Contractor Informational Workshop
Valley Conveyance System
Construction Sequencing

01 February, 2017
Workshop Agenda

- Welcome and Introductions
- Project Purpose and Major Design Features
- Construction Procurement/Bid Phase Schedule
- Consent Decree Milestone and VCS Construction Schedule
- Construction Scope of Work and Critical Issues
- Key Contract/Commercial Provisions
- Lunch Break
- Project Site Tour
Welcome and Introductions

• Introductions

• Intent of Workshop
  • Share information about VCS project construction schedule and scope of work
  • Provide open forum for contractors to ask questions and provide input on any aspect of the bid and/or construction phases of the project

• Workshop presentation and any workshop summary or follow-up materials will be posted to www.msdgc.org
Project Purpose and Major Design Features
This presentation will consist of multiple sections

- Valley Conveyance System (VCS) Overview
- Background Data
- Major Project Components
- Permits & Approvals
- Specifications
VCS Overview
VCS Overview

Multi-objective solution to maximize public dollars based on integrated planning

- Maximize CSO control
  - Water quality and ecology
- Conform with SMU standards
  - Safe conveyance of stormwater
- Conform with approved Master Plan
  - Community benefits and ecology
With SSA projects, reduce CSOs into the Mill Creek.

Provide flood control while minimizing risks to public safety.

Improve water quality by reducing CSOs and addressing runoff with a treatment train approach.

Maximize tangible, visible benefits to the community including the potential to provide a catalyst for community revitalization.
VCS Stakeholders

- MSD Departments
- Stormwater Management Utility
- Hamilton County Stormwater District
- Communities of the Future Committee
- CDOTE
- Cincinnati Park Board
- Cincinnati Recreation Commission
- South Fairmont Business Association
- South Fairmont Community Council
- Ohio EPA and US EPA
- Sierra Club
- Hamilton County Commissioners
- Hamilton County Monitor
- Cincinnati City Council
- GCWW
- Time Warner Cable
- ETS (Cincinnati Enterprise Technology Solutions)
- CinBell
- Duke Gas & Electric
VCS Vision
Background Data

- Geotechnical Boring Locations
- Geologic Characteristics
- Environmental Investigations
Geotechnical Boring Locations
Geologic Characteristics

- 150+ borings
- Filled Valley
  - East: Up to 37 feet fill (borings)
  - West: Shallow Bedrock
  - Variable fill
- Groundwater Seepage anticipated
- Bedrock is interbedded shale and limestone
- **Geotech Report included as non-contract document**
Environmental Investigations

- 193 Environmental Borings
- Some areas of contamination – most significant between State Ave and Beekman St
- Volatiles and metals
  - Lead is most significant contaminant
- Pre-treatment of some material
- Up to 12 potential UST sites
Environmental Investigations

• Contaminated material areas identified on drawings
• Environmental Reports included as non-contract document
VCS Design Components

- Utilities
- Channel
- Box Conduit/Precast Arches
- Structural Elements
- Roadways
- Bridges
- Retaining Walls
- Lighting and Electrical
- Public Space
Utilities

- Combined Sewer System
- Storm Sewer System
- Structural Stormwater Separator Units
- Recirculation System
- Utility Relocation by Others
Combined Sewer System
# Combined Sewer System

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<tr>
<th>CS Segment</th>
<th>Existing</th>
<th>Ex. Flow (CFS)</th>
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<th>Prop. Flow (CFS)</th>
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<td>LRCS @ Beekman</td>
<td>240” Brick</td>
<td>2” = 11 feet</td>
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2” = 11 feet
Combined Sewer System
Storm Sewer System

- Tributary Area: Approx. 156 acres immediately tributary to VCS
- Infrastructure: 15,750 LF of storm sewer, 12” to 60” diameter
- Storm Sewer BMP’s: Three structural stormwater separators (⭐️) and forebay (⭐️)
- SSA Connections: Five need to be disconnected from CSS and connected to VCS (🚫)
## Structural Stormwater Separator Units and Base Flow Diversion

![Diagram of a stormwater separator unit](image)

<table>
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<tr>
<th>Separator</th>
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Recirculation System

- Approx. 5,300 LF of 12” PVC Force Main
- Intake Structure in Online Pond
- Submersible Pump Station with Pre-Screening Vault
- Valve Manhole
- Control Panel with PLC for multiple operation scenarios
Utility Relocation by Others

- GCWW Water Main Relocations
- Duke Gas
Utility Relocation by Others

- Duke Electric*
- Time Warner Cable*
- Cincinnati Bell*
- City ETS (fiber)*

*conduit by MSD contractor
Channel

- Hybrid Conveyance System and Functions
- Channel Components
- Online Pond
- Forebay
- Earthwork
- Mill Creek Flood Levels
Channel
Hybrid Conveyance System and Functions

- Small flows conveyed in the bankfull channel
- Larger flows conveyed in the bankfull channel and box conduit
- Largest flows (i.e. > 25-yr) use both the box conduit and wider flood control channel for conveyance
Channel Components

- **Riffles** – Grade control structures
- **Pools** – Backwater zone upstream of riffle structure
- **Runs** – Portion of channel between downstream end of riffle and the receiving pool zone
Base Flow (ROCK) – Top width 6 – 12’; depth 6 – 18”

Bankfull (VEGETATION/ROCK EDGE) – Top width 15 - 40’; depth 36”

Flood Control (VEGETATION) – Conveys flows > 25-yr Q

On top of box conduit

Impermeable liner
Channel Components

Channel at CRC Area
“Dump and Spread...will not be allowed.”
Online Pond
Online Pond

- 1.8-acre surface area (El. 482.0)
- 10-ft pool depth
- 8.6 ac-ft pool volume
- 2-ft clay liner
- Safety/Planting Shelf
Forebay

30” Inflow Pipe

30” Outflow Pipe to Headwater Feature

QC-1 – Leaping Weir Diversion Structure

Stream Base Flow Bypass
Earthwork

- Approximately 382,000 CY of unclassified excavation*
  - Majority occurring between Harrison Ave. & State Ave.
  - Cuts up to 35’ deep
  - Primarily in fill
  - Includes foundations remaining
- Approximately 149,000 CY of fill
  - Up to 13’ thick
- Approximately 19,000 CY Compacted Clay Liners at Pond and Channel
- 189,000 Tons contaminated soil volume (some hazardous)*

* Based on Engineer’s 100% Opinion of Probable Quantities Submittal
Mill Creek Flood Levels

Mill Creek 100-YR BFE = 482.8
Mill Creek 10-YR BFE = 477.8
Observed Water = 456.8
Outfall Apron = 465.0
Outfall Inv. = 472.1*
Box Conduit/Precast Arches

- Locations
- Typical Sections
- Precast vs. CIP
- Construction Considerations
Box Conduit/Precast Arches

- 2,250 LF – 1-cell
- 2,800 LF – 2-cell
- 3,050 LF – 3-cell and Precast Arches
Box Conduit Typical Section

2-Cell Box

3-Cell Box

PDP & PRV
Precast Arches

Harrison to State

State to Mill Creek
Precast vs. CIP Box Conduit

• 40% of total length is precast (1-cell box and arches)
• Faster construction important at Queen City Bypass and State Ave.
• CIP expected to be cost competitive with precast for 2-cell and 3-cell
Advantages of CIP Box Conduit

• 20 bends in alignment
• Numerous pipe penetrations
• Fewer and tighter joints (watertight)
• Monolithic construction
• Rolling form option
Box/Arch Conduit Construction

- Open cut (1.5:1 cut slope)
- Temporary shoring
  - Westwood Avenue
  - State Ave
  - Adjacent to Brick Sewer
- Rock excavation
- Dewatering
- Limited load capacity
- Conveyance during construction
- Consent Decree Substantial Completion
Structural Elements

- Headwater Feature
- State Avenue to Mill Creek Segment
- State Avenue Transition Structure
- Mill Creek Outfall
- Outfall Access Road
- Large CS Protection and Reinforcement
Headwater Feature
Headwater Feature

- Sandstone and Limestone wall with special treatment at outfall
• CIP chamber on top of CIP 2-cell box conduit
State Ave. Transition Structure
State Ave. Transition Structure
Mill Creek Outfall
Large CS Protection

- Multi-wythe brick sewer built in 1890’s
- Concrete cradle on lower half
- 15’ to 20’ round and semi-elliptical
- Field located by multiple methods
- Possible protection measures:
  1. Excavate equally on both sides to balance earth pressure
  2. Provide temporary shoring on excavated side (INCLUDED)
  3. Internal bracing
Large CS Reinforcement

- Connections to Ex. Large Brick Sewer
- Possible reinforcement at pipe penetrations:
  1. Internal Shoring
  2. Rods
  3. Core & Sleeve
  4. Encase
Roadways

- Modifications to Existing Roadway Network
- Horizontal Alignment Modifications
- Profile Modifications
- Typical Sections
- Traffic Signal Design
Modifications to Existing Roadway Network

- Queen City Ave converted to two-way
- State Ave reconstructed over arch conduit
- Harrison Ave realigned over VCS
- Beekman St connector vacated
Horizontal Alignment Modifications

- Van Hart St alignment shifted west
Profile Modifications

- Slight profile modifications on most cross streets
  - Hydraulic considerations
  - Match existing elevations at Westwood and Queen City Aves
  - Design requirements

- Harrison Ave profile for shared use path under bridge
Typical Sections

- Asphalt on concrete base (CDOTE)
- Sidewalks per CDOTE standards
Traffic Signals

- 11 signalized intersections to be modified or reconstructed
- Reuse existing signal equipment where possible.
Bridges
A total of 6 bridges cross the VCS Channel
5 – Vehicular and 1 - Pedestrian
• Design followed ODOT, AASHTO, and CDOTE guidelines
• Quebec and Grand – 3 lanes.
• Van Hart and Kebler – 2 lanes.
• Sidewalks both sides

<table>
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<tr>
<th>BRIDGE NAME</th>
<th>SPAN</th>
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<tr>
<td>Quebec Road</td>
<td>39’-4”</td>
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<tr>
<td>Van Hart Street</td>
<td>38’-0”</td>
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<tr>
<td>Kebler Avenue</td>
<td>38’-0”</td>
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<tr>
<td>Grand Avenue</td>
<td>48’-5 5/8”</td>
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Precast box beam superstructure

- Limits formwork, superstructure can be quickly set and quickly prepared for concrete deck pour
Bridges - Quebec through Grand

- Stub abutment type
- Cast-in-place concrete wing walls
  - Formliner to match gravity block
  - Deep foundation
Drilled Shafts to Bedrock

- Based on geotechnical report, poor soils, and top of rock elevations
- Close proximity of brick sewer to bridge foundations
Use CLSM (CDF) in lieu of an approach slab on select bridges
Bridges - Harrison Avenue

- 7 lanes and 8’ sidewalks on both sides. 96-feet wide, 25-degree skew.
- 3-span composite prestressed adjacent box beam superstructure
- Utilizes prestressed box beams, consistent with the bridges at Quebec through Grand
- End spans of 20’-6”, center span of 55’-0”
- Wall type abutments
- Cap-column piers
- Cast in place concrete wingwalls
Bridges – Pedestrian

- Span of 82’-0”, clear walking path width of 14’-0”
- Prefabricated truss selected based on cost, constructability
- Cast in place concrete deck
Bridges - Harrison Avenue
Bridges – Grand Ave

Grand Avenue & smaller bridges
Support utilities in a chase created by omitting box beams
• Custom crash-rated rail that complimented South Fairmount-inspired bridge architecture
• CDOTE has approved rating of TL-2 railing on Quebec, Van Hart, Kebler and Grand. A TL-3 rated railing is required on Harrison Avenue.
Retaining Walls

- Locations and Purpose
- Wall Type Considered
- Construction Considerations
• Walls along Westwood Avenue for 4:1 VCS overbank slope and protect Westwood
• Walls to be set about 17’ behind BOC of Westwood
• Railing with concrete curb from Van Hart to Grand
Wall Types

- Large Gravity block selected for most walls
- CIP concrete used at outfall and basketball court
- Temporary shoring required to construct walls in many areas
Gravity Block Wall Section

TYPICAL MODULAR BLOCK RETAINING WALL SECTION — WALLS 1 THRU 5, 9
Lighting and Electrical

- Ownership
- LED Lighting
- Other Electrical
Ownership and CDOTE Standards

- Lighting broken up into systems (by controller) based on who will own and maintain the lights (MSD, CDOTE, Parks Dept., or CRC)
• Styles of light poles - all are LED:
  – Streetscape lighting
  – Open space lighting
  – Roadway lighting

• Streetscape and open space lighting:
  – Designed to meet AASHTO standards for light levels with input from MSD and CRC
  – Selected by Human Nature

• Lighting controllers include photocell and timeclock control of the associated lights
  – contactor panels
  – CDOTE cabinets
  – pad-mounted lighting cabinets
Other Electrical

- Irrigation Controllers
- Traffic Signal power service
- Recirculation System (Pump Station)
Public Space

• Pedestrian Path System & Vehicular Access
• Civic Spaces
• Planting Restoration
• Planting Irrigation
• Streetscape
• Interpretive Signage
Pedestrian Path System & Vehicular Access

- Multi-purpose path system – pedestrian and maintenance
- Continuous Shared Use Path below Harrison bridge
- Replace sidewalk on Queen City south and Westwood north
- Vehicular Access – 2 Parking Lots with Bioinfiltration
Civic Spaces

CRC Space:
• Existing Sprayground & shelter to remain
• 1 shelter relocated
• 1 playground

• Basketball courts
• 1 new off-street parking lot;
• ADA-compliant walkways
• Channel access feature
Planting Restoration

- Channel Zone (inundated with water): Riparian Plug Mixes
- Native Meadow Seed Mixes (above channel water elevation)
- Seeded or Sodded Lawn
- Limited shrub massings
- Perennial Beds at bridge gateways
- Trees: Deciduous, Street, Flowering, Coniferous, Moon
Planting Restoration

Channel Planting Cross section

• High and low planted terraces
• Planting on top of box with limited soil depth
• Plant types for water regime
• Preventing soil erosion on top of box
Planting Restoration

Channel Aesthetic
Native areas irrigated for establishment and to prevent losses in extreme conditions (in green)

CRC and ROW not irrigated
Queen City Avenue (south)

- Stormwater planters with street trees
- Permeable pavers between planters for on-street parking
- CDOT pedestrian pavement requirements limited planter width requiring rail in lieu of curb
Interpretive Signage

- Incorporate interpretive/educational locations along corridor
- Provide branding at key moments in corridor
- Provide wayfinding and regulatory signage with consistent look
Permits/Approvals by Owner and Design Team
• Ohio EPA Permit To Install (Combined Sewers) – Complete
• USACE Nationwide Permit – Complete (conditions)
• USACE Section 10 Permit – Complete (conditions)
• CSX Approval – Complete
• Subdivision Permit – To be issued
• Water Main Relocation (by GCWW)
Permits by Contractor

- Ohio EPA Construction Stormwater Discharge Compliance (NOI, NOT, SWPPP)
- Contaminated Soil disposal
- Dewatering
- Local Permits (Retaining Walls, Cut/Fill)
Specifications

- MSD Boilerplate specifications supplemented by Design Team specs
Bid Phase and Construction Schedule
01-Feb-17
Contractor Outreach Workshop

01-Mar-17
Bid Advertisement

08-Mar-17
Pre-Bid Workshop

28-Apr-17
Bid Opening

22-Feb-17
BoCC Legislation Approval

09-Jun-17
Notice of Commencement
**VCS Schedule – Construction & Establishment Phases**

- **01-Jul-17**: Contractor Mobilization & Start-Up
- **15-Oct-19**: Construction Substantial Completion
- **15-Oct-21**: Establishment Period – Year Two
- **30-Dec-18**: Consent Decree Substantial Completion
- **15-Oct-20**: Establishment Period – Year One
- **15-Nov-21**: Final Completion
Construction Agenda

- Review Major Elements of Construction
- Consent Decree Milestone
- Construction Sequence of Events
- Construction Traffic Mitigation
- Construction Site Management
- Site Security Considerations
- Key Contract/Commercial Provisions
Major Elements of Construction
Existing brick sewer

New combined sewer lines
Substantial completion of the following components by December 31, 2018

- VCS box conduit including the precast concrete box, the two-cell and three-cell cast-in-place concrete box
- Daylighted open channel conveyance from headwaters to Quebec Road
- Type 1 and Type 2 arch conduits, high capacity inlets, transition structures and outfall structure – continuous from the west end of the project (Structure QC-1) to the Outfall Structure at Mill Creek
- Sewer separation work including separate storm sewers, relocated combined sewers, completion of sewer connections to the VCS box conduit or existing CSS
- Removal of surface drainage within the project limits from the CSS to the box conduit or separate storm drain
Consent Decree Milestone Constructed Facilities

Rendering courtesy of Human Nature

Existing brick sewer

7 new combined sewer lines
Divided into zones and project areas

**Example of Construction Schedule**

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<th>Activity ID</th>
<th>Activity Name</th>
<th>Original Duration</th>
<th>BLT Early Start</th>
<th>BLT Early Finish</th>
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Consent Decree Substantial Completion
3 Construction Zones

- Zone B-1: Mill Creek to Grand Ave.
- Zone B-2: Grand Ave. to Quebec Rd.
- Zone B-3: Quebec Rd. to Forebay Pond
8 Construction Areas

1. Outfall Structure to Beekman St.
2. Beekman St. to Harrison Ave.
3. Harrison Ave. to Grand Ave.
4. Grand Ave. to Kebler St.
5. Kebler St. to Van Hart St.
6. Van Hart St. to Quebec Rd.
7. Quebec Rd. to White St.
8. White St. to Forebay Pond
Construction Sequence of Events
Construction Sequence #1

COMPLETE: Mass excavation or clearing and grubbing

BEFORE: Other work elements
**Construction Sequence #2**

**COMPLETE:** Support-of-excavation (temp. sheet pile)

**BEFORE:** Adjacent work
COMPLETE: Drilled shafts
BEFORE: Bridge structures, inlet/transition structures, or box conduit under bridges
COMPLETE: Combined sewers
BEFORE: Box conduit
COMPLETE: Inlet structures or box conduit

BEFORE: Bridge structures
COMPLETE: Box conduit
BEFORE: Storm sewers or retaining walls
COMPLETE: Storm sewers installed to roadways
BEFORE: Retaining walls
Construction Sequence #8

COMPLETE: Retaining walls

BEFORE: Channel construction
Construction Sequence #9

**COMPLETE:** Channel construction

**BEFORE:** Landscape and hardscape
• Consent Decree Milestone drives the major elements to be constructed

• Construction constraints drive how it has to be built

• Developed in collaboration with CDOTE
Construction Traffic Mitigation #1

• CANNOT remove Beekman St. UNTIL Harrison Bridge and associated roadway modifications are complete

• Harrison traffic cannot be restricted at the same time as traffic restrictions on Beekman
CANNOT close Kebler St. the SAME TIME as Grand Ave. or Van Hart St.
Construction Traffic Mitigation #2

YES

CANNOT close Kebler St. at the SAME TIME as Grand Ave. or Van Hart St.
Construction Traffic Mitigation #3

NO

CANNOT close Van Hart St. the SAME TIME as Quebec Rd. or Kebler St.
Construction Traffic Mitigation #3

CANNOT close Van Hart St. the SAME TIME as Quebec Rd. or Kebler St.

YES
NO

CANNOT close Quebec Rd. the SAME TIME as Grand Ave.
Construction Traffic Mitigation #4

CANNOT close Quebec Rd. the SAME TIME as Grand Ave.
STATE AVE. must have a minimum one northbound lane maintained at all times during construction.
Additionally, access to the fire station on State Ave. cannot be obstructed during construction.
Construction Site Management
Construction Areas

1. Outfall Structure to Beekman St.
2. Beekman St. to Harrison Ave.
3. Harrison Ave. to Grand Ave.
4. Grand Ave. to Kebler St.
5. Kebler St. to Van Hart St.
6. Van Hart St. to Quebec Rd.
7. Quebec Rd. to White St.
8. White St. to Forebay Pond
Outfall Structure to Beekman St.
Grand Ave. to Kebler St.
Kebler St. to Van Hart St.
White St. to Forebay Pond
Site Security Considerations
Site Security Considerations

- Adequately safeguard all excavations with barricades, caution signs, lights, and any other means to prevent accidents to the public or damage to property.
- Provide suitable and safe bridges and crossings to accommodate travel by pedestrians and craft workers.
- Provide adequate site lighting for all trenches, excavated material, and equipment at night.
- Control access to all active work zones.
- Contractor is responsible for site security.
Key Contract/Commercial Provisions
• Federal Consent Decree mandated project subject to liquidated damages and/or Consent Decree damages for missing December 31, 2018 milestone completion date for Lower Mill Creek Partial Remedy (LMCPR)

• Two separate and distinct substantial completion requirements on project:
  • Consent Decree Substantial Completion – 12/31/18
  • Project or Construction Substantial Completion – 10/15/19

• Modified retainage provisions to accommodate both substantial completion dates
Contract/Commercial Provisions

• Two year “Establishment Period” requiring contractor to provide landscape maintenance and inspection services prior to achieving final completion in approximately Q4 2021

• Requirement to provide Maintenance Bond during Establishment Period

• WPCLF funded project subject to USEPA requirements including, but not limited to:
  • “Buy American” provisions
  • MBE/WBE utilization requirements
Questions