

1. Sample and test resin at a minimum frequency of one test per rail car to demonstrate that the resin complies with the requirements of this Section. Perform tests on resin after the addition of additives to the virgin resin. Certify in writing that the resin meets the requirements of this Section.
2. Do not use any noncomplying resin.

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B. Rolls:

1. Continuously monitor for geomembrane defects during manufacturing.
2. Do not supply geomembrane that exhibits any defects.
3. Regularly monitor for geomembrane thickness during manufacturing.
4. Do not supply geomembrane that fails to meet the specified thickness.
5. Sample and test the geomembrane, to demonstrate that its properties conform to the values specified in Table 1. Perform the following quality control tests at a minimum frequency, as shown:

Test	Procedure	Frequency
Thickness	ASTM D 5199 ASTM D 5994	one per 50,000 ft ²
Tensile strength	ASTM D 6693	one per 50,000 ft ²
Tensile elongation	ASTM D 6693	one per 50,000 ft ²
Tear resistance	ASTM D 1004	one per 50,000 ft ²
Carbon black content	ASTM D 1603 ASTMD D 4218	one per 50,000 ft ²
Carbon black dispersion	ASTM D 5596	one per 50,000 ft ²
Specific gravity	ASTM D 792 ASTM D 1505	one per 50,000 ft ²
Asperity height	ASTM D 7466	one per 50,000 ft ²
Oxidative induction time	ASTM D 3895	one per formulation

6. Provide a geomembrane sample for use in sandwich shear testing (ASTM D 5321) to demonstrate that the geomembrane properties conform to the shear strength parameters specified in Table 1.
7. If a geomembrane sample fails to meet the quality control requirements of this Section, sample and test rolls manufactured, in the same resin batch, or at the same time, as the failing roll. Continue to sample and test the rolls until the extent of the failing rolls are bracketed by passing rolls. Do not supply any failing rolls.

- C. Permit the Engineer to visit the manufacturing plant for project specific visits. If possible, such visits will be prior to, or during, the manufacturing of the geomembrane rolls for this project.

2.04 LABELING

- A. Label the geomembrane rolls with the following information.

1. thickness of the material;
2. length and width of the roll;
3. name of Manufacturer;

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4. product identification;
5. lot number; and
6. roll number.

- B. Geomembrane rolls not labeled in accordance with this Section or on which labels are illegible will be rejected and replaced by the Contractor at no additional cost to the Owner.

2.05 TRANSPORTATION, HANDLING, AND STORAGE

- A. Deliver geomembranes to the site at least 14 calendar days prior to the planned deployment date to allow the Engineer adequate time to perform conformance testing on the geomembrane samples as described in the CQA Plan.
- B. Provide proper handling and storage of the geomembrane at the site. Protect the geomembrane from excessive heat or cold, dirt, puncture, cutting, or other damaging or deleterious conditions. Provide any additional storage procedures required by the Manufacturer.
- C. Store geomembrane rolls on pallets or other elevated structures. Do not store geomembrane rolls directly on the ground surface. Do not store more than 3 rolls high.

PART 3 – EXECUTION

3.01 FAMILIARIZATION

- A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section.
- B. Inspection:
 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.
 2. If the Contractor has any concerns regarding the installed work of other Sections, the Contractor shall immediately notify the Engineer in writing. Failure to inform the Engineer in writing or continuance of installation of the geomembrane cover will be construed as the Contractor's acceptance of the related work of all other Sections.

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3.02 SUBGRADE SURFACE PREPARATION

- A. The Contractor shall provide certification in writing from the Geomembrane Installer that the surface on which the geomembrane cover will be installed is acceptable. This certification of acceptance shall be given to the Engineer prior to commencement of geomembrane cover installation in the area under consideration.
- B. Special care shall be taken to maintain the prepared leveling layer surface and placed geotextile cushion layer.
- C. No geomembrane cover shall be placed onto an area which has been softened by precipitation or which has excessively cracked due to desiccation. The leveling soil layer surface shall be observed daily to evaluate the effects of desiccation cracking and/or softening on the integrity of the subgrade.
- D. Any damage to the underlying layer caused by installation activities shall be repaired by the Contractor at no additional cost to the Owner.

3.03 GEOMEMBRANE DEPLOYMENT

- A. General:
 - 1. The Contractor shall produce layout drawings prior to geomembrane deployment. These drawings shall indicate the geomembrane configuration, dimensions, details, locations of seams, etc. The layout drawings must be approved by the Engineer prior to the installation of any geomembranes. The layout drawings, as modified and/or approved by the Engineer, shall become part of these specifications.
 - 2. Do not deploy geomembrane until the layout drawings are approved by the Engineer.
 - 3. Do not deploy a geomembrane panel in an area until the Engineer has been provided with a certificate of acceptance for the underlying layer in that area.
 - 4. Do not deploy geomembranes until Engineer completes conformance evaluation of the geomembrane and performance evaluation of previous work, including evaluation of Contractor's survey results for previous work.
 - 5. Deploy each geomembrane panel in accordance with the approved layout drawings.
- B. Field Panel Identification:
 - 1. A geomembrane field panel is a roll or a portion of roll cut in the field.

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2. Give each field panel an identification code (number or letter-number). This identification code shall be agreed upon by the Engineer and the Installer.

C. Field Panel Placement:

1. Each geomembrane panel shall be seamed on the same day the panel is deployed.
2. Use temporary rubsheets as required to prevent displacement or damage to underlying geosynthetics.
3. Do not place geomembrane panels when the ambient temperature is below 32° Fahrenheit (F). For cold weather (>32°F and <40°F) deployment, use the additional procedures authorized in writing by the Engineer. Additional procedures authorized by the engineer for cold weather seaming shall include, more trial welds, deploying panels the night before to maintain consistent temperatures between the panels being seamed, and utilizing temporary enclosed structures with heaters. In addition, all manufacturer specifications for cold weather seaming and panel placement for the selected geomembrane shall be followed.
4. Do not place geomembrane cover during any precipitation, in the presence of heavy fog or dew, in an area of ponded water, or in the presence of wind in excess of 20 miles per hour.
5. Ensure that:
 - a. No vehicular traffic drives directly on the geomembrane cover.
 - b. Equipment used does not damage the geomembrane cover by handling, trafficking, or leakage of hydrocarbons (i.e., fuels).
 - c. Personnel working on the geomembrane cover do not smoke, bring glass onto the geomembrane cover, or engage in other activities that could damage the geomembrane cover.
 - d. The method used to unroll the panels does not scratch or crimp the geomembrane cover and does not damage lower geosynthetics or the supporting soil.
 - e. The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels). The method used to place the panels results in intimate contact with the geocomposite drainage layer, where present. Adjust or repair any area of geomembrane cover wrinkles where the wrinkle height causes a concern for wrinkle to fold over during placement of material on top. A wrinkle height of 4 inches measured perpendicular to the slope can be used as a general guide. The method used to place the panels does not cause the panels to lift up or trampoline during the coolest portion of the day.
 - g. The geomembrane cover is anchored or weighted with sandbags, or the equivalent, to prevent damage or uplift from wind. Install sufficient

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anchoring or weighting to prevent uplift and maintain such system until overlying material is placed.

6. Replace any field panel or portion thereof that becomes damaged (torn, twisted, or crimped). Remove from the work area damaged panels or portions of damaged panels.

3.04 FIELD SEAMING

- A. Personnel shall be experienced as specified in this Section. Do not perform seaming unless a “master seamer” and the Engineer are on-site.
- B. Orient seams parallel to the line of maximum slope (i.e., oriented down, not across, the slope). Minimize the number of seams in corners and at odd-shaped geometric locations. No horizontal seam shall be less than 10 feet beyond the toe of the slope and above the crest of the slope, except where approved by the Engineer. Do not locate seams at an area of potential stress concentration.
- C. Weather Conditions for Seaming:
 1. Do not seam geomembrane cover at ambient temperatures below 32°F. Do not seam geomembrane cover at sheet temperatures above 158°F. For cold (>32°F and <40°F) or hot (>104°F) weather seaming, use the additional procedures authorized in writing by the Engineer. Cold weather procedures (including manufacturer specifications) will be a contractor submittal that will be made available to the regulators.
 2. Measure ambient temperatures between 0 to 6 inches above the geomembrane cover surface.
 3. In all cases the geomembrane cover seam areas shall be dry and protected from wind. Do not seam geomembrane cover during periods of precipitation or if winds are in excess of 20 miles per hour.
- D. Overlapping and Temporary Bonding:
 1. Sufficiently overlap geomembrane cover panels for welding and to allow peel tests to be performed on the seam. Any seams that cannot be destructively tested because of insufficient overlap are failing seams.
 2. Control the temperature of the air at the nozzle of heat bonding apparatus such that the geomembrane cover is not damaged.
- E. Seam Preparation:
 1. Prior to seaming, clean the seam area and ensure that area to be bonded is free of moisture, dust, dirt, debris of any kind, and foreign material.

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2. If seam overlap grinding is required, complete the process according to the Manufacturer's instructions or within 60 minutes of the seaming operation. Do not grind to a depth that exceeds ten percent of the geomembrane cover thickness. Grinding marks shall not appear beyond 0.25 inch of the extrudate after it is placed.
3. Align seams with the fewest possible number of wrinkles and "fishmouths".

F. General Seaming Requirements:

1. Extend seams to the outside edge of panels to be placed in the anchor trench.
2. If required, place a firm substrate such as a flat board or similar hard surface directly under the seam overlap to achieve proper support.
3. Cut fishmouths or wrinkles at the seam overlaps along the ridge of the wrinkle to achieve a flat overlap. Seam the cut fishmouths or wrinkles and patch any portion where the overlap is less than 6 inches with an oval or round patch of geomembrane that extends a minimum of 6 inches beyond the cut in all directions.
4. Place the electric generator used for power supply to the welding machines outside the area to be lined or mount it on soft tires such that no damage occurs to the geomembrane cover. Properly ground the electric generator. Place a smooth insulating plate or fabric beneath the hot welding apparatus after use.

G. Seaming Process:

1. Approved processes for field seaming are extrusion welding and fusion welding. The primary method of welding shall be fusion. Seaming equipment shall not damage the geomembrane cover. Use only geomembrane Manufacturer-approved equipment.
2. Extrusion Equipment and Procedures:
 - a. Maintain at least one spare operable seaming apparatus on site.
 - b. Equip extrusion welding apparatus with gauges giving the temperature in the apparatus and at the nozzle.
 - c. Prior to beginning a seam, purge the extruder until all heat-degraded extrudate has been removed from the barrel. Whenever the extruder is stopped, purge the barrel of all heat-degraded extrudate.
3. Fusion Equipment and Procedures:
 - a. Maintain at least one spare operable seaming apparatus on site.
 - b. Fusion-welding apparatus shall be automated self-propelled devices equipped with gauges giving the applicable temperatures and pressures.
 - c. Fusion-welding apparatus shall produce a double-track seam.

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- d. Abrade the edges of cross seams to a smooth incline (top and bottom) prior to extrusion welding.

H. Trial Seams:

1. Make trial seams on excess pieces of geomembrane to verify that seaming conditions are adequate. Conduct trial seams on the same material to be installed and under similar field conditions as production seams. Conduct trial seaming at the beginning of each seaming period, after every four hours of continuous seaming, every time seaming equipment is changed and if significant changes in geomembrane cover temperature are observed, for each seaming apparatus used that day prior to seaming. In addition, each seamer shall make at least one trial seam each day, for each day that seaming is performed by that seamer. Conduct trial seaming under the same conditions as the actual seaming. Prepare trial seams that are at least 15 feet long by 1 foot wide (after seaming) with the seam centered lengthwise for fusion equipment and at least 3 feet long by 1 foot wide for extrusion equipment. Prepare seam overlap as indicated in the "Overlapping and Temporary Bonding" Article of this Part.
2. Cut four specimens, each 1.0 inch wide, from the trial seam sample. Test two specimens in shear and two in peel, using a field tensiometer. The test specimens shall not fail in the seam. If a specimen fails, repeat the entire operation. If the additional specimen fails, do not accept the seaming apparatus or seamer until the deficiencies are corrected and two consecutive successful trial seams are achieved. A seamer may start production seaming prior to testing of the trial seams. In the event the trial seam fails, all production seams by the seamer are failed seams.

I. Nondestructive Seam Continuity Testing:

1. Nondestructively test for continuity of field seams over their full length. Perform continuity testing as the seaming work progresses, not at the completion of field seaming. Record the location, date, unit number of test apparatus, name of tester and results of testing. Complete any required repairs in accordance with the "Defects and Repairs" Article of this Part. Apply the following procedures:
 - a. use vacuum testing for extrusion welds; and
 - b. use air pressure testing for double-track fusion seams.
2. Vacuum Testing:
 - a. Use the following equipment:

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- i. A vacuum box assembly consisting of a stiff housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
 - ii. A system for applying 5 pound per square inch (psi) gauge suction to the box.
 - iii. A bucket of soapy solution and applicator.
 - b. Follow these procedures:
 - i. Energize the vacuum pump and reduce the tank pressure to 5 \pm 1 psi gauge.
 - ii. Wet an area of the geomembrane seam larger than the vacuum box with the soapy solution.
 - iii. Place the box over the wetted area.
 - iv. Close the bleed valve and open the vacuum valve.
 - v. Ensure that a leak tight seal is created.
 - vi. Examine the geomembrane cover through the viewing window for the presence of soap bubbles for not less than 20 seconds.
 - vii. If no bubbles appear after 20 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.
 - viii. Mark all areas where soap bubbles appear with a marker that will not damage the geomembrane cover and repair in accordance with the “Defects and Repairs” Article of this Part.
- 3. Air Pressure Testing:
 - a. Use the following equipment:
 - i. an air pump (manual or motor driven) or air reservoir, equipped with a pressure gauge, capable of generating and sustaining a pressure between 25 and 30 pounds per square inch;
 - ii. a rubber hose with fittings and connections; and
 - iii. a hollow needle, or other approved pressure feed device.
 - b. Follow these procedures:
 - i. Seal both ends of the seam to be tested.
 - ii. Insert needle, or other approved pressure feed device, into the tunnel created by the fusion weld.
 - iii. Insert a protective cushion between the air pump and the geomembrane cover.
 - iv. Energize the air pump to a pressure between 25 and 30 pounds per square inch, close valve, and sustain the pressure for not less than 5 minutes.
 - v. If loss of pressure exceeds 3 pounds per square inch, or does not stabilize, locate faulty area and repair in accordance with the “Defects and Repairs” Article of this Part.

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- vi. Cut opposite end of air channel from pressure gauge and observe release of pressure to ensure air channel is not blocked.
- vii. Remove needle, or other approved pressure feed device, and seal both ends in accordance with the “Defects and Repairs” Article of this Part.

J. Destructive Testing:

1. Destructive testing shall be performed by the CQA Personnel. The Contractor shall provide assistance if requested by the CQA Personnel to obtain samples. Perform destructive seam tests to evaluate seam strength and integrity (see Table 2 for seam properties of 40-mil LLDPE). Perform destructive testing as the seaming work progresses, not at the completion of field seaming.
2. Sampling and Testing:
 - a. Collect destructive test samples at a minimum frequency of one test location per 500 feet of seam length and at additional locations of suspected nonperformance. A minimum of one test sample for each seaming machine operating on a given day is required. The Engineer will select test locations, including locations with evidence of excess geomembrane crystallinity, contamination, offset seams, or any other evidence of inadequate seaming.
 - b. Cut samples at the locations designated by the Engineer at the time the locations are designated. Number each sample and identify the sample number and location on the panel layout drawing. Immediately repair all holes in the geomembrane cover resulting from the destructive seam sampling in accordance with the repair procedures described in the “Defects and Repairs” Article of this Part. Test the continuity of the new seams in the repaired areas according to “Nondestructive Seam Continuity Testing” Article of this Part.
 - c. Cut two strips 1 inch wide and 12 inch long with the seam centered parallel to the width from either side of the sample location. Test the two 1-inch wide strips in the field tensiometer in the peel mode. The Engineer may request an additional test in the shear mode. If these samples pass the field test, prepare a laboratory sample at least 1 foot wide by 3.5 feet long with the seam centered lengthwise. Cut the laboratory sample into three parts and distribute as follows:
 - i. one portion 1 foot long to the Installer;
 - ii. one portion 1.5 feet long to the Engineer for testing; and
 - iii. one portion 1 foot long to the Engineer for archival storage.
3. In the event of failing field or laboratory test results, the Contractor may reconstruct the entire seam between two passing destructive tests;

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otherwise, the Engineer will identify the extent of the nonconforming area following the procedures given in the CQA Plan. Obtain additional samples for testing as requested by the Engineer.

K. Defects and Repairs:

1. Inspect the geomembrane cover before and after seaming for evidence of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane cover shall be clean at the time of inspection. Sweep or wash the geomembrane cover surface if surface contamination inhibits inspection.
2. Test each suspect location, both in seam and non-seam areas, using the methods described in the “Nondestructive Seam Continuity Testing” Article of this Part. Repair each location that fails nondestructive testing.
3. Cut and reseat wrinkles not conforming with Part 2 of this Section. Test the seams thus produced like any other seam.
4. Repair Procedures:
 - a. Repair any portion of the geomembrane cover exhibiting a flaw, or failing a destructive or nondestructive test. Use the most appropriate of the available procedures:
 - i. patching, used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter;
 - ii. abrading and reseaming, used to repair small sections of extruded seams;
 - iii. spot seaming, used to repair minor, localized flaws;
 - iv. capping, used to repair long lengths of failed seams;
 - v. topping, used to repair areas of inadequate seams, which have an exposed edge less than 4 inches in length; and
 - vi. removing bad seam and replacing with a strip of new material seamed into place (used with long lengths of fusion seams).
 - b. When making repairs, satisfy the following:
 - i. abrade surfaces of the geomembrane cover that are to be repaired no more than 20 minutes prior to the repair;
 - ii. clean and dry all geomembrane cover surfaces immediately prior to repair;
 - iii. only use approved seaming equipment; and
 - iv. extend patches or caps at least 6 inches beyond the edge of the defect, and round corners of patches to a radius of at least 3 inches.
5. Repair Verification:
 - a. Test each repair using the methods described in the “Nondestructive Seam Continuity Testing” Article of this Part. Repairs that pass the nondestructive test are adequate unless the Engineer elects to also perform destructive tests. Re-repair and retest failed tests.

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3.05 MATERIALS IN CONTACT WITH THE GEOMEMBRANE COVER

- A. Take all necessary precautions to prevent damage to the geomembrane cover during the installation of other components of the final cover system.
- B. Do not drive equipment directly on the geomembrane cover. Only use low ground pressure equipment above the geomembrane cover.

3.06 SURVEY CONTROL

- A. Survey the installed geomembrane cover for preparing the as-built panel layout drawing in accordance with Section 01720 – Project Surveying.
- B. Locate panel seams and intersections as requested by the Engineer.

3.07 GEOMEMBRANE COVER ACCEPTANCE

- A. The Contractor shall retain all ownership and responsibility for the geomembrane cover until accepted by the Engineer.
- B. The geomembrane cover shall be accepted by the Owner when:
 - 1. The installation is finished;
 - 2. All documentation of installation is completed including the Engineer's final report; and
 - 3. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

3.08 PROTECTION OF WORK

- A. The Contractor shall protect all prior work and all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall make all repairs or replacements necessary to be in full compliance with the Contract Documents.

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TABLE 1
REQUIRED GEOMEMBRANE PROPERTIES FOR SMOOTH AND TEXTURED 40-MIL LLDPE

Properties	Qualifiers	Units ⁽¹⁾	Specified Values		Test Method
			Smooth	Textured	
<u>Physical Properties</u>					
Thickness	minimum average	mils	40		ASTM D 5199 (smooth) ASTM D 5994 (textured)
Asperity Height ⁽²⁾	minimum average	mils	Not Applicable	20	ASTM D 7466
Density	minimum	g/cm ³	0.939 (sheet)		ASTM D 792 (Method B) / ASTM D 1505
Carbon Black Content	range	%	2.0-3.0		ASTM D 1603 / ASTM D 4218
Carbon Black Dispersion	N/A	None	9 of 10 views in category 1 or 2		ASTM D 5596
Tensile Properties (each direction)					
1. Tensile Strength (force per unit width at break)	minimum average	lb/in	152	60	ASTM D 6693
2. Elongation at Break	minimum average	%	800	250	ASTM D 6693
Tear Resistance	minimum average	lb	22		ASTM D 1004 Die C Puncture
Puncture Resistance	minimum average	lb	56	44	ASTM D 4833
Shear Strength	minimum	psf	See Note 3		ASTM D 5321
Oxidative Induction Time (OIT)	minimum average	Minutes	100		ASTM D 3895

Notes:

1. mils = milli-inches
% = percent
g = grams
g/cm³ = grams per cubic centimeter
lb = pound
lb/in = pounds per inch
2. Of 10 readings, 8 out of 10 must be greater or equal to 7 mils and the lowest must be greater or equal to 5 mils.
3. The required peak and residual shear strength parameters are included in a figure as part of Section 02235.

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TABLE 2
REQUIRED GEOMEMBRANE SEAM PROPERTIES FOR SMOOTH AND TEXTURED
40-MIL LLDPE

Properties	Qualifiers	Units⁽¹⁾	Specified Values	Test Method
<u>Shear Strength⁽²⁾</u>				
Fusion	minimum	lb/in	60	ASTM D 6392
Extrusion	minimum	lb/in	60	ASTM D 6392
Peel Adhesion			FTB ⁽³⁾	
Fusion	minimum	lb/in	50	ASTM D 6392
Extrusion	minimum	lb/in	44	ASTM D 6392

Notes:

1. lb/in = pounds per inch.
2. Also called “Bonded Seam Strength”.
3. FTB = Film Tear Bond. (Maximum 10 percent seam separation)

[END OF SECTION]

SPECIFICATION NO: 02910

SPECIFICATION TITLE: SEEDING AND ROLLED EROSION CONTROL PRODUCTS

PROJECT NO: 448847

PROJECT TITLE: ONONDAGA LAKE SCA FINAL COVER

CLIENT: HONEYWELL, INC.

				APPROVALS								
Issue	Date	Pages	Issue Description	Prepared	Checked	Approved						
0	05-04-16	9	For Agency Approval and Construction	RW	SB	JFB						
<input checked="" type="checkbox"/> Entire Specification Issued this Revision <input type="checkbox"/> Revised Pages Only Issued this Revision			SPECIFICATION ISSUED FOR: <table><tr><td><input type="checkbox"/> In-house Review</td><td><input type="checkbox"/> Bid</td></tr><tr><td><input type="checkbox"/> Client Review/Approval</td><td><input checked="" type="checkbox"/> Construction</td></tr><tr><td><input type="checkbox"/> Information Only</td><td><input type="checkbox"/> Other</td></tr></table>				<input type="checkbox"/> In-house Review	<input type="checkbox"/> Bid	<input type="checkbox"/> Client Review/Approval	<input checked="" type="checkbox"/> Construction	<input type="checkbox"/> Information Only	<input type="checkbox"/> Other
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SECTION 02910

SEEDING AND ROLLED EROSION CONTROL PRODUCT

PART 1 GENERAL

1.1 DESCRIPTION

- A. The Work specified in this Section consists of all labor, equipment, tools, materials, services, supervision and incidentals necessary to complete the installation of seed and the use of rolled erosion control product (RECP) and/or hydromulch for completion of the Work as described herein, shown on the Contract Drawings, or as directed by the Engineer. Work in this Section includes, but is not limited to:
 - 1. Procurement and placement of seed. Procurement and placement of fertilizer may be required if directed by the Engineer.
 - 2. Provision for and installation of hydromulch and/or RECP.
- B. Related Work specified in other Sections includes, but is not limited to:
 - 1. Section 02200 – Earthwork
 - 2. Section 02370 – Erosion Control
 - 3. Section 02250 – Vegetative Soil Layer

1.2 PERFORMANCE REQUIREMENTS

- A. The Contractor shall comply with all applicable Federal, State and Local codes, ordinances, regulations, statutes and standards.

1.3 REFERENCES

- A. New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 575 Prohibited and Regulated Invasive Species.
- B. NYSDEC Nutrient Runoff Law – ECL Article 17, Title 21.
- C. Rules and Regulations of the Secretary of Agriculture, Part 201 – Federal Seed Act.
- D. American Association of State Highway and Transportation Officials (AASHTO).
- E. National Transportation Product Evaluation Program Report (NTPEPR).
- F. New York State Department of Transportation (NYSDOT) Engineering Instruction EI 06-004, EI 09-035.

1.4 SUBMITTALS

- A. The Contractor shall submit the following in accordance with Section 01300 – Document Submittal Procedures and as elsewhere specified in this Section:
 - 1. Seed Vendors Certificate: Seed vendor's certified statement for the seed mixture is required that states common name, scientific name, percentage by weight,

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percentages of pure live seed, date of last germination and certification of absence of noxious weeds per Subpart 1.5A.

2. Hydromulching (if used): Data concerning hydromulching equipment including material application rates.
3. Fertilizer (if used): Manufacturer's product data showing contents and test results; and a plan describing how the fertilizer and its application complies with the NYS Nutrient Runoff Law – ECL Article 17, Title 21.
4. Installer: Name of Subcontractors (if used) and Qualification Statements.
5. Manufacturer's Certification: Certify that products meet or exceed specified requirements.
6. Rolled Erosion Control Products (if used) – Technical product details and proposed installation methods.

1.5 QUALITY CONTROL

- A. Label seed in accordance with United States Department of Agriculture (USDA) Rules and Regulations under the Federal Seed Act and applicable State seed laws. Furnish seed in sealed bags or containers bearing the date of the last germination, which shall be less than six months prior to commencement of planting operations. Inspect seeding material upon arrival at the job site. Remove unacceptable material from the job site. Seed shall be from same or previous year's crop. Each variety of seed shall have a weed content of less than 1 percent and contain no noxious weeds such as Smooth Brome, Tall Fescue, Purple Loosestrife, Phragmites or Japanese Knotweed.
- B. Inspect all RECP upon delivery and verify that the proper materials and quantities have been supplied.
- C. Inspect the subgrade prior to installation of RECP. The subgrade shall be free of irregularities, protrusions, abrupt changes in grade, or other unacceptable conditions that could damage the RECP. Maintain the subgrade in a smooth and uniform condition during installation of the RECP. The subgrade shall be inspected and approved by the Engineer prior to placement of the RECP.
- D. Continuously inspect RECP for damage. Reject the RECP if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage. Repair or replace RECP damaged during installation.

1.6 PROJECT AND SITE CONDITIONS

- A. The Contractor shall carefully examine the site to determine the full extent, nature and location of work required to conform to the Contract Drawings and Specifications. The Contractor shall bring any inaccuracies or discrepancies between the Contract Drawings and Specifications to the Engineer's attention in order to clarify the exact nature of the Work to be performed.

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PART 2 PRODUCTS

2.1 NATIVE GRASSLAND SEED MIX

- A. Honeywell is currently conducting an ongoing study to establish a seed mix of native grassland species that will grow and thrive on the Vegetative Soil Layer (Section 02250). Preliminary results from vegetative test plots conducted during the 2015 growing season were used to select the native grassland seed mixture described in Section 2.1C below. Additional vegetative test plot evaluations will be performed during the 2016 growing season to further evaluate the performance of native grasses on the SCA final cover. Based on the preliminary results of the vegetative test plots, it is expected that two to three years will be required to fully establish native species and that all planted species may not survive. Subsequent reseeding of species that do well after the first couple years may be necessary. Additional reseeding, irrigation, and placement of amendments shall be accounted for in the post-closure care phase.
- B. Native grassland seed mix shall be evenly applied on vegetative soil. Prior to the application of seed, all areas where compaction has occurred shall be scarified or tracked. The seed bed shall be loose and friable for positive seed retention. When tracking on slopes, tracking shall be performed such that the tracks are created perpendicular to the direction of the slope.
- C. A native grassland seed mixture composed of species native to New York and beneficial to wildlife shall consist of the following species at the listed quantities:

Genus	Species	Common Name	oz / ac
<i>Agrostis</i>	<i>scabra</i>	Ticklegrass	50.0
<i>Agrostis</i>	<i>perennans</i>	Autumn Bentgrass	50.0
<i>Andropogon</i>	<i>gerardii</i>	Big Blue Stem	100.0
<i>Asclepias</i>	<i>tuberosa</i>	Butterflyweed	2.0
<i>Aster</i>	<i>novi-belgii</i>	New York Aster	1.5
<i>Bromus</i>	<i>kalmii</i>	Prairie Brome	8.0
<i>Chamaecrista</i>	<i>fasciculata</i>	Partridge Pea	52.5
<i>Elymus</i>	<i>canadensis</i>	Canada Wildrye	70.0
<i>Euthamia</i>	<i>graminifolia</i>	Grass-leaved goldenrod	1.5
<i>Heliopsis</i>	<i>helianthoides</i>	Smooth Oxeye	10.0
<i>Lespedeza</i>	<i>capitata</i>	Round Head Lespedeza	2.0
		Common Evening	
<i>Oenothera</i>	<i>biennis</i>	Primrose	1.0
<i>Oligoneuron</i>	<i>rigida</i>	Stiff Goldenrod	2.0
	<i>virgatum</i> (Long Island-NY		
<i>Panicum</i>	<i>Ecotype</i>)	Switchgrass	40.0
<i>Panicum</i>	<i>virgatum</i> ('Cave-In-Rock' variety)	Switchgrass	70.0
<i>Panicum</i>	<i>virgatum</i> ('Shelter' variety)	Switchgrass	60.0
<i>Panicum</i>	<i>virgatum</i> ('Trailblazer' variety)	Switchgrass	40.0
<i>Panicum</i>	<i>clandestinum</i>	Deertongue	30.0
<i>Panicum</i>	<i>dichotomiflorum</i>	Smooth panicgrass	38.0

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<i>Penstemon</i>	<i>digitalis</i>	Tall White Beardtongue	1.0
<i>Pycnanthemum</i>	<i>muticum</i>	Blunt Mountain Mint	2.0
<i>Pycnanthemum</i>	<i>virginianum</i>	Virginia mountain-mint	1.0
<i>Rudbeckia</i>	<i>hirta</i>	Black-eyed Susan	10.0
<i>Rudbeckia</i>	<i>triloba</i>	Brown-eyed Susan	4.0
<i>Schizachyrium</i>	<i>schoparium</i>	Little Blue Stem	15.0
<i>Senna</i>	<i>hebecarpa</i>	Wild Senna	15.0
<i>Solidago</i>	<i>juncea</i>	Early goldenrod	0.5
<i>Solidago</i>	<i>rugosa</i>	Wrinkled goldenrod	0.5
<i>Sorghastrum</i>	<i>nutans</i>	Indian Grass	50.0
<i>Sporobolus</i>	<i>heterolepis</i>	Prairie Dropseed	4.0
<i>Symphyotrichum</i>	<i>laeve</i>	Smooth Blue Aster	0.5
<i>Symphyotrichum</i>	<i>novae-angliae</i>	New England Aster	0.5
<i>Tridens</i>	<i>flavus</i>	Purpletop	20.0
Totals			752.5

Cover crop^{1,2}

Genus	Species	Common Name	oz / ac
<i>Avena</i>	<i>Sativa</i>	Oats	480
<i>Secale</i>	<i>cereale</i>	Rye, Winter	350

Notes:

1. Cover crop seed shall be applied simultaneously with grassland seed mix to ensure timely soil stabilization and protection of grassland seed mix until germination.
2. Cover crop seed type shall be installed based on the time of the year (i.e., only one seed type will be installed). Oats shall be installed from March 1 to September 30, and winter rye shall be installed from October 1 through December 15.

2.2 HYDROMULCH (IF USED)

A. Hydromulch shall be Wood Cellulose Fiber Pulp processed to contain no growth or germination inhibitor factors, and dyed an appropriate color to facilitate visual metering of the application of the materials. Hydromulch shall meet the requirements of NYSDOT 713-11 with the exception that hydromulch manufactured from recycled paper products is acceptable. The Contractor shall be responsible for assuring that the application of recycled paper mulch is appropriate for the specific application. Mulch shall be applied based on the slope of the area according to the following:

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Slope	Mulch Type	Application Rate (lb/ac)
<10%	EcoFibre, Ecoblanket or equivalent	To be proposed by the Contractor for Engineer's approval
>10%	EcoFibre plus tackifier, Ecoblanket or equivalent	To be proposed by the Contractor for Engineer's approval

2.3 ROLLED EROSION CONTROL PRODUCTS (IF USED)

- A. Class I, Type A Bio-degradable Rolled Erosion Control Product is suggested for use in areas where slopes do not exceed 4H:1V.
 1. Bio-degradable RECP shall be a machine-produced 100 percent biodegradable mat with a 100 percent biodegradable netting and thread. No synthetic components are acceptable.
 2. RECP must be on the approved list of Class I, Type A RECP in the current AASHTO NTPEPR or on the current NYSDOT approved list of RECP.
- B. Class I, Type B Bio-degradable Rolled Erosion Control Product is suggested for use on slopes 3.33H:1V and flatter.
 1. Bio-degradable RECP shall be a machine-produced 100 percent biodegradable mat with a 100 percent biodegradable netting and thread. No synthetic components are acceptable.
 2. RECP must be on the approved list of Class I, Type B RECP in the current AASHTO NTPEPR or on the current NYSDOT approved list of RECP.
- C. Staking (for Bio-degradable Rolled Erosion Control Product)
 1. Stakes shall be non-treated wood or other suitable biodegradable material and shall be designed to safely and effectively secure erosion control product for temporary or permanent applications.
 2. The stake shall meet the RECP manufacturer recommendations for the intended application. Stake length for RECP shall be 6 inches or longer as recommended by the manufacturer, but no stakes shall be greater than 12 inches to protect the geomembrane below.
 3. Serrate the stake on the leg to increase resistance to pull-out from the soil.
- D. All RECP must be on the approved list of RECP in the current AASHTO NTPEPR or on the current NYSDOT approved list of RECP. Alternatively, project specific testing of the specified properties may be submitted in lieu of AASHTO or NYSDOT approval.

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PART 3 EXECUTION

3.1 GENERAL

- A. Areas to be restored with vegetation shall receive seed and, if necessary, temporary erosion control unless otherwise shown on the Contract Drawings. Temporary erosion control shall be installed according to the following, unless otherwise directed by the Engineer:

Slope	Erosion Control Type
<10%	None, Hydromulch or RECP ^{1,2,3}
>10%	Hydromulch or RECP ^{1,3}

Notes:

1. Recommended RECP installation if seed application occurs on or after the first day of fall.
2. If no erosion control provided, increasing seed application rate by 25% is recommended.
3. Contractor may propose additional erosion control products or methods for approval by the Engineer.

3.2 SEEDING

- A. Seeding shall be performed on unfrozen ground from March 1 to April 30 or from October 15 to December 15. If site soils require seeding and stabilization between May 1 and October 14, they shall be temporarily seeded using 50 pounds of oats (*Avena sativa*) per acre and two tons per acre of straw (or comparable product as approved by the Engineer). No seeding will occur from December 16 to February 28 or when the ground is substantially frozen, ice or snow covered.
- B. Apply seed mixture uniformly and directly on the prepared surface with a hand or mechanical spreader at the minimum rates specified in the table in Subpart 2.1.
- C. Immediately following seed application the entire seeded surface shall be tracked or a caltipacker shall be used to ensure good seed to vegetative layer material contact.
- D. Apply hydromulch or RECP uniformly over the top of seeded areas, as required in Subpart 3.1.
- E. Alternative application methods may be proposed by the Contractor for approval by the Engineer.

3.3 LABELING, DELIVERY, STORAGE AND HANDLING OF RECP (IF USED)

A. Labeling

1. Each roll of RECP delivered to the site shall be wrapped in protective covers and labeled by the manufacturer with the manufacturer's name, product identification, length, width, and roll number.

B. Delivery

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1. The RECP rolls shall be shipped by appropriate means to prevent damage to the material and to facilitate off-loading. Materials shall not be delivered to the site until the appropriate submittals of Subpart 1.4 have been approved by the Engineer. At such time, the RECP may be delivered to the site, unloaded and stored at an area approved by the Engineer.

C. Storage and Handling

1. Store and handle materials as per the manufacturers' recommendations in such a manner as to prevent damage or deterioration to any part of the RECP.
2. Maintain the protective wrapping on RECP rolls at all times until the RECP is deployed for immediate placement.
3. Protect the RECP from punctures, abrasions, dirt, dust, grease, mud, moisture, excessive heat, sunlight, cutting, or other damage or deleterious conditions. Protect the RECP rolls from theft and vandalism and store away from high traffic areas. Repair any damage to protective wrapping immediately. The Contractor is responsible for the on-site storage and handling of all RECP. Damaged RECP shall be replaced at the Contractor's expense.

3.4 INSTALLATION OF RECP (IF USED)

- A. Ensure the RECP is not damaged in any way during handling.
- B. Position RECP rolls as required and unroll.
- C. Overlap RECP rolls in the direction of flow so that the RECP on the upstream side is overlapped on top of the RECP on the downstream side.
- D. When placed on stable subgrades flatter than 5H:1V, overlap RECP a minimum of 18 inches on all edges.
- E. When placed on stable subgrades steeper than 5H:1V, overlap RECP a minimum of 2 ft.
- F. Lay RECP smooth and free of tension, stress, folds, wrinkles and creases. Unless specifically permitted by the Engineer, RECP shall be placed in continuous intimate contact with the underlying subgrade so that water cannot flow unimpeded between the soil and RECP.
- G. If RECP is damaged during any phase of construction or installation, place a new piece of the same type over the damaged area with a 3-foot minimum overlap and stake.
- H. RECP shall not be installed over existing hard features (including structural concrete, tabular structural stone or other similar hard feature) unless a minimum of 1 foot of backfill material can be placed over the features to achieve the finished grade.
- I. RECP shall not be placed over other stabilization features including stone.
- J. The RECP shall be removed or repaired if plant growth lifts RECP off the soil to the extent that vegetation growth is being inhibited.

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3.5 WARRANTY

- A. One year warranty period for seed from the date of substantial completion or correction period. As determined by the Engineer, maintain as necessary, including repairs, re-seeding, re-mulching, and/or replacement of erosion control material, so that acceptable coverage of the area is established. A satisfactory condition of vegetated area is defined as follows:
1. Area shall have a predominant stand of the seed vegetation;
 2. Within 3 weeks, germination shall occur over at least 70 percent of the area with no single bare area greater than 4 square feet. If this is not achievable because of the timing of initial seeding or general weather conditions, other measures (including, but not limited to, additional erosion control and/or cover crop seeding) may be required, as determined by the Engineer; and
 3. Within 3 months of the first growing season (May to October), 90 percent of the area shall be covered with vegetation. Native grassland species are expected to require two to three years to become fully established.
- B. The Engineer will provide approval during the one-year warranty period.

[END OF SECTION]