SECTION 33 40 00

SURFACE DRAINAGE SYSTEMS

** NOTE TO SPECIFIER ** ACO, Inc.; general duty trench drains. This section is based

on the products of ACO, Inc., which is located at:

Northeast Sales Office
9470 Pinecone Dr.
Mentor, OH 44060
Toll Free Tel: (800) 543-4764
Tel: (440) 639-7230
Fax: (440) 639-7235
Email: info@acousa.com
Web: http://www.acousa.com

West Sales Office
825 W Beechcraft St.
P.O. Box 12067
Casa Grande, AZ 85122
Tel: (520) 421-9988
Fax: (520) 421-9899

Southeast Sales office
4211 Pleasant Rd.
Fort Mill, SC 29708
Toll Free Tel: (800) 543-4764
Fax: (803) 802-1063

Established in 1946, the ACO Group has been a major manufacturer of products for the construction and building industry for almost 70 years. The Group operates on a global basis and has companies in more than 40 countries with manufacturing on 4 continents. ACO employs more than 3,800 people and has sales in excess of $850 million. ACO has been present in the USA since 1978 and has offices and manufacturing facilities nationwide.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Modular trench drain systems.

1.2 RELATED SECTIONS

** NOTE TO SPECIFIER ** Delete any sections below not relevant to this project; add others as required.

A. 03 30 00 - Cast in Place Concrete

B. 22 00 00 – Plumbing

1.3 REFERENCES

** NOTE TO SPECIFIER ** Delete references from the list below that are not actually required by the text of the edited section.

A. European Standard (EN): EN1433 – Drainage channels for vehicular and pedestrian areas; Classification, design and testing requirements, marking and evaluation of conformity.

1.4 SYSTEM DESCRIPTION

A. System Type:
1. Trench drain systems shall employ an angled grade on both sides of a linear trench to move runoff into a point along the channel. Liquids shall be discharged by gravity flow at the end of the drain into an underground pipe system or culvert.

B. System Design:
1. Modular trench drains shall be factory manufactured and engineered with compatible grates and accessory components in sizes and capacities to provide a complete functioning trench drain system.
2. Modular channels are aligned onsite via male/female interconnecting ends to form a continuous run. Systems shall provide neutral channels with no slope.

C. System Requirements:
1. Loading:

** NOTE TO SPECIFIER ** Loading - traffic type and frequency. Provide general description to allow verification of design selection. Particular important when section written for Delegated Design by Contractor.

2. Durability:

** NOTE TO SPECIFIER ** Durability: - address liquids to be drained and surrounding environment. Particular important when section written for Delegated Design by Contractor.

a. Liquid Type:
b. Grade Surface Adjacent To Trench Grate:
c. Grate and trench materials shall resist Liquid Type attack and corrosion of trench drain components and grate.

3. User Requirements:

** NOTE TO SPECIFIER ** User Requirements: - project specific site, user, legislative and aesthetic requirements. Particular important when section written for Delegated Design by Contractor.

a. Grate Finish:
b. Grate Safety Requirements:

** NOTE TO SPECIFIER ** Delete grate requirement not required.

1) Grates shall comply with requirements of the Americans with Disabilities Act (ADA).
2) Grates shall include a ‘heelsafe’ pattern in compliance with American Society of Mechanical Engineers (ASME) A112.6.3, Floor and Trench Drains. Section 7.12, “Heel Resistant Strainers and Grates,
3) Grates shall prevent small stiletto-style heels from getting stuck, causing injury or falls.
4) Grates shall be bicycle-safe grates to avoid slot openings that trap modern bicycle wheels.

4. Hydraulic Performance:

** NOTE TO SPECIFIER ** Hydraulic Performance: - volume of liquid to be removed in a given timeframe. Particular important when section written for Delegated Design by Contractor.

a. Trench drain system shall provide drain performance without grate bypass occurring and without uncontrolled ponding during maximum design flow rate and duration.
b. Trench drain system shall provide temporary ponding during hydraulic rates exceeding the trench design capacity in areas and boundaries indicated.

** NOTE TO SPECIFIER ** Ponding allows a more economical system to be used that will work effectively under most weather conditions, but will be slightly under designed for heavy storms. Delete if ponding strategy is not practical for the Project.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Submit product data and installation instructions including manufacturer's product sheet, for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

D. Engineering Calculations: Manufacturer shall provide Trench Hydraulic Service by modeling lateral intake into the trench design based on Project environmental locale and drainage surfaces.

** NOTE TO SPECIFIER ** Delete if not required.

1. Calculations shall include Grate Hydraulic Service comparing the specified grate catchment efficiency with the hydraulic modeling to determine the Bypass amount.

** NOTE TO SPECIFIER ** Delete if not required.

2. Calculations shall include a ponding analysis of area indicated on drawings acceptable for ponding of discharge during storm events that exceed trench drain capacity.

** NOTE TO SPECIFIER ** Delete if not required.

E. Quality Assurance Submittals: Submit the following:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

** NOTE TO SPECIFIER ** Delete selection samples if colors have already been selected.

G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

B. Installer Qualifications: Installer experienced in performing Work of this section who has specialized in installation of work similar to that required for this project.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

** NOTE TO SPECIFIER ** Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 01 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.10 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.11 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty:
   1. Warranty Period: 12 months commencing on Date of Substantial Completion or 24 months from date of purchase, whichever is sooner.

PART 2 PRODUCTS

** NOTE TO SPECIFIER ** On occasion, installation constraints are of greater concern than hydraulics. The most common constraint is lack of depth. ACO SlabDrain offer solutions where shallow trench drains are required.

** NOTE TO SPECIFIER ** ACO SlabDrain – Non-Metallic Edge systems consist of manufactured modular trench channel units made from corrosion resistant polymer concrete, together with grates from a variety of materials for all loading applications.

ACO SlabDrain – Non-Metallic Edge systems are available in 4 inch nominal internal widths and either 2.5 inch nominal (65mm) or 3.3 inch nominal (85mm) depths. ACO SlabDrain – Non-Metallic Edge systems offer light to medium duty solutions for traffic ranging from pedestrians to light commercial areas.

2.1 MANUFACTURERS

A. Acceptable Manufacturer:
   1. ACO, Inc.; 9470 Pinecone Dr., Mentor, OH 44060. ASD. Toll Free Tel: (800) 543-4764. Tel: (440) 285-7000. Fax: (440) 285-7005. Email: info@acousa.com. Web: http://www.acousa.com.
   2. ACO, Inc.; 825 W Beechcraft St. P. O. Box 12067, Casa Grande, AZ 85122. Tel: (520) 421-9988. Fax: (520) 421-9899. Email: info@acousa.com. Web: http://www.acousa.com.

** NOTE TO SPECIFIER ** Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SYSTEM DESIGN:

** NOTE TO SPECIFIER ** Provide system design information when the Contractor will be engineering and selecting the components, sizes and material. Delete if not required.

** NOTE TO SPECIFIER ** There are a variety of different standards that partly cover the use trenches and grates in North America. There is only one global standard specifically written to measure and dictate the use of trench drain systems: EN1433. EN1433 classifies load ratings as follows -
Load class A - Residential and light pedestrian traffic
Load class B - Sidewalks and small private parking lots
Load class C - Parking lots and general commercial areas
Load class D - Trafficked sections of roads and highways
Load class E - Industrial areas, gas stations and light commercial forklifts
Load class F - Aircraft pavements, docks, heavy fork trucks and heavy wheel loads.

ACO SlabDrain – Non-Metallic Edge provides systems up to and including **load class C.**

Load Class: Provide trench drain system designed, engineered and installed to support the minimum loads as defined by EN1433. Load Class shall be: _____.

A. Grate Design: Safety.
1. Grates that comply with requirements of the Americans with Disabilities Act (ADA) of 1990 are available.
2. Other safety-focused grates include a ‘heelsafe’ pattern in compliance with American Society of Mechanical Engineers (ASME) A112.6.3, Floor and Trench Drains. Section 7.12, “Heel Resistant Strainers and Grates,
3. Grates are designed to prevent small stiletto-style heels from getting stuck, causing injury or falls. In addition, bicycle-safe grates avoid slot openings that can trap modern bicycle wheels.

B. Hydraulic Performance:

** NOTE TO SPECIFIER ** Provide volume of liquid to be removed in a given timeframe.

1.

2.3 SlabDrain – General purpose trench drains system with non-metallic edge

** NOTE TO SPECIFIER ** A general purpose, shallow depth modular drainage system, in a choice of 2 depths - Ideal for pedestrian, commercial and light commercial applications. All systems consist of non-sloping, shallow depth channels.

A. Product: SlabDrain – Non-Metallic Edge Trench System as manufactured by ACO, Inc.
1. Units: Polymer concrete, grate lugs and locks to prevent dislodgement.
a. One meter (39.4 inches) long neutral units shall provide a 2.5 inch nominal (65mm) or 3.3 inch nominal (85mm) invert depth. Include accessories for a complete system.

2. Polymer Concrete Edge, Single Lock, Modular Trench System.
a. 4 inch nominal (100 mm) internal width, 2.5 inch nominal (65 mm) invert depth Trench System: H100-8 Trench System.
b. 4 inch nominal (100 mm) internal width, 3.3 inch nominal (85 mm) invert depth Trench System: H100-10 Trench System

** NOTE TO SPECIFIER ** Delete trench depth not required.

B. Product: KlassikDrain Grates as manufactured by ACO, Inc.

** NOTE TO SPECIFIER ** Delete grate sizes not required. ACO SlabDrain systems utilize same grating options available for ACO KlassikDrain systems – K/KS100

** NOTE TO SPECIFIER ** While some K/KS100 grating options are listed to EN1433 load classes up to class E, the SlabDrain – Non-Metallic Edge channels are only rated up to class C. Where higher load class grates are used with the H100-8 or H100-10, the channel load class C is the limiting factor regardless of grate load class rating.

** NOTE TO SPECIFIER ** Not all grate material and pattern are available for all Load Class and Rating for user safety. Refer to manufacturer's engineering information.

1. K/KS100 Grates (4 inch nominal)
   a. Type 494Q 0.5m Grate: Black plastic longitudinal, EN1433 load class A
   b. Type 495Q 0.5m Grate: Grey plastic longitudinal, EN1433 load class A
   c. Type 420Q 1.0m Grate: Galvanized slotted, EN1433 load class A
   d. Type 421Q 0.5m Grate: Galvanized slotted, EN1433 load class A
   e. Type 450Q 1.0m Grate: Stainless slotted, EN1433 load class A
   f. Type 452Q 0.5m Grate: Stainless slotted, EN1433 load class A
   g. Type 410Q 1.0m Grate: Galvanized perforated, EN1433 load class A
   h. Type 412Q 0.5m Grate: Galvanized perforated, EN1433 load class A
   i. Type 451Q 1.0m Grate: Stainless perforated, EN1433 load class A
   j. Type 453Q 0.5m Grate: Stainless perforated, EN1433 load class A
   k. Type 447Q 1.0m Grate: Stainless longitudinal, EN1433 load class B
   l. Type 448Q 0.5m Grate: Stainless longitudinal, EN1433 load class B
   m. Type 492Q 0.5m Grate: Composite slotted, EN1433 load class C
   n. Type 425Q 1.0m Grate: Galvanized slotted, EN1433 load class C
   o. Type 426Q 0.5m Grate: Galvanized slotted, EN1433 load class C
   p. Type 455Q 1.0m Grate: Stainless slotted, EN1433 load class C
   q. Type 457Q 0.5m Grate: Stainless slotted, EN1433 load class C
   r. Type 411Q 1.0m Grate: Galvanized perforated, EN1433 load class C
   s. Type 413Q 0.5m Grate: Galvanized perforated, EN1433 load class C
   t. Type 465Q 1.0m Grate: Stainless perforated, EN1433 load class C
   u. Type 466Q 0.5m Grate: Stainless perforated, EN1433 load class C
   v. Type 405Q 1.0m Grate: Galvanized mesh, EN 1433 load class C
   w. Type 406Q 0.5m Grate: Galvanized mesh, EN 1433 load class C
   x. Type 430Q 1.0m Grate: Stainless mesh, EN1433 load class C
   y. Type 431Q 0.5m Grate: Stainless mesh, EN1433 load class C
   z. Type 480Q 0.5m Grate: Ductile iron wave, EN1433 load class C
   aa. Type 481Q 0.5m Grate: Ductile iron decorative, EN1433 load class C
   bb. Type 479Q 0.5m Grate: Ductile iron mosaic, EN1433 load class C
   cc. Type 435Q 1.0m Grate: Galvanized slotted, EN1433 load class E
   dd. Type 436Q 0.5m Grate: Galvanized slotted, EN1433 load class E
   ee. Type 490Q 1.0m Grate: Stainless slotted, EN1433 load class E
   ff. Type 493Q 0.5m Grate: Stainless slotted, EN1433 load class E
   gg. Type 461Q 0.5m Grate: Ductile iron slotted, EN1433 load class E
   hh. Type 478Q 0.5m Grate: Ductile iron longitudinal, EN1433 load class E

2.4 MATERIALS

A. Polymer Concrete: Durable material which is resistant to road salts and common chemicals, made from polyester resin reinforced with mineral aggregates and fillers.

** NOTE TO SPECIFIER ** While polymer concrete trench drains provide effective durability in general industrial uses carrying water and basic liquids, certain chemicals or extreme temperatures may not be suitable for use with polymer concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved submittals. Install in proper relationship with adjacent construction.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION