Attachment D-1: Civil/Structural Scope of Work

Project: **Targa Sound Renewable Fuels Project**

Location: **Tacoma, WA**

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Revision	Date	Description	Prepared	Checked	Approved
A	2/27/12	Issued for Bid	TRF	DHB	BCK

1.0 SCOPE OF SUPPLY

Refer to Attachment D, Technical Specification, Section 2.2, for summary Scope of Work.

2.0 OWNER-FURNISHED MATERIALS

All equipment, instrumentation and valves (unless otherwise noted in this document) will be provided by the Owner and provided to the Contractor from a storage location at the job site.

3.0 SCHEDULE

The Contractor is to prioritize the work in order to complete the truck rack mechanically by July 20, 2012 and the entire project by October 1st, 2012.

4.0 SCOPE OF WORK

4.1 Erosion Control

The project access will require a construction entrance with wheel wash to remove all site debris from construction vehicles before entering 11th Avenue and Marine View Drive, see drawing 125-406-E3 for locations. Silt collection will be added to on-site and off-site catch basins. Silt fencing will be installed on the downhill side of the construction site and along the waterline of the Hylebos Waterway.

- See drawing 125-406-E3 for plan locations.
- See drawing 125-406-E4 for details.
- Install Catch basin Filters on-site and off-site
- Install stabilized construction entrance
- Install wheel wash
- Install silt fencing

4.2 Erosion Control Surfacewater Management

Excess surface water that is laden with silt must be collected at low points and pumped to Baker tanks or approved equivalent. Once the water meets discharge BMP requirements, treated water can be discharge to a location determined by the Engineer and City of Tacoma.

4.3 Survey Control

The civil engineering drawings have been drawn in state plane coordinates. Existing survey data was provided by Sitts & Hill. The existing survey data was used as the base to generate the construction design and drawings. It will be the contractor's responsibility to work with Sitts & Hill, or other approved surveyor by Targa Sound Terminal, to coordinate

staking prior to construction. These items are required to be located by construction staking at a minimum:

- Containment wall corners
- Center of tanks
- Center of stone columns
- Stormwater system
- Fire Hydrants, monitors

4.4 Construction Dewatering

Ground water is likely to be encountered at elevations below 4 feet of excavation. Pump excess water to Baker tank or other approved discharge location. Once the water meets discharge BMP requirements, treated water can be discharge to a location determined by the Engineer and City of Tacoma.

4.5 Site Preparation

Demolition of building located at the 11th Avenue entrance. The existing barn located on-site will also be demolished. There is an existing house on the site that will need demolished. All debris from demolished structures will be hauled off. Initial Clearing & Grubbing will begin at the southeast corner of the project, TK-201 and progress toward the west. The tank farm area will be excavated to the sub grade of the bentonite mat lining approximately 2' in depth. In general, the overburden material is silty sand and gravel fill that is very loose to dense. It's suitability for reuse in the backfill between tank pads and in the bentonite mat bedding will be evaluated during construction. Additional excavation of 1' depth is required under each tank and extending out 15' beyond the edge diameter of the proposed tanks as shown on drawing 125-406-E12. All excavation activities should be performed in an order that would allow the ground improvements for TK-201 to begin as soon as possible. Ground improvements would then continue from tank to tank as the excavation of the next tank area is completed. See ground improvement section for additional information.

The Clearing and Grubbing debris will be exported from the site. The remainder of the excavation material will be retained on site for use in backfilling and bedding above and below the bentonite mat. Contractor to locate an appropriate dump site for all materials exported from the site.

- Structures to be demolished see drawing 125-406-E1
- See drawing 125-406-E6 for plan locations.
- See drawing 125-406-E8 for details.
- Excavate containment wall foundations and prepare subgrade for construction.
- Excavate proposed roadways and prepare subgrade.
- Excavate utility trenches as needed.

- Trees removed from construction area will be used as woody debris, to be placed in the enhanced shoreline buffer.

4.6 Ground Improvement

Stone columns will be utilized for ground improvement. Contractor will coordinate with Surveyor to locate center of tank and stone columns as needed. Provide Engineer of Record with a plan to locate remaining stone column locations with surveyor or other approved layout process to insure layout meets design. Stone columns will be capped with 1 foot of crushed stone aggregate. Install ground improvement before storm drain replacement. Expose the top of the storm drain during stone column installation. Stone column locations in the immediate vicinity of the storm drain will be adjusted in the field as needed. The adjustment will be based on the exact storm drain location and stone column installation conditions. The objective will be to protect the existing storm drain and maintain the quantity and distribution of stone columns to the extent possible.

- Attachment G2 – Stone Column Specification
- See drawing 125-406-E5 for plan and details.
- See drawing 125-406-E8 for foundation details.

4.7 Replace 30" Outfall Pipe

The existing City of Tacoma 30" concrete outfall line that runs through the tank containment will be replaced. The replacement will begin at a point within 30' of the northwest property line. The end of the replacement will be within 10 feet of the proposed road on the south side of the containment area. Stormwater pipe will match existing materials, invert elevations and slope. The approximate length of replacement is 257 LF. The nominal depth to invert is 9.5' with granular bedding material throughout a 12" pipe bedding zone above, below, and each side.

- See drawing 125-406-E9 for plan.
- See drawing 125-406-E10 for pipe bedding details.
- Replace with like kind. 30" Reinforced Concrete Pipe.

4.8 Containment Lining

Following the Ground Improvement work, the bentonite mat for containment will be placed. The mat will be continuous over the area of containment and graded to the drainage system. At the perimeter wall, the mat will be lapped over the foundation and up the wall a minimum of 4". The tank pads and other foundations within the containment are to be built above the lining. The lining mat section will be 6" of soil above and below the mat and 6" of crushed rock on top for a total thickness 18". The total containment area is estimated to be 103,700 square feet. The remaining areas within the containment area will be backfilled with native material that has been approved by the GeoEngineer. The last 1 foot of backfill will be crushed rock cap.

- See drawing 125-406-E6 for plan.

- See drawing 125-406-E8 for foundation details.
- Bentonite mat 108,600 square feet.
- Native fill: 8,369 CYD
- Sand fill: 2,598 CYD
- Crushed stone: 5,386 CYD
- Quantities are estimated, for reference only

4.9 Tank Foundations

Tank foundations are to be built up rock pads starting just above the lining. Each pad will be 4 foot 6 inches high, 18" above local grade, and will have an outer diameter 3 feet greater than the tank it supports. Edges of the pads will be sloped out at 1.5: 1 to the elevation of the lining. Material will be well graded crushed granular material readily available from local sources. Material will be placed in lifts and compacted to 95 %.

- See drawing 125-406-E6 for plan.
- See drawing 125-406-E8 for foundation details.
- Crushed stone foundation: 6,673 CYD

4.10 Stormwater

Storm water collection in the containment area: The Storm Water collection system is 8 inch perforated piping and 24" catch basins tied to a lift station. Piping will lie in valleys formed in the upper soil layer on the bentonite mat. Finished grade will slope away from the tank foundations to the catch basins. Slope of the piping will be too slight to effectively drain the piping however, it will allow storm water to flow to the lift station. Total piping run is estimated to be 270'. Lift station is a 6 foot diameter x 10 foot depth pump manhole. The pump manhole will be fitted with 2 submersible pumps. Storm runoff will be piped to existing systems via the process piping racks. Pipe is 6 inch Carbon Steel.

Storm water collection in paved road along south side of containment: The Storm Water collection system is 12 inch N-12 piping and 24" catch basins tied to a lift station located in Manhole 4. Drainage will flow down the roadway center gutter pan to each catch basin. Total piping run is estimated to be 968 LF. Lift station is a 6 foot diameter x 10 foot depth pump manhole. The pump manhole will be fitted with a single submersible pump. Storm runoff will be piped to the containment area catch basin. Pipe is 6 inch Carbon Steel.

Storm water collection in gravel road along north side of containment: The Storm Water collection system is N-12 piping from the 24" catch basins to the east and 6 in perf pipe from the west. The piping is tied to a lift station located in Manhole 1. Drainage will flow into catch basin located at edge of parking lot and from perf pipe located along footing of containment wall. Total piping run is estimated to be 300 LF of perf pipe and 200 LF of 8 inch N-12 piping. Lift station is a 6 foot diameter x 6 foot 6 inch depth pump manhole. The pump manhole will be fitted with a single submersible pump. Storm runoff will be piped to the containment area catch basin. Pipe is 2 inch Carbon Steel.

- See drawing 125-406-E9 for plan.
- See drawing 125-406-E10 through E12 for details.
- Install containment area stormwater system
- Install containment area lift station
- Containment area lift station will penetrate containment liner and will need to be sealed with additional bentonite around manhole. Manhole must be water tight.
- Install paved roadway stormwater system
- Install roadway lift station
- Roadway discharge piping will be piped to containment wall, up and over top of wall and then below grade to catch basin.
- Install gravel roadway stormwater system
- Install gravel roadway lift station
- Discharge piping will be piped to containment wall, up and over top of wall and then below grade to catch basin.

4.11 Containment Wall

While the stone column Ground Improvement is being placed, work will proceed on the containment wall. The top of the wall is 7 feet above grade on the exterior and 5 feet above grade on the interior of the tank farm. The wall will require expansion joints at intervals not to exceed 50'. The expansion joints will be slip-doweled and will have cast-in and fusion welded waterstops tied to a continuous waterstop cast in the foundation. In addition, all joints above the bentonite mat will be sealed with a product resistant caulking. The concrete mix used for the wall will provide for a durable, liquid retaining product. No external coating will be used.

- See drawing 125-406-E2 for plan.
- See drawing 125-406-E8 and E16 for wall details.
- Pipeline wall penetration see drawing 125-406-E16
- Containment wall is to be located by survey staking.
- Containment wall is 1545 LF

4.12 Crossing Vault At Roadway

The piping route crossing vault is a cast in place trench with prestressed precast covers, HS20 capacity. All bearing surfaces of the vault and precast are to be armored. The vault will contain pipe supports and product piping. The interior will be sloped to collect water at the west end so any stormwater runoff can be pumped into the containment area with a portable AOD pump. The total length of the vault is 201 feet 4 inches long by 13 feet 8 inches wide. The depth varies.

- See drawing 125-406-E2 and 125-1206-E for plan.
- See drawing 125-1306-E4 for vault details.
- Roadway will tie into top of vault

4.13 Plant Roadways

Roadway from 11th Avenue will run along south side of containment area. This roadway is 20 feet wide, 2 lanes with 4' shoulder. The roadway will have a concrete gutter running down the center with road sloping down to the center. The south side of the road will have a 6 inch extruded curb running the length of the roadway. The asphalt paving along the containment area will be extended to the containment wall. Roadway will provide H20 loading.

A single lane fire and maintenance access road will be located along the north containment wall.

In addition to the new roadways the existing parking lot to the north and around the site office is to be repaved.

- See drawing 125-406-E6 for plan of roadways.
- See drawing 125-406-E7 for plan and profile of new paved roadway.
- See drawing 125-406-E8 for sections

4.14 Fire Water Loop

Fire water loop will be 12" DI piping with hydrants located along the water main. The 12 inch main will be connected to the city main in 11th avenues and in Marine View Drive. The main will also supply the foam building through a RPDA backflow device. Connections to existing are unknown. Each end of the pipe run will connect to the existing City mains using City of Tacoma connection procedures.

- See drawing 125-406-E13 for plan.
- See drawing 125-406-E14 details.
- 12 inch main: 2085 LF
- 6 Fire Hydrants
- 6 Fire Monitors

4.15 Foam Building

The Foam building is 20 foot wide by 30 feet by 12 feet eave height, stick framed, steel stud structure with cement board exterior fire resistant material. Roof trusses are supplier designed. Contractor to provide all temporary stability bracing. The building is heated and it will be insulated to R19 in the roof and walls. We have included (1) 8'x10' insulated overhead door and (2) 3-0 x 7-0 insulated personnel doors.

- See drawing 125-1306-E3 for foundation plan and details.
- See drawing 125-1206-E19 and E20 for building details.

- Header for foam piping to tanks located inside

4.16 Fencing

Perimeter fencing is proposed as 6' + 3 strand barbed wire with an automatic operated security gate. There will be 2 additional manually operated gates that will be lockable. Security fencing around the tank farm will be 1 foot tall on top of the concrete wall with 3 strand barbed wire. The top of the fence will be 6 feet above grade on the interior and 8 feet above grade on the exterior of the containment wall. The fence sections on either side of the man gates and access gate located on the walls will be increased to 6 feet tall at these crossings.

- See drawing 125-406-E15 for plan.
- See drawing 125-1206-E24 through E26 for details.
- 1 double lane card lock automatic gate with operators.
- 3 manual vehicle gates.
- 4 lockable man gates.

4.17 Foundations In Containment

There will be numerous foundations in the containment area. The most significant of these will be the pump containment pad. There will be five pads located on the pump containment pad to support pumps. Along one side there will be a shallow trench draining to a sump in one corner with a 1-inch PVC drain line extending to the outside with a ball valve.

- See drawing 125-1306-E1 and E2 for plan and sections.
- Top of curb around pump pads to be a minimum of 1 foot above grade.

4.18 Electrical Pads

Transformer and MCC foundation is to be located outside but adjacent to the containment area. Another MCC foundation will be constructed adjacent to the existing tank farm. MCC covers shall be steel framed.

- MCC 7 See drawing 125-1206-E7 for plan.
- MCC 7 See drawing 125-1206-E22 for foundation, framing plan and details.
- MCC 4 See drawing 125-1206-E9 for plan.
- MCC 7 See drawing 125-1206-E21 for foundation, framing plan and details.

4.19 Stair Crossings And Crossovers

The containment area will be accessed by steel stairs. Steel crossovers will be constructed for pipe crossings. All stairs and crossovers will be built with concrete landings.

- See drawing 125-1206-E10, E12, E13, E15 and E18 for stair plans and sections.
- See drawing 125-1206-E14, E16 and E17 for crossover plans and sections.

4.20 Dock Improvements

The existing dock that extends to the west on the south end of the property requires improvements. The improvements involve the demolition of the existing dock operations building located on the westernmost section and the construction of a new building in the same location. The building will be constructed in a similar manner to the foam building. The building will be constructed on a structural steel base of minimum height of 18-inches. The building will be approximately 10' by 10' with 8' eaves. It will be stick framed, steel stud structure with cement board exterior fire resistant material. Roof trusses are supplier designed. Contractor to provide all temporary stability bracing. The building is heated and it will be insulated to R19 in the roof and walls. The building will also contain at minimum one (1) 3' by 7' insulated personnel doors. Additional work will be to create 18" platforms for existing electrical equipment. The platforms will be constructed of structural steel and the approximate foot print is 6' by 10'. A roof structure will be fabricated and installed above the electrical equipment with a nominal height of 8'.

- Construction of 10' by 10' by 8' stick framed, steel stud structure.
- Fabrication and Installation of two (2) 18-inch structural steel platforms of 10' by 10' and 6' by 10' footprints.