

**Date:** December 3, 2024

**To:** Holly Christmann, Assistant County Administrator

**From:** Diana Christy, Executive Director  
Reese Johnson, Deputy Director (Chief Engineer)

**Copy:** Matt Spidare, Principal Engineer  
Daniel Anderson, Supervising Engineer / Project Manager  
Lauren DeGorcia, Assistant Superintendent, OOD  
Karen Ball, County Monitor

**Subject:** **COMMENTS FROM OCTOBER 3, 2024 PUBLIC HEARING  
KENWOOD HILLS LOCAL SEWER (PROJECT ID 10370025)**

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This memo is intended to address comments received during the public hearing that was held on October 3, 2024 to discuss MSD's Kenwood Hills Local Sewer project.

### **Background**

The Kenwood Hills Local Sewer project was initiated by a citizen's petition in 2014 pursuant to MSD Rules and Regulations Section 1805 Policy on Management of Requests for Local Sewer Assessment Projects. Under Section 1805, property owners that are not served by public sewers (*i.e.*, not current MSD customers or ratepayers) may request the construction of a public sewer to serve their properties if there is a majority support amongst the total number of benefited properties. The Board may authorize the design of the requested sewer improvements and determine to proceed with construction. Following construction, the benefited owners will be assessed a portion of the costs of the improvement, but, per Board policy, that amount is capped at \$12,000 per property and the balance is funded by MSD. In addition to the cap, owners may pay the assessed cost through property taxes over 20 years (40 semi-annual payments; subject to additional interest, fees, and charges). This policy has been in place since 2014 and is applied uniformly to all property owners, resulting in the construction of dozens of local and lateral sewer projects throughout MSD's service area and assessment of costs to the benefited property owners over the years.

The Kenwood Hills Local Sewer, the petitioned sewer improvements at issue, would benefit 160 properties, including 159 single-family parcels and one forestry with building parcel. Property owners representing 81 of the aforementioned properties expressed support for this project (50.6% level of support), making the petition valid under Section 1805. As required for sewer assessment projects with less than 100% support, a public hearing was held on October 3, 2024 to hear comments from the property owners that would be assessed a portion of the project costs. Many residents attended and offered comments, some in support of the project and others against. Several property owners questioned the design/alignment of the project and expressed concern regarding the cost to the property owners for both the assessed portion (typically \$12,000 plus interest/fees) and private-side costs (varies by property, but such costs are often thousands or tens of thousands of dollars).

The Board ultimately determined to leave the public hearing open pending receipt of further information and discussion regarding the following broad categories:

1. consideration of alternative designs, particularly those that would reduce private-side costs;
2. private-side costs for connecting to the provided sewer;
3. opportunities for additional funding for property owners; and
4. potentially re-polling property owners to determine the current level of support for the project.

### **Response**

Each category above is responded to, as follows:

#### **1. Alternative Designs**

The currently proposed project design, which has been recommended by MSD and approved by the Board, would be located primarily in the public right-of-way (*i.e.*, streets) in front of the homes. It entails a mix of gravity sewers in the northern part of the project area and low-pressure forcemain in the southern part of the project area. This design was chosen based on the final Business Case Evaluation in which the design consultant evaluated four different alternatives. It was noted at the outset, “[t]he design of sewers is particularly challenging in this neighborhood because the development was not laid out for gravity sewers. There are a variety of competing objectives involved in the design of this complex local sewer project, including initial and life cycle costs for MSD and benefited property owners and impacts during construction.”

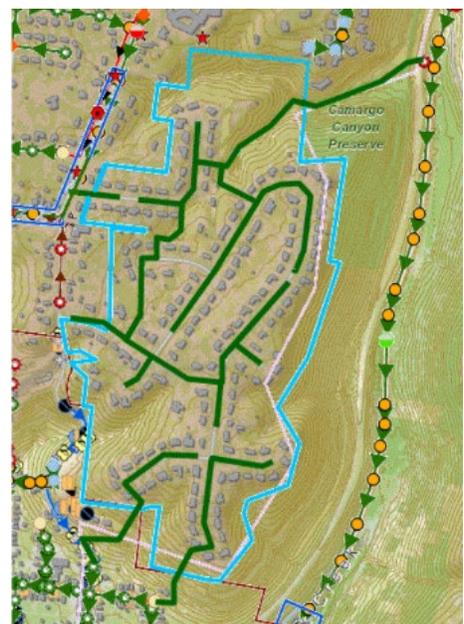
Additionally, the strategy of having sewers in the rear yards, as recently suggested at the hearing by some owners, was screened out early in the planning phase. Having sewers in rear yards would cause the construction cost to significantly increase as there would be need to be approximately twice the length of sewer installed to serve the project area. Along with the construction cost increase, maintenance costs for the sewers would increase as the sewers are harder to access for MSD staff and vehicles. The construction as well as the permanent presence and periodic maintenance of the sewers on private property can also be a disturbance or inconvenience to homeowners. Lastly, easement acquisition would be necessary from all property owners, which would lengthen the time to reach construction and increase overall cost. For these reasons, the final alternatives considered only proposed sewers within the public right-of-way.

#### **Alternative 1 – Deep Gravity Sewer:**

Description: Connection of the subdivision (project area) to three separate sewer locations – one to the north to Camargo Road, and two locations in the south (Chandler Street and Darling Road).

Property Owner Considerations: Majority of properties could be served by gravity sewers, but some properties would still need to pump.

MSD Cost Considerations: Most expensive with an estimated construction cost approximately 236% over the current recommendation (estimated \$183,000 per parcel, \$26.8M total\*).



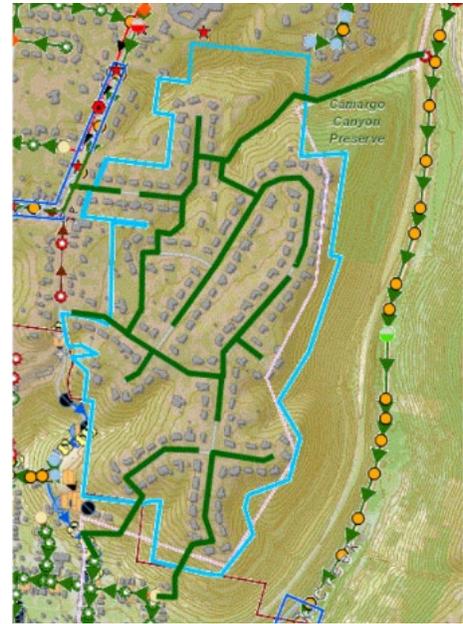
*Alternative 1 – Deep Gravity Sewer*

### Alternative 2 – Shallow Gravity Sewer:

Description: Similar to Alternative 1, but the gravity sewer would be built shallower to reduce project costs.

Property Owner Considerations: Higher number of properties would need to pump compared to Alternatives 1 and 4.

MSD Cost Considerations: High cost; estimated construction cost is approximately 147% higher than the current recommendation (estimated \$114,000 per parcel, \$16.7M total\*).



*Alternative 2 – Shallow Gravity Sewer*

### Alternative 3 – Low-Pressure Forcemain:

Description: Installation of low-pressure force mains.

Property Owner Considerations: All properties would need to pump.

MSD Cost Considerations: Most affordable option for MSD; estimated construction cost is approximately 52% of the current recommendation (estimated \$40,000 per parcel, \$5.8M total\*).



*Alternative 3 – Low-Pressure Forcemain*

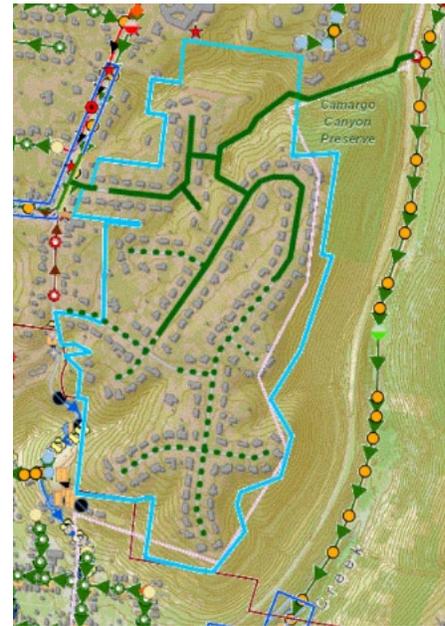
\* Estimates developed for discussion and comparison purposes by utilizing the opinion of probable cost of construction for the current 100% design and extrapolating planning level estimates for the evaluated alternatives

Alternative 4 – Hybrid Gravity and Low-Pressure Forcemain (recommended):

Description: Hybrid of the other alternatives with gravity sewers in the northern part of the project area and low-pressure forcemain in the southern part of the project area.

Property Owner Considerations: Majority of properties will be served by gravity, but some will require pumps. Many of the houses in the southern part would have to install a pump anyway, even with a gravity sewer installed in the right-of-way, to get their sewage discharge from the rear yard to the street.

MSD Cost Considerations: Second most affordable construction cost (estimated \$77,000 per parcel, \$11.3M total).



*Alternative 4 – Gravity Sewer in the North and Low-Pressure Forcemain in the South*

Recommended Alternative:

MSD proceeded with Alternative 4, as Alternatives 1 and 2 were unreasonably expensive and would still require some properties to pump based on the terrain/elevations of the neighborhood. Alternative 3 was not preferred as all properties would need to pump. During the detailed design, MSD made changes to the sewer alignment to enable more properties to be served by gravity service although it increased the construction cost. The current 100% design estimated construction cost for the recommended alternative is \$11.3 million.

Alternatives	Gravity v. Pump	MSD Cost
Alternative 1	Some owners pump	Highest Cost
Alternative 2	Some owners pump	Second Highest Cost
Alternative 3	All owners pump	Lowest Cost
Alternative 4	Some owners pump	Second Lowest Cost

Suggested Division of the Project Area:

While not evaluated in the Business Case Evaluation, certain residents recently suggested altering the proposed design to remove the sewers that would serve homes which would need to pump, to the extent practicable. This approach would reduce the total number of benefited (and assessed) properties. In theory, the removed properties would continue to utilize their household sewage treatment systems, but could initiate a separate petition for an assessment project if they choose. However, it may not be feasible to design the sewers such that they are able to serve the properties that are “last on the line” without being sited within 200 feet of at least a portion of the properties that are proposed to be removed from the project, prompting the legal requirement for those properties to connect to the public sewer. Additionally, it’s important to acknowledge this approach would not be cost efficient as it would require two separate construction projects to sewer the same area that is proposed to be addressed by this single project and would also address the public and environmental concerns to a lesser extent as compared to the proposed project.

Lastly, it’s important to note that, at this point, MSD has reached 100% design, acquired nearly all right-of-way necessary for said design, and spent eight years and approximately \$600,000 of MSD funds to advance this project. Therefore, any significant change to the design will cause additional cost (e.g., design, easement acquisition) and delay to the project.

## **2. Private Side Improvement Costs**

The Commissioners also requested additional information regarding the amount of private-side costs for property owners to connect to the new public sewer once MSD completes construction. At the public hearing, the Hamilton County Public Health Department mentioned the private-side costs for this neighborhood could range between \$15,000 and \$30,000 per property. MSD is unable to provide more detailed information on the private-side costs as these costs are highly property-dependent and market-dependent. Each property is unique in terrain, building layout, and the location of the household treatment system. MSD recommends that property owners contact multiple plumbing contractors for property-specific quotes, and can request this information be obtained and provided by the property owners for the next public hearing session.

## **3. Funding Opportunities**

All property owners have been provided information regarding the following financial assistance options:

- Hamilton County Public Health and Ohio EPA's Water Pollution Control Loan Fund (WPCLF) Grant Program provides financial assistance for qualifying homeowners to connect to the public sanitary sewer.
- Hamilton County Home Improvement Program (HIP), which provides loans to homeowners in Hamilton County communities to borrow money to repair or remodel their homes at interest rates 3% below the lowest rate a bank would normally offer. However, the County Auditor's property value for most if not all properties in the project area exceeds this program's \$350,000 cap, likely making them ineligible.

MSD has taken efforts to seek funding for this project to lessen the burden on the property owners that will be assessed costs and/or MSD ratepayers. In late 2023, MSD submitted a grant application for this project through the Ohio Department of Development's Ohio BUILDS Water and Wastewater Infrastructure Grant; however, the project was ultimately not chosen to receive funding. More recently, MSD nominated this project for low interest loan funding, with possible principal forgiveness, through Ohio EPA's Water Pollution Control Loan Fund (WPCLF) and is awaiting the release of the proposed 2025 program plan to see if any principal forgiveness will be available (anticipated January 2025). WPCLF nominated projects are also considered for H2Ohio grant funding.

While the potential to mitigate the public health and environmental risks involved make this project an attractive recipient for funding, the relatively high median household income (MHI) in Madeira and property values in the project areas may negatively impact meeting financial assistance eligibility and prioritization criteria. Grant funding is also limited and competitive. As additional examples, the Ohio Department of Development's Critical Infrastructure and Residential Public Infrastructure grant programs require 51% or more are low- or moderate-income and grants are capped at \$500,000 and \$750,000 per project, respectively. Similarly, Ohio Water Development Authority offers grants to populations below Ohio's MHI and grants are capped at \$1M per project.

MSD will continue to monitor for grant opportunities and other financial assistance that may be available for this project.

#### **4. Re-Polling**

Potentially re-polling the property owners to gauge the current level of support for the Kenwood Hills Local Sewer project has also been a point of discussion. Any re-polling would not definitively determine whether or not the project will proceed, but rather provide the Board with more information to consider in determining whether or not to proceed. The Board has the authority and discretion under Ohio law to determine whether or not to proceed with the project, regardless of the results of any polling. This authority is detailed in Ohio Revised Code Section 6117.07 and MSD Rules and Regulations Section 1805(C)(8).

#### **Conclusion & Next Steps**

MSD has been diligent and comprehensive in its evaluation of reasonable alternatives and chosen an approach that best balances property owner considerations with the cost to MSD ratepayers. The referenced Business Case Evaluation and other design deliverables related to the current design are enclosed for reference. Unless significantly more funds are contributed to this project than presently estimated, redesigning this project will add further expense and time but is not likely to result in a major savings for the property owners.

Based on the Commissioners' previous input, MSD will provide proposed legislation for the Board to set another time, date, and location to present the information herein and to hear additional public comments. The next step is for the Board to, at its discretion, close the public hearing.

After the public hearing is closed, there will then be a five-day waiting period for receipt of any written comments. Proposed legislation will be provided to address any objections received and, approximately one month later, to determine whether or not to proceed with construction of the project. Following the determination, there will be a 10-day waiting period for appeals. If no appeal is successfully made, MSD will provide proposed legislation to appropriate remaining necessary easements for the project and, following the conclusion of those proceedings, legislation to appropriate construction funding. Following the completion of construction, the benefited property owners would be assessed an anticipated \$12,000 each for the public side improvements and may choose to pay, in full or in part, within 30 days and/or pay any remaining balance through property taxes over the next 20 years (40 semi-annual payments), subject to additional interest, fees, and charges.

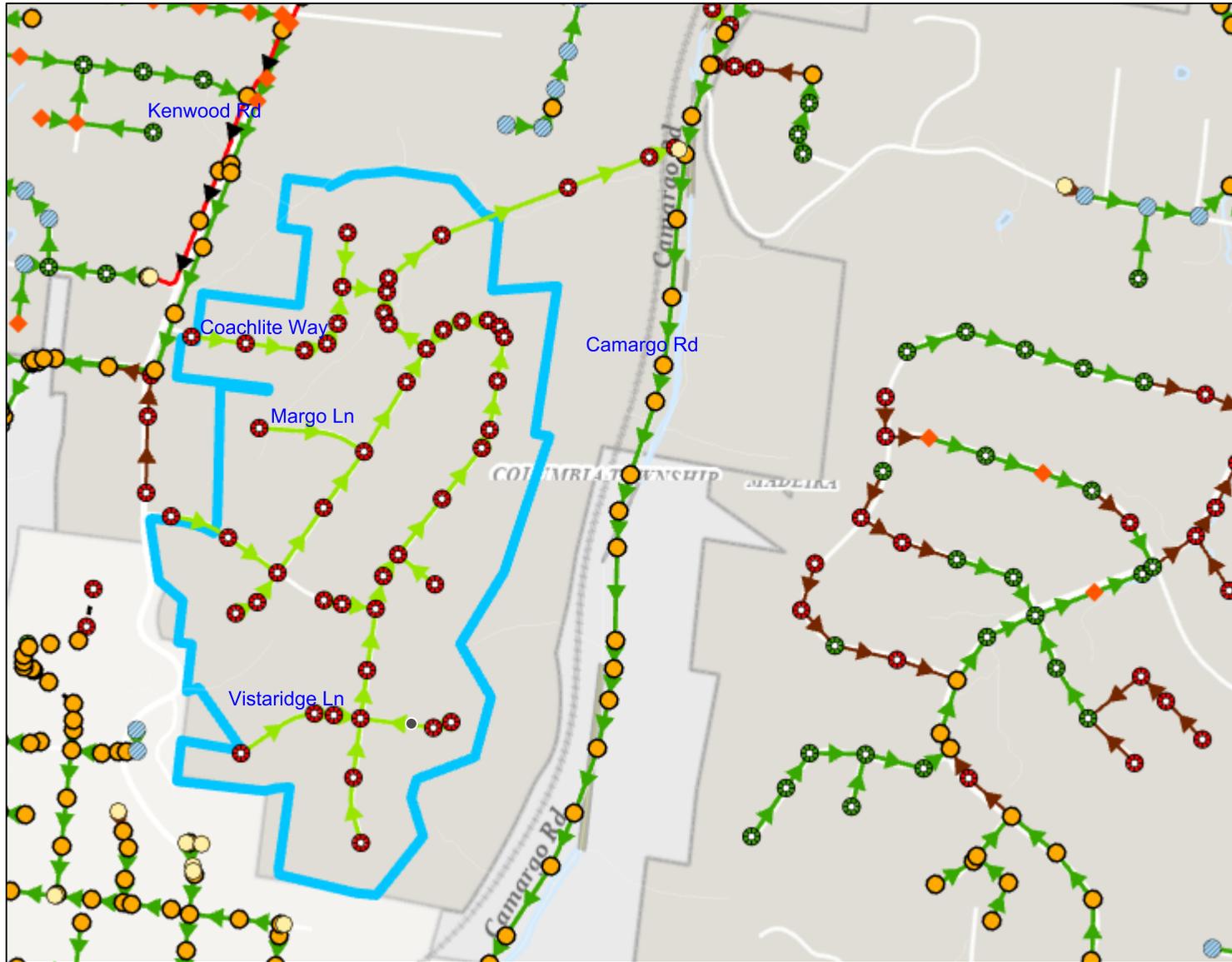
We welcome any questions and further discussion on these matters.

Enclosed:

- Project Map
- Planning Report (Business Case Evaluation)
- 100% Basis of Design Memorandum
- 100% Design Submittal

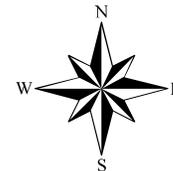
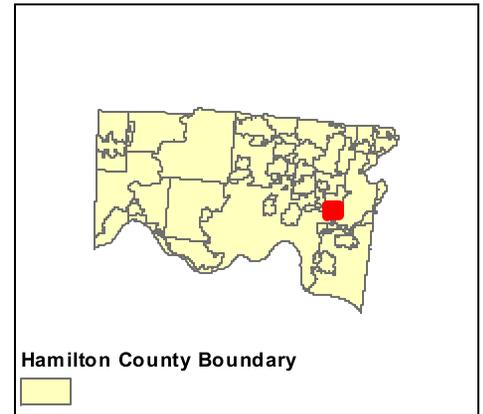
# Kenwood Hills Local Sewer, S.S. 5933, Project ID 10370025

City of Madera, Hamilton County, Ohio



## Map Legend

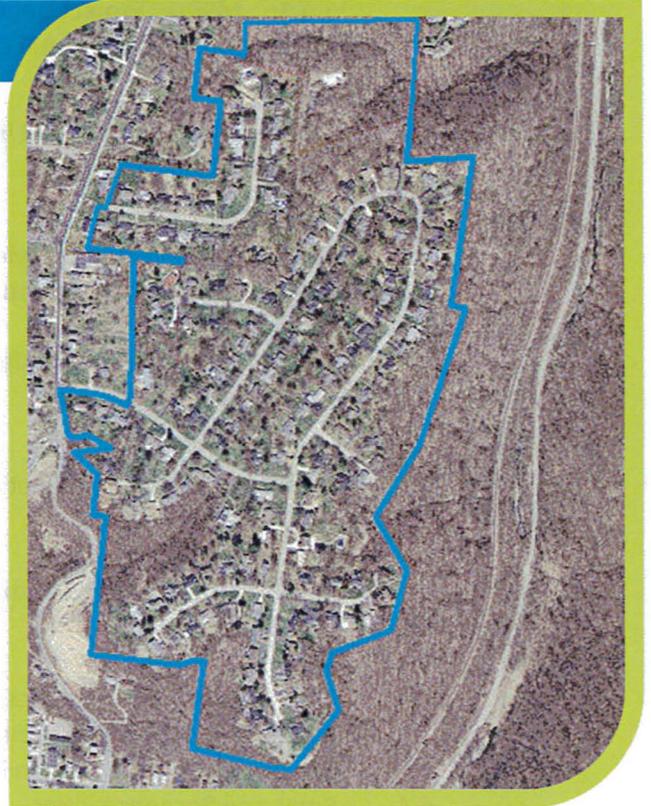
- Existing Sewer
- Existing Manholes
- Benefited Properties
- Proposed Sewer





# Kenwood Hills Local Sewer

## Planning Report



### PROJECT GROUNDWORK

Prepared by Casey Walter

10190315

Final Revision 0 - EMP Superintendent Approval

March 18, 2016



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MSD DOCUMENT CONTROL

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## Section 1 – Executive Summary

### Why:

The purpose of this project is to bring public sewer service to an area served by Home Sewage Treatment Systems.

### What:

The recommended alternative is Alternative 4, construction of approximately 7,400 feet of gravity sewer and 5,000 feet of Low Pressure Force Main to eliminate 159 home sewage treatment systems (HSTS) plus the on-site system at the community pool in the Kenwood Hills neighborhood.

### Where:

The project is located in Coachlite Way, Kenwood Hills Drive, Oakvista Drive, Mapleridge Drive, Vistaridge Drive, Margo Lane, and Maplespur Lane in the City of Madeira.

### How:

The estimated construction cost of this alternative is \$3,440,200, and the estimated project cost is \$4,957,200. The proposed funding source is MSD Capital Improvement Funds. A portion of the cost will be assessed to the property owners.

### When

The proposed schedule includes design in 2016 and construction in 2019.

## Section 2 – The Problem

### Section 2.1 Problem Statement

According to Section 1805 of the MSD Rules and Regulations, “It is the policy of the Board of County Commissioners of Hamilton County, Ohio to encourage public sewers and to finance sewer improvements which provide local service by levying special assessments on the properties receiving benefit from a public sewer improvement. “ (Additional rules about the process can be found in Section 1805 of the MSD Rules and Regulations).

A citizen petition was returned to MSD requesting sewers on Coachlite Way, Kenwood Hills Drive, Oakvista Drive, Mapleridge Drive, Vistaridge Drive, Margo Lane, and Maplespur Lane in the City of Madeira. The area is served by individual Home Sewage Treatment Systems. A majority of property owners in the area are interested in obtaining public sewer service. Ballot polling confirmed majority support.

The purpose of this effort is to identify feasible and efficient alignment and profile options and a recommended budget for the Kenwood Hills Local Sewer, as described in the project’s citizen petition. The design of sewers is particularly challenging in this neighborhood because the development was not laid out for gravity sewers. There are a variety of competing objectives involved in the design of this complex local sewer project, including initial and life cycle costs for MSD and benefited property owners and impacts during construction.

### Section 2.2 Existing Sewers and Home Sewage Treatment Systems

The Kenwood Hills neighborhood is a Hamilton County Public Health priority area. *The Kenwood Hills Subdivision 2008 Sanitary Survey*, by Hamilton County Public Health reported the following:

“FINDINGS: There are one hundred sixty-four aerobic treatment units in the survey area...The aerobic treatment units located within the survey area have failed to meet the operational and maintenance criteria 16% of the time. Even when these systems are meeting operational criteria, they will not routinely meet the effluent quality standards.”

“CONCLUSIONS: Due to the poor effluent quality within the sanitary survey area, the nuisance situation present must be addressed.”

“RECOMMENDATIONS: Based on the findings of this Sanitary Survey and the requirements of USEPA Phase 1 Storm Water Regulations, the staff of the Water Quality Division recommends the construction of a sanitary sewer system for the survey area.”

<http://www.hamiltoncountyhealth.org/files/files/Reports/kenwoodhills%20sanitary%20survey%202008.pdf>

*Sanitary Survey of Kenwood Hills* by Hamilton County General Health District dated April 13, 2001 also recommended construction of “a sanitary sewer to service the homes involved and abate the nuisance conditions in the neighborhood.”

<http://www.hamiltoncountyhealth.org/files/files/Reports/kenwoodhills%20sanitary%20survey%202001.pdf>

There are no existing, public, sanitary sewers in the project area. The project area is surrounded by sanitary or combined public sewers in all directions, though some are not deep enough for gravity service or are difficult to access.

The project area contains numerous other sewers or pipelines that convey stormwater runoff as well as effluent from HSTS. All of the following can be found in the project area:

Storm Sewer: conveys stormwater only

Effluent line: conveys effluent from a single HSTS.

Effluent collector line: conveys effluent from more than one HSTS.

Combined storm and effluent line: conveys effluent from HSTS and stormwater runoff

The assessment sewer boundary was laid out during a citizen petition process and modified during the development of alternatives.



Figure 1 - Boundary of assessment sewer area

The assessment sewer boundary includes all but one lot of the Kenwood Hills Subdivision, all but two lots of the Carriage Hill Subdivision, 5698 Kenwood Road, 6228 Kenwood Hills Drive, and the Kenwood Hills Community Pool located at 5669 Oakvista Drive.

The assessment sewer area includes 159 single family residences which are served by Home Sewage Treatment Systems, plus the community pool, which is served by an on-site system, for a total of 160 properties to be benefited by the proposed sewer.

One property in the assessment sewer area is served by a public sewer. 6256 Vistaridge Lane is connected to the existing sanitary sewer crossing Kenwood Road. There is an assessment sewer waiver for this property; therefore, it is included in the assessment roll but not benefited by the proposed sewer. The total number of properties to be assessed is 161.

It should be noted that the community pool was not included in the initial vote because the proposed alignment was not set at that time. As of 3-8-2016, the proposed alignment will serve the pool, and the pool property board should be provided a polling ballot so they can demonstrate their support.

Notable properties are shown in the following map, and listed in the table below. More information about Kenwood Hills Subdivision and Carriage Hill Subdivision is included in the following pages.

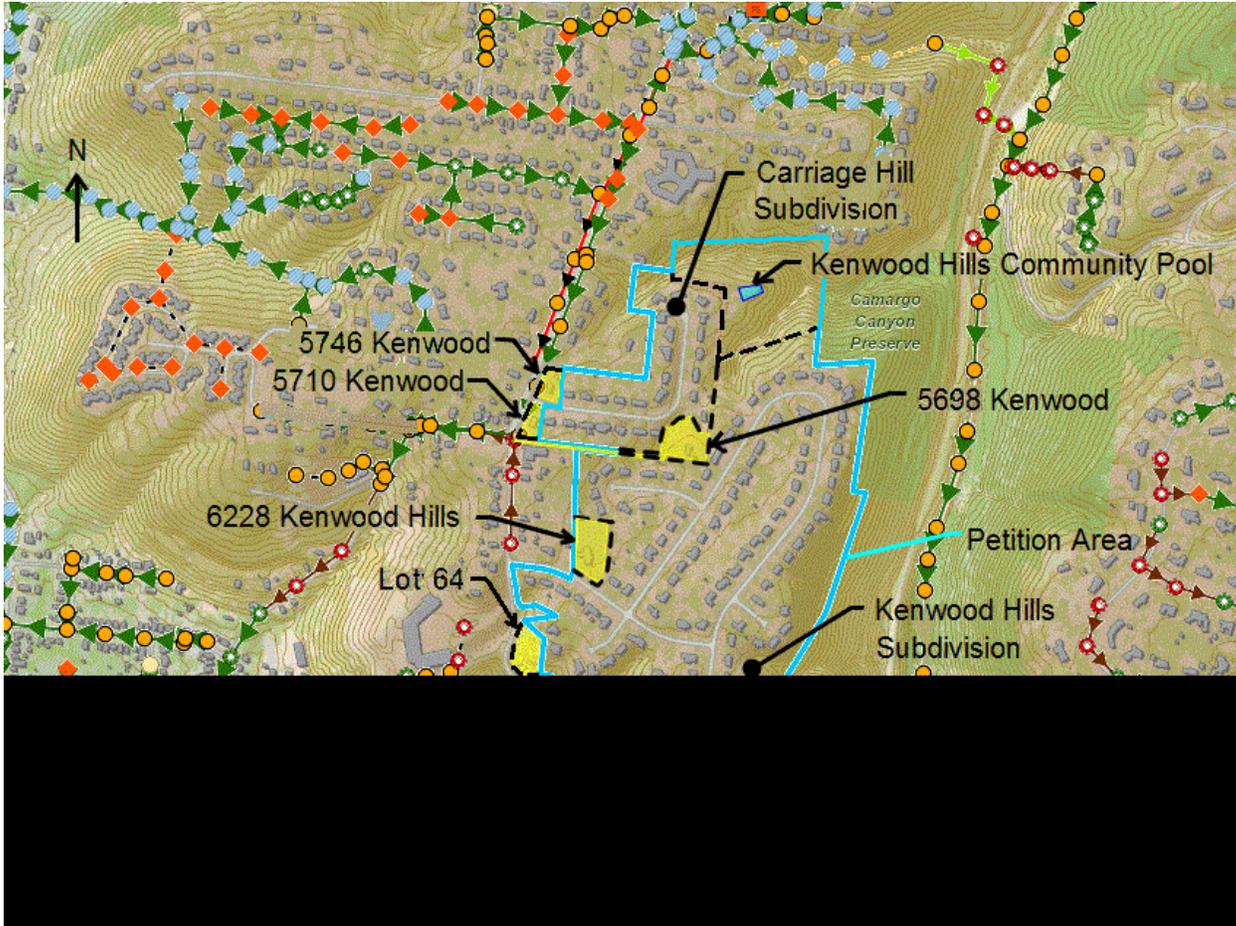


Figure 2 - notable properties

Parcel	Address	Remarks
525-210-41	5669 Oakvista Drive	Kenwood Hills Community Pool, to be included in assessment area
525-24-60	5746 Kenwood	Lot 28 Carriage Hill subdivision; already served by public sewer and not included in assessment area.
525-24-40	5710 Kenwood	Lot 1 Carriage Hill subdivision; already served by public sewer and not included in assessment area.
525-21-42	5698 Kenwood	Not part of a subdivision; included in assessment area
525-230-31	6228 Kenwood Hills	Not part of a subdivision; included in assessment area
525-23-58	none	Lot 64 Kenwood Hills – Vacant, also the only lot in Kenwood Hills subdivision not included in assessment area.
525-23-74	6256 Vistaridge	Already served by public sewer. Has sewer assessment waiver. To be assessed but not benefited.

### Kenwood Hills Subdivision

Many of the Home Sewage Treatment Systems drain to sewers in the street that also collect street drainage. Some of the storm sewers pass between houses to an outfall; these reside in public easements labelled “Storm Sewer Easements” on the subdivision plat. The City of Madeira follows the following policy for maintenance of these sewers:

- If the sewer conveys street runoff and effluent from HSTS, then the City of Madeira maintains the sewer.
- If the sewer conveys only effluent from HSTS, the City of Madeira does not maintain the sewer.

There are also other sewers either within or outside of the public right of way that convey effluent from one or more HSTS, but not street runoff, that outfall to the environment.

The Kenwood Hills Subdivision Plat contains the following documentation:

*“When sanitary sewers are available, the then owners of the lots which can be served by an extension of said sanitary sewers agree to concur in such extensions and will assume their proportionate share of the cost of such extensions on an assessment basis.”*

In addition to the houses included in the petition area, the Kenwood Hills Community Pool has a pair of restrooms with an on-site treatment system. The pool water is not connected to the treatment system. The community pool, which is operated by the Kenwood Hills Cabana Club, was not included in the petition and ballot polling area. Since the recommended alignment will be adjacent to this property, it is recommended that the property be included in the assessment roll.

### Carriage Hill Subdivision (Coachlite Way)

24 of 26 residences in the subdivision are served by HSTS. The other two, 5746 Kenwood and 5710 Kenwood, are connected to a public sanitary sewer in Kenwood Road and are not part of the assessment area.

Carriage Hill Subdivision has public storm sewers and private HSTS effluent collector lines. Where the sewers are located outside of the public right of way, those sewers are situated in sewer easements. On the subdivision plat, the storm sewer easements are labeled “Sewer Easement” and the effluent line easements are labeled “Private Sewer Easement.”

The plat contains the following documentation:

#### *“Private Sewer Easements*

*The Board of County Commissioners of Hamilton County do not accept any private sewer easements shown on this plat and the County of Hamilton is not obligated to maintain, repair, or operate any private sewer line within the subdivision. Operation and maintenance of all private sewer lines within the subdivision is the obligation of the owners of the lots in the subdivision using the sewer lines.”*

A few of the lots discharge to the environment without using the private sewers.

Note that 5746 and 5710 Kenwood Road, which are included in the subdivision but not in the assessment area, have private sewer easements. These properties will be important to the project if the private sewers become part of the assessment project; see Sections 4.1.2 and 4.1.3.

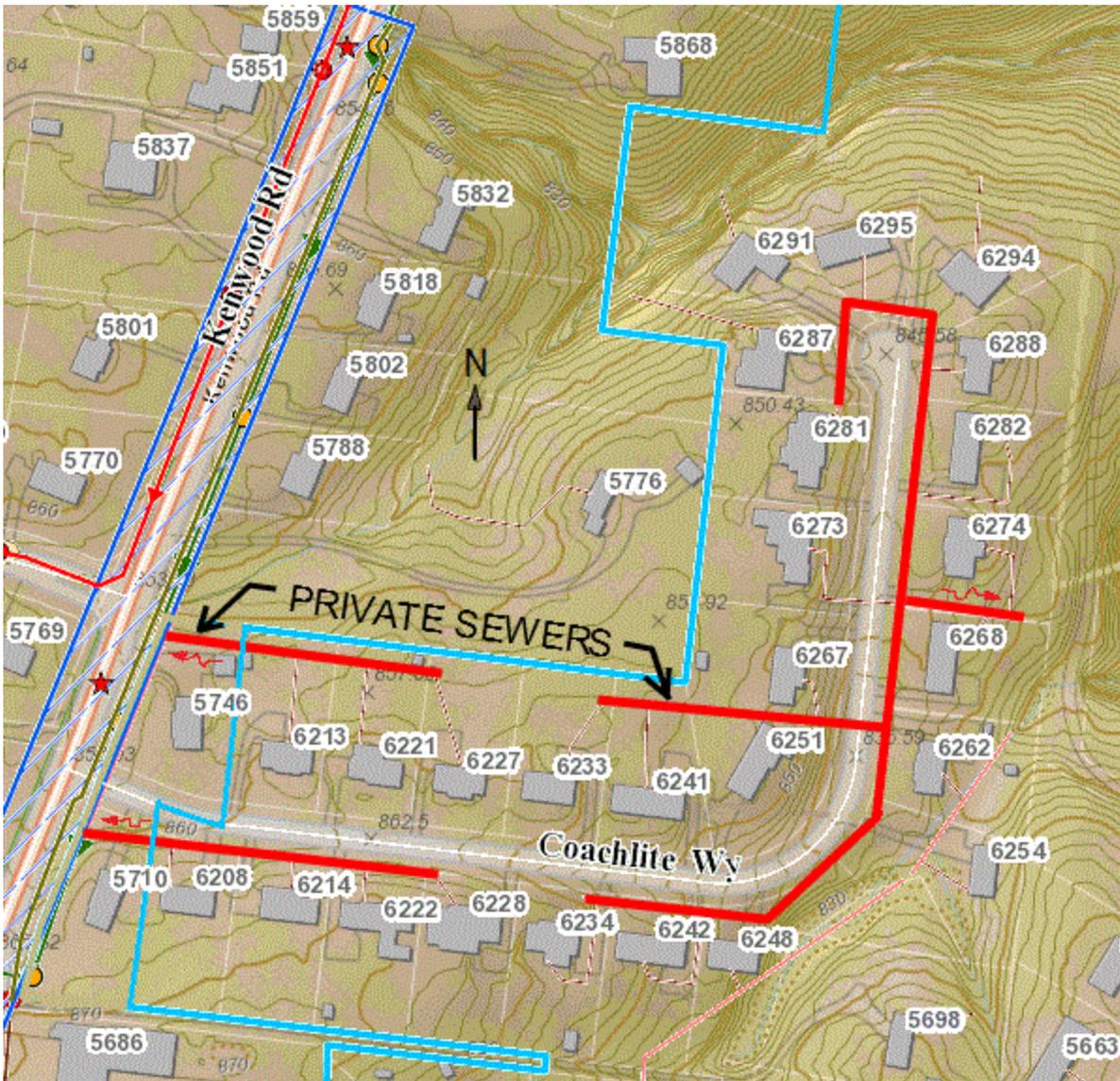


Figure 3 - Existing private sewers in Carriage Hill subdivision

## Section 3 – Project Objectives

### Section 3.1 The “Big Picture”

As stated in section 2.1 above, according to Section 1805 of the MSD Rules and Regulations, “It is the policy of the Board of County Commissioners of Hamilton County, Ohio to encourage public sewers and to finance sewer improvements which provide local service by levying special assessments on the properties receiving benefit from a public sewer improvement. “ (Additional rules about the process can be found in Section 1805 of the MSD Rules and Regulations).

The 2009 Final Wet Weather Improvement Program endorses the Home Sewage Treatment System Elimination Program and includes a budget for this purpose. The Home Sewage Treatment System Elimination Program has been in place for many years.

### Section 3.2 Project Objectives

#### 3.2.1 Project Objectives Established Prior to the Planning Effort

The objective of this project is to provide sanitary sewer service to existing houses in the project area that are served by HSTS.

#### 3.2.2 Project Objectives Established During the Planning Effort

During the planning effort, the community pool was added to the assessment sewer area.

#### 3.2.3 Unique Project Constraints, Influences, or Issues affecting the Project

none

### Section 3.3 Boundary of the Analysis

The boundary of the analysis includes the neighborhood of Carriage Hill Subdivision and Kenwood Hills subdivision, along with the surrounding existing sewers.

### Section 3.4 Project Coordination

#### 3.4.1 MSD Project Dependencies and Coordination Requirements

There are no known MSD project dependencies or coordination requirements.

There is an opportunity to combine part of this project with another nearby project during the design or right of way phase. The Camargo Canyon Pump Station Elimination project is located about 1000 feet north of this project. Both projects will include a railroad crossing. It may be possible to share a sewer segment crossing the railroad, or at least apply for permits for two crossings at the same time.

#### 3.4.2 Intergovernmental Coordination Requirements

This project must be coordinated with the City of Madeira. The City of Madeira maintains the streets and some of the existing sewers in the project area.

The City of Cincinnati maintains the streets at two of the potential tie-in points in Madisonville.

Hamilton County Public Health monitors and regulates the household sewage treatment systems in the project area. This sewer project is a high priority for the HCPH. Also, any impacts to operation of existing household sewage treatment systems during sewer construction and up until all homes are connected to the proposed sewers will be of interest to HCPH.

## Section 4 – Strategies

### Section 4.1 Strategy Development and Initial Screening of Strategies

#### 4.1.1 Strategy 0: Do Nothing

This strategy will leave one or more of the existing home sewage treatment systems along with associated collector lines in service, allowing them to discharge to the environment. Hamilton County Public Health has recommended installation of sewers to abate sanitary nuisance conditions in the neighborhood since at least 2001.

#### 4.1.2 Strategy 1: Connect existing private sewers in Carriage Hill subdivision to public sewer system, and abandon associated home sewage treatment systems.

The existing collector lines in Carriage Hill Subdivision (Coachlite Way) are private sewers residing in private sewer easements. These private sewers collect effluent from individual Home Sewage Treatment Systems and discharge it to the environment. According to CAGIS data collected by the Hamilton County Health Board, 20 houses have home sewage treatment systems that are connected to these private sewers, and 6 houses have home sewage treatment systems that discharge to the environment without a using the private sewers.

This strategy will keep the existing private sewers in service, and eliminate the need for home sewage treatment systems by connecting the private sewers to the public sewer system. The existing private sewers will remain private, and the property owners will be assessed for the connection.

This strategy is permitted by the MSD Rules and Regulations. Appropriate excerpts from the Rules and Regulations are copied below.

##### Section 204

“Any connection to a public or private sanitary or combined sewer within the jurisdiction of the District shall be subject to these Rules and Regulations and to any charges, rates, fees, and assessments which are or may be established by the Board as being applicable, and shall be made under permits issued by the Director.”

##### Section 202

“All public or private sanitary and combined sewers shall continue to be owned by the respective public or private owners now owning same until such time as the owner and the Board mutually agree to a transfer of ownership to the Board.

##### Section 208

“The owner of a private sanitary sewer shall be responsible for any future updates necessary to prevent excessive infiltration and/or inflow from entering the private sewer system.

Properties not already connected to the private sewers may be ordered to connect to the private sewers, in accordance with Ohio Revised Code section 6117.51:

The board of county commissioners, by resolution, may order the owner of any premises located in a sewer district in the county to connect the premises to the sewer for purpose of discharging sewage or other waste. This section does not apply to any

premises that are served by a common sewage collection system when the foundation wall of the structure from which sewage or other waste originates and the common sewage collection system are more than two hundred feet from the nearest boundary of the right-of-way within which the public sewer is located.

In the event that the property owners would like to convert the public sewers to private sewers, they may petition the Board of County Commissioners to accept them, subject to certain conditions as described in the MSD Rules and Regulations Section 1806. Conversion of private sewers to public sewers is not part of this strategy.

The advantage of this strategy is reduced construction costs for MSD and reduced private-side connection costs for property owners.

This strategy does not conform to the basis of the citizen petition that was supported by majority of property owners in that it would result in private sewers for the Carriage Hill subdivision. Maintenance of these private sewers would be the responsibility of the various properties connected to the private sewers. Furthermore, it would open up the possibility of a subsequent assessment project to upgrade the private sewers to MSD standards in order to convert the private sewers to public sewers. A potential two-phase approach would involve significant inefficiencies and impacts to the neighborhood due to repeated construction efforts.

#### **4.1.3 Strategy 2: Convert existing private sewers in Carriage Hill subdivision to public sewers in accordance with MSD Rules and Regulations, Section 1806.**

This strategy will convert the existing private sewers in Carriage Hill subdivision to public sewers and connect them to the sewer system as part of the local sewer assessment project. This will eliminate the need for Home Sewage Treatment Systems in Carriage Hill subdivision.

The existing private sewers reside in private sewer easements, not in the public right-of-way. Easements will be needed from 28 property owners, including owners of 5646 and 5610 Kenwood Road, which are in the subdivision but not in the assessment area. Section 1806 requires owners of the private sewer to dedicate and provide a recordable plat for any and all easements necessary for the maintenance and operation of the sewer, at no cost to the County.

The existing private sewers need to meet minimum standards for design and condition, per the MSD Rules and Regulation Section 1806. If the existing sewers do not meet the standards, then they must be upgraded or replaced.

The advantage of this strategy is that the public sewers will reside in the same alignment as the former private sewers, simplifying connections and facilitating elimination of the home sewage treatment systems.

In accordance with Section 1806, this strategy can be advanced only if all 28 Carriage Hill property owners agree to provide dedicated easements.

#### **4.1.4 Strategy 3: Construct “Shallow” public sanitary gravity sewers**

This strategy will construct public sanitary gravity sewers in Carriage Hill Subdivision and Kenwood Hills subdivision that are as shallow as possible in order to minimize construction costs, without regard for basement elevations. Any property owner that cannot connect to the proposed sewer by gravity will be obligated to pump to the public sewer.

**4.1.5 Strategy 4: Construct “Deep” public sanitary gravity sewers**

This strategy will construct public sanitary gravity sewers in Carriage Hill Subdivision and Kenwood Hills Subdivision that are deep enough to serve basements of adjacent houses. Property owners may connect by pump or by gravity as they choose.

**4.1.6 Strategy 5: Construct Public Low Pressure Sanitary Force Mains**

This strategy will construct public sanitary sewers using a technology commonly called “Low Pressure Force Mains.” This technology includes a public pressurized pipeline along with individual privately operated pumps. The advantage of this alternative is reduced construction cost compared to gravity sewers; the drawback is that there are operation and maintenance concerns for both MSD on the public sewers and for property owners on the private-side building sewers.

Section 613 of the MSD Rules and Regulations allows for consideration of low pressure force mains only when a gravity sewer is not reasonably possible:

“When the construction of a gravity sewer system is not reasonably possible as determined by the Director, an alternative low-pressure sewer system will be considered for approval. Where approved, the design and construction shall be in accordance with the District's latest specifications, standards, policies and procedures.”

**Section 4.2 Analysis of Strategies**

All of the strategies are viable.

Strategy 0, maintaining the Home Sewage Treatment Systems, is the default strategy, which will continue if none of the other strategies are supported by the residents and the Hamilton County Board of County Commissioners. Strategy 0 does not conform to the petition that was supported by a majority of benefited property owners. Strategy 0 would likely result in a Board of Health declaration of public nuisance at some time in the future as the project area has demonstrated nuisance conditions in at least two prior sanitary surveys. In such a scenario, the Board of County Commissioners would be compelled to install sewers.

Strategy 1, connection of the existing private HSTS effluent sewers to the proposed public sewer system, was ruled out as the strategy does not conform to the citizen petition. That is, the strategy would not provide public sewers to all properties included in the assessment district.

Strategy 2, conversion of the private sewers in Carriage Hill Subdivision to public sewers, is dependent on all 28 property owners providing dedicated easements for conversion of the private sewers to public. It may be moved forward only if the property owners dedicate the required easements prior to design.

Strategies 3 and 4, construction of public gravity sewers, should be moved forward as long as the cost is not excessive.

Strategy 5, construction of Public Low-Pressure Force Mains, may be used only where gravity sewer installation is not reasonably possible.

## Section 5 – Alternatives

### Section 5.1 Alternative Development Methodology

Alternatives are developed from the strategies by laying out proposed sewers on a drawing.

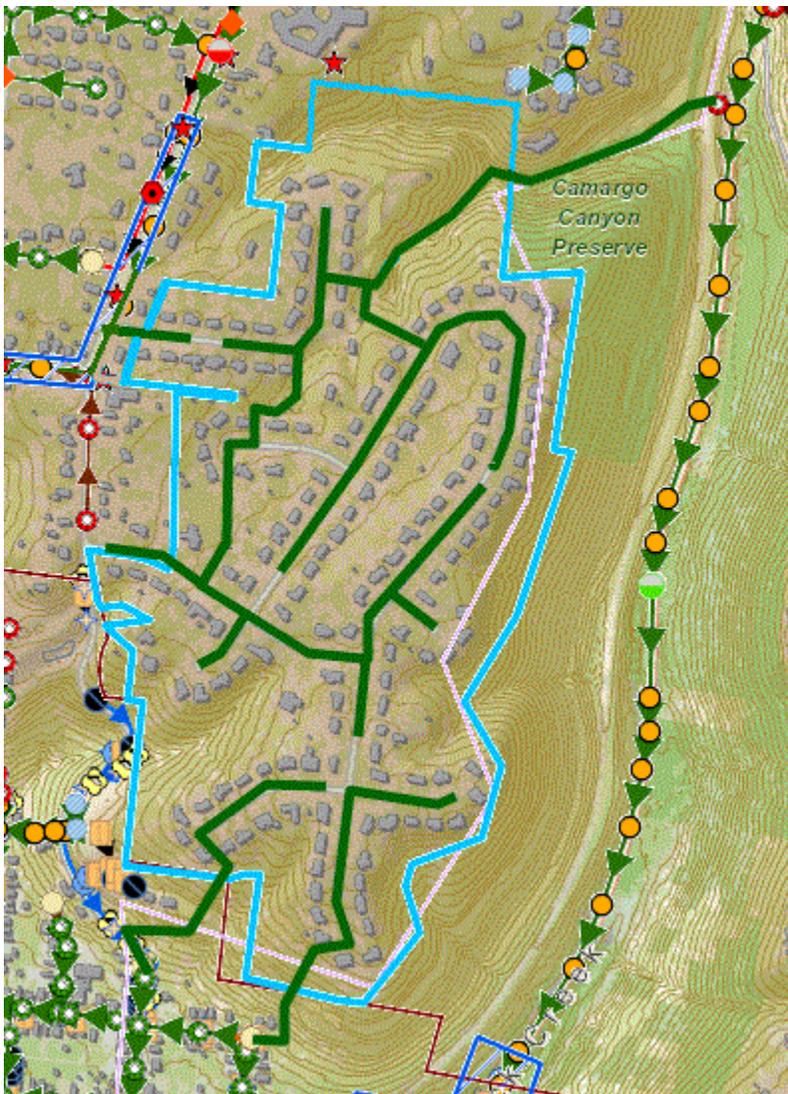
### Section 5.2 Alternative Analysis Methodology

Alternatives are analyzed based on cost with consideration of social and environmental factors.

### Section 5.3 Alternatives

#### 5.3.1 Alternative "1"

This alternative will construct public gravity sewers to serve all of the properties in the project area. Some of the properties will need to pump to the gravity sewer in the street.



Approximate quantities for this alternative include:

- 12,300 feet of 8" diameter gravity sewer up to 20 feet deep
- Laterals to right-of-way line for 159 houses
- 1 Lateral to the community pool

***Regulatory requirements/restrictions***

This alternative will require support of the Hamilton County Board of County Commissioners after a public hearing process. This alternative will require a Permit to Install (PTI) from Ohio EPA.

***Impact to WWIP schedule/Impact on other work in the sewershed***

None

***Key Stakeholders***

Key Stakeholders include the benefited property owners, the City of Madeira, Hamilton County Public Health, and the MSD Wastewater Collection Division.

***TBL analysis***

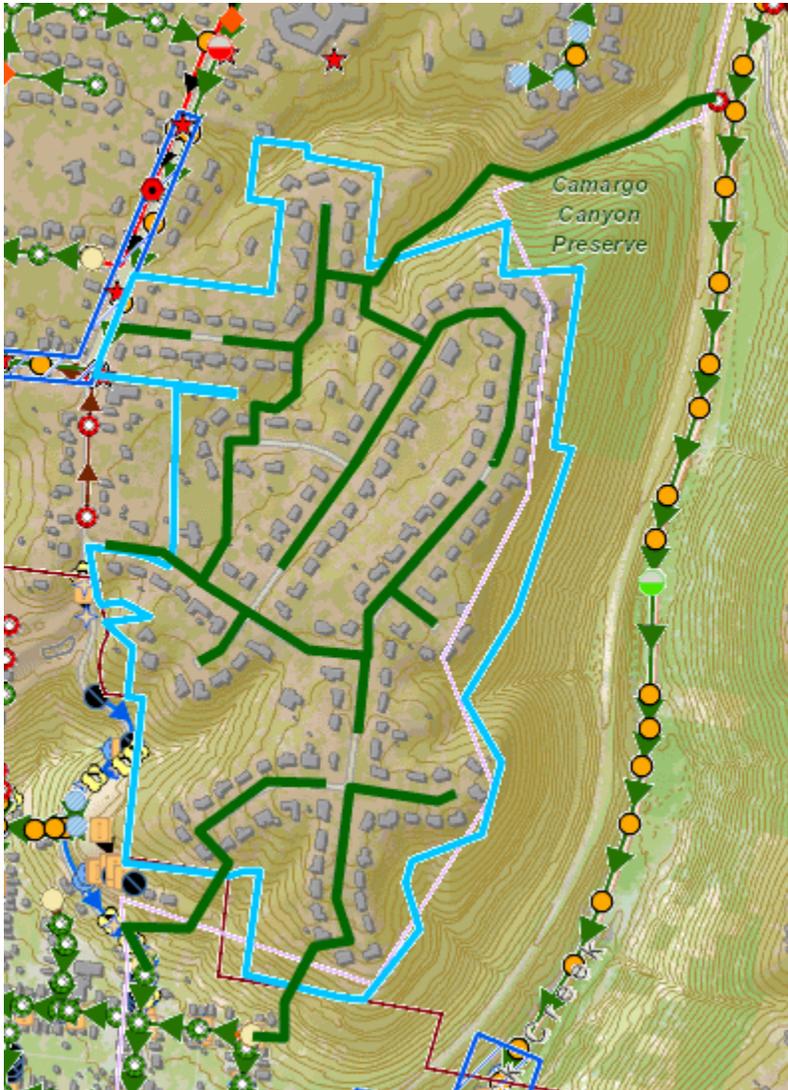
The estimated construction cost of this alternative is \$5,830,000, and the estimated project cost is \$8,143,000.

***Risk***

This alternative includes deep gravity sewers, sewers on steep hillsides, and a sewer in a narrow ravine, all posing construction and maintenance challenges. For more on the ravine sewer, see section 6.3.2.

### 5.3.2 Alternative "2"

This alternative is the same as Alternative 1, except that the proposed sewers on Vistaridge and Mapleridge ("the loop") will be built as shallow as possible, without regard for the elevation of adjacent basements, in order to minimize cost. Compared to Alternative 1, more properties will have to employ a pump to lift wastewater to the public gravity sewer.



Approximate quantities for this alternative include:

- 12,300 feet of 8" diameter gravity sewer up to 20 feet deep
- Laterals to right-of-way line for 159 houses
- 1 lateral for the community pool

#### ***Regulatory requirements/restrictions***

This alternative will require support of the Hamilton County Commissioners after a public hearing process. This alternative will require a Permit to Install (PTI) from Ohio EPA.

***Impact to WWIP schedule/Impact on other work in the sewershed***

None

***Key Stakeholders***

Key Stakeholders include the property owners, the City of Madeira, Hamilton County Public Health and the MSD Wastewater Collection Division.

***TBL Analysis***

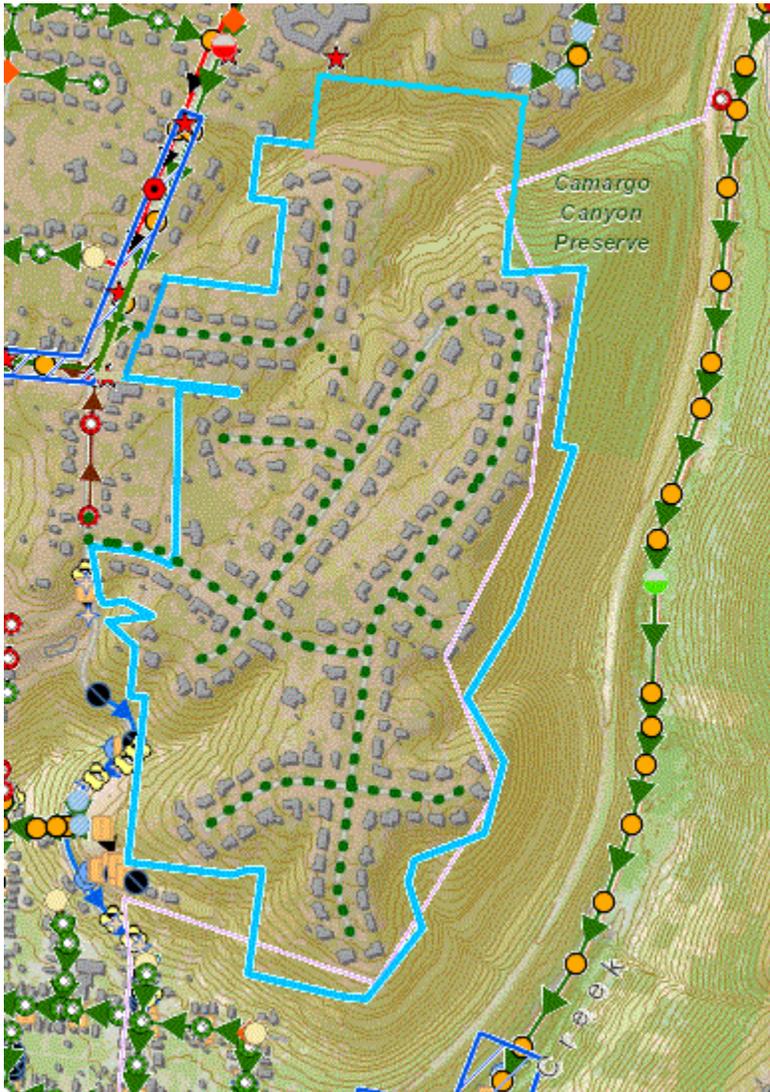
The estimated construction cost of this alternative is \$5,073,300, and the estimated project cost is \$7,201,200.

***Risk***

This alternative includes deep gravity sewers, sewers on steep hillsides, and a sewer in a narrow ravine, all posing construction and maintenance challenges. For more on the ravine sewer, see section 6.3.2.

### 5.3.3 Alternative "3"

This alternative will construct Low Pressure Force Mains to serve the entire project area. Special provisions would be required to provide sewer service to the community pool.



Approximate quantities for this alternative include:

- 9,600 feet of Low Pressure Force Main
- Laterals to right-of-way line for 159 houses

#### ***Regulatory requirements/restrictions***

This alternative will require support of the Hamilton County Board of County Commissioners after a public hearing process. This alternative will require a Permit to Install (PTI) from Ohio EPA.

#### ***Impact to WWIP schedule/Impact on other work in the sewershed***

None

***Key Stakeholders***

Key Stakeholders include the property owners, the City of Madeira, Hamilton County Public Health and the MSD Wastewater Collection Division.

***TBL analysis***

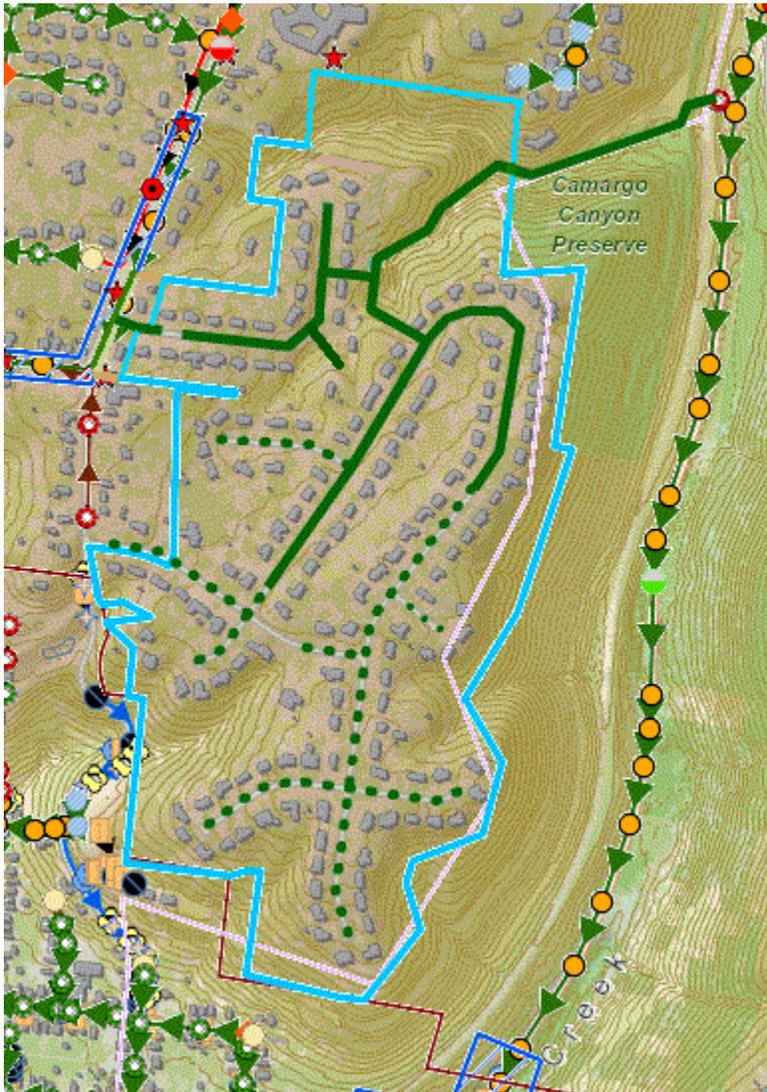
The estimated construction cost of this alternative is \$1,772,000, and the estimated project cost is \$2,568,190.

***Risk***

This alternative includes Low Pressure Force Mains, which present operation and maintenance challenges for MSD and for property owners.

### 5.3.4 Alternative "4"

This alternative will construct gravity sewers in the northern part of the project area, and construct low pressure force mains in the southern part of the project area.



Approximate quantities for this alternative include:

- 7,400 feet of 8" diameter gravity sewer
- 5000 feet of Low Pressure Force Main
- Laterals to right-of-way line for 159 houses

#### ***Regulatory requirements/restrictions***

This alternative will require support of the Hamilton County Board of County Commissioners after a public hearing process. This alternative will require a Permit to Install (PTI) from Ohio EPA.

***Impact to WWIP schedule/Impact on other work in the sewershed***

None

***Key Stakeholders***

Key Stakeholders include the property owners, the City of Madeira, and the MSD Wastewater Collection division.

***TBL analysis***

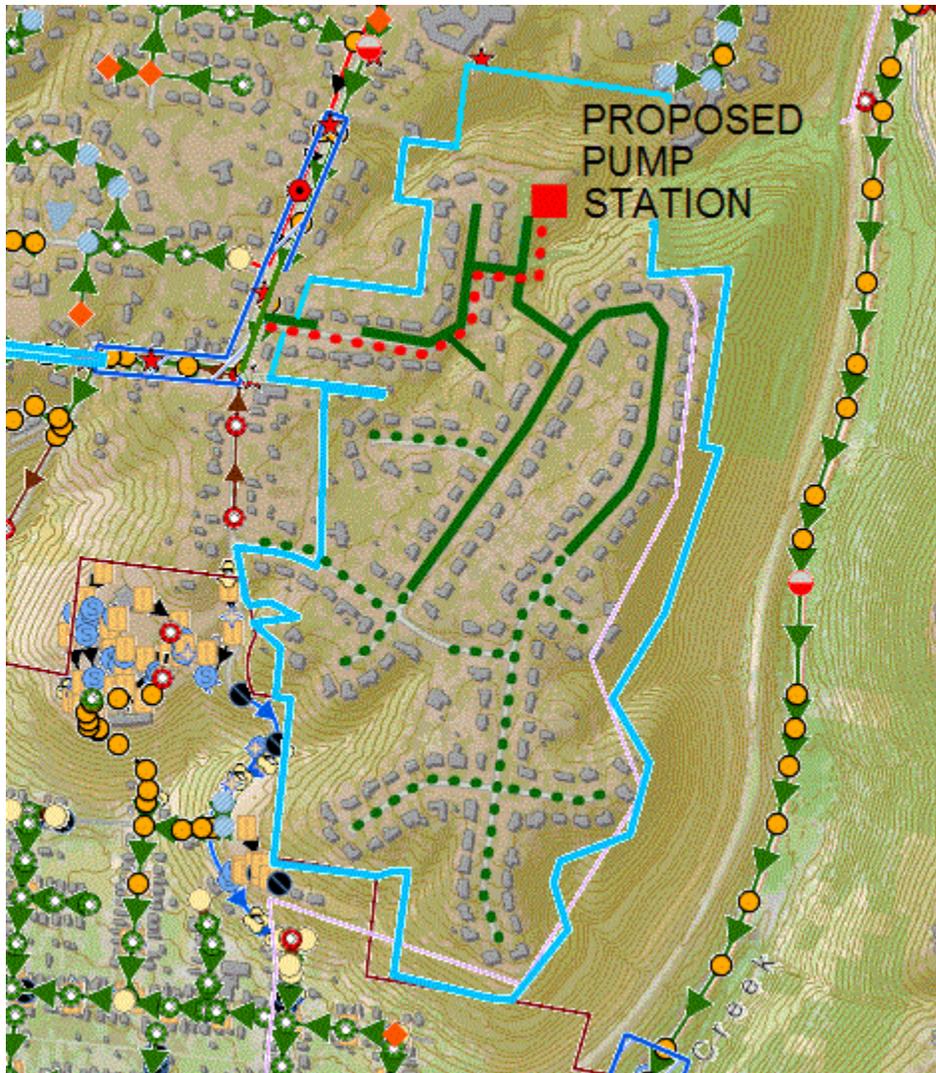
The estimated construction cost of this alternative is \$3,440,200, and the estimated project cost is \$4,957,200.

***Risk***

This alternative includes a sewer in a narrow ravine. This alternative includes Low Pressure Force Mains, which presents operation and maintenance challenges. For more on the ravine sewer, see section 6.3.2.

### 5.3.5 Alternative “1A, 2A, and 4A”

Alternatives 1, 2, and 4 each include a proposed sewer along the ravine near the Kenwood Hills community pool. This set of alternative considers a pump station near the community pool instead of a gravity sewer along the ravine. The pump station will discharge to an existing gravity sewer in Kenwood Road via a new force main.



Pump stations are subject to MSD Rules and Regulations Section 701:

#### Section 701 Approval of Wastewater Lift Stations

Approval of wastewater lift stations will be limited to providing service only to those areas where a gravity sanitary sewer system is not feasible as determined by the Director. The Director will consider the following factors in determining feasibility:

- A. 50-year economic analysis;
- B. Interest rate;
- C. Offsetting environmental concerns;
- D. Availability of necessary easements;
- E. Other items or factors applicable to the specific situation.

Prior to approval, a 50-year economic analysis must be submitted by the developer to the District with the request for concept approval.

The District will not approve a wastewater lift station for less than 20 single-family units, or equivalent.

Flow shall be calculated using the MSD Design Standards for estimating sanitary sewage flow from new developments (per Section 601 (A.)).

Prefabricated wastewater lift stations shall be a product of a manufacturer who has demonstrated its abilities in the field. Such stations must comply in all respects with the requirements of the State of Ohio Environmental Protection Agency in effect at the time detailed plans are approved. Additionally, such stations shall be subject to such requirements as the District may indicate based upon safety, layout, access, and auxiliary equipment required for proper operation and maintenance, or any other item peculiar to that station, which may be required in the judgment of the Director.

Following is a preliminary cost comparison between the proposed gravity sewer and pump station:

**Ravine sewer:**

Ravine sewer construction proportioned (1910 feet /7362 feet)(\$3,440,185)= \$892,522

Ravine right of way (Part A) cost: \$110,950

Design 0.252 \* \$892,522 = \$224,915

Construction Services 0.03 \* \$892,522 = \$26,775

Contingency 0.10 \* \$892,522 = \$89,252

Total ravine sewer (approximate) = \$1,344,414

Source: Estimate 10190315 PL A4 E1 R0, proportioned

**Pump station and force main construction cost:** \$750,000 Source: MSD ICE estimating wizard

**Pump station Operation and Maintenance cost, 50-year Net Present Value**

Source: Taken from sample of pump station operations and maintenance costs, from recent Business Case Evaluations.

Bahama Gardens pump station: \$133,449 per year

Beckman pump station: \$47,000 per year

Homelawn pump station: \$19,152 per year

Spring Leaf pump station: \$39,500 per year

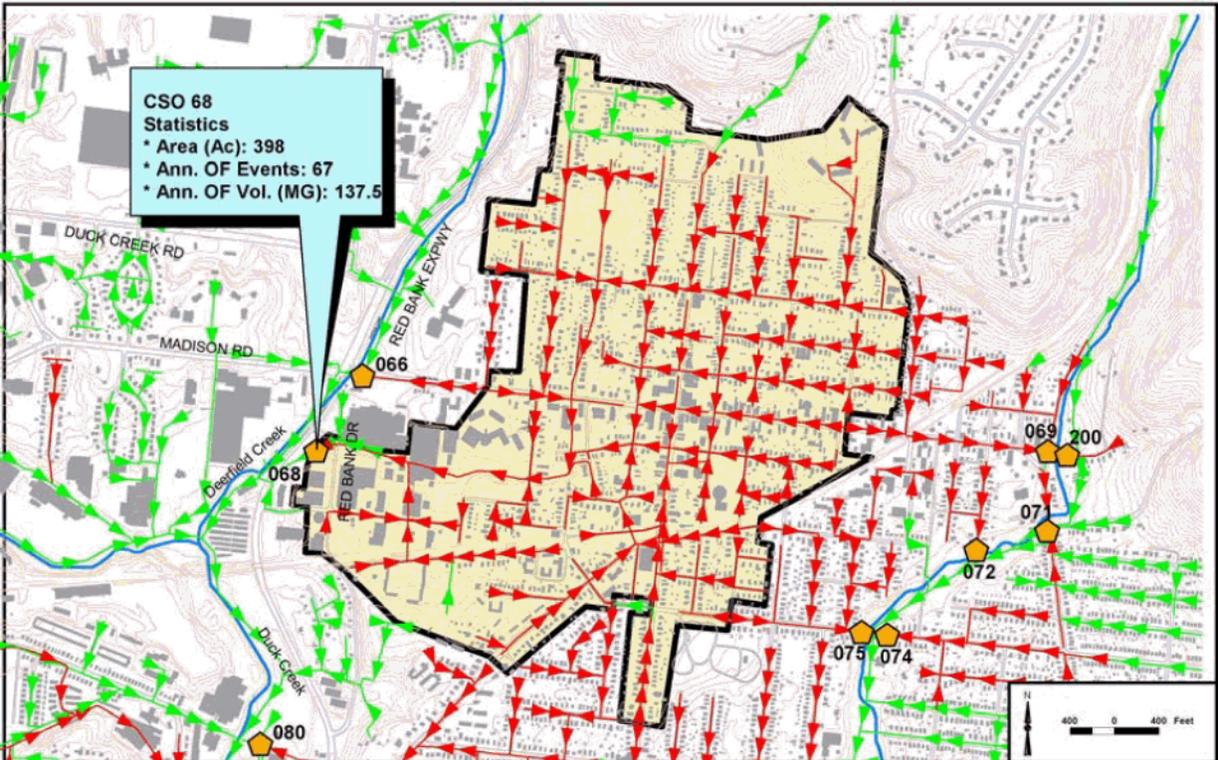
Say \$40,000. 50-year Net Present Value for interest 5%, inflation 3%: \$1,250,000

**Preliminary cost comparison results:**

Ravine sewer =	\$1,344,000
Pump station + 50 years O&M = \$750,000 + \$1,250,000 =	\$2,000,000

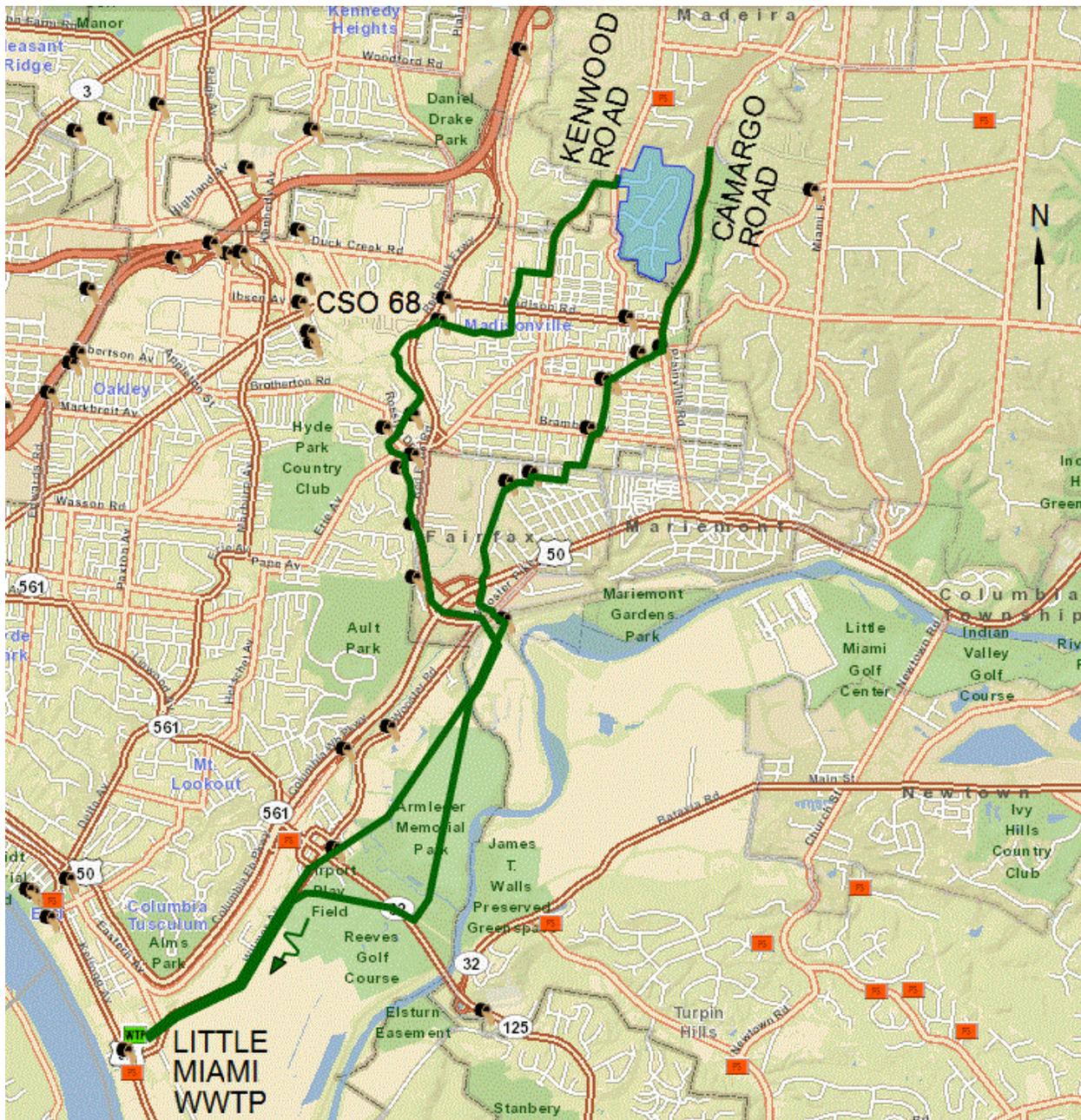
The sanitary sewer in Kenwood Road leads to a combined sewer which is intercepted at CSO 68. According to the 2006 Wet Weather Improvement Program volume 9, Little Miami CSO Study Area Alternatives Development Report, CSO 68 overflows 67 times per year with an annual overflow volume of 138 million gallons. Also, there are numerous records of sewage back-ups and overflowing manholes along the way to the CSO. The interceptor then flows south approximately 5 miles to the Little Miami Wastewater Treatment Plant.

### CSO 68 – Nu-Tone Parking Lot



The proposed ravine sewer leads to the 30" Camargo Road sanitary sewer. This sewer is an interceptor which passes several CSO's on the way to the Little Miami Wastewater Treatment Plant.

The main difference between the Kenwood Road route and the Camargo Road route are that the Kenwood Road route includes a combined sewer in an area with a history of complaints while the Camargo Road sewer does not. For this reason, the Camargo Road route is preferred.



Since both the financial analysis and the hydraulic situation favor the gravity sewer along the ravine, the pump station alternative is not recommended.

## Section 5.4 Summary Comparison of Alternatives

Alternate	HSTS eliminated	Value Project Cost/HSTS	Triple Bottom Line					Risk	Comments
			NPV	Project Cost	O&M (unit/yr)	Env. Score	Social Score		
1 – Deep Gravity	159 + pool	\$50,900		\$8,146,600		20	24	Includes ravine sewer	
2 – Shallow Gravity	159 + pool	\$45,300		\$7,201,200		20	24	Includes ravine sewer	
3 – Low Pressure Force Main	159	\$16,200		\$2,568,200		20	4	O&M concerns	
4 – Shallow Gravity and Low Pressure Force Main hybrid (Recommended)	159 + pool	\$31,200		\$4,957,200		20	4	Includes ravine sewer; O&M concerns	
1A – Pump Station alternative	159					20	-6		Not recommended; conflicts with MSD rules and regs
2A – Pump Station alternative	159					20	-6		Not recommended; conflicts with MSD rules and regs
4A – Pump Station alternative	159					20	-6		Not recommended; conflicts with MSD rules and regs

The community pool has an on-site treatment system that serves a pair of restrooms.

**Level of Cost Estimate**

The foundation of the turnover is the Association for the Advancement of Cost Engineering (AACE) International Class IV estimate. The details of this estimate are presented in the 2005 AACE International document: “Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries (TCM Framework 7.3 – Cost Estimating and Budgeting)”. A summary of the Class IV estimate is presented below; for more detailed see the 2005 AACE document.

**Description:**

- Forms the basis for budget authorization, appropriation and/or funding
- Engineering is from 10% to 40% complete
- Comprises at a minimum – process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists.

**End Usage:**

- Typically prepared to support full project funding requests, and become the first project phase “control estimates” against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates.

**Expected Accuracy Range:**

- Typical accuracy ranges are -10% to -20% on the low side and +10% to 30% on the high side depending on the complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination.

## Section 5.5 Recommendation

The recommended alternative is **Alternative 4**. This alternative minimizes the length of proposed Low Pressure Force Main while keeping the cost reasonable.

Most of the houses that drain toward the street will be served by a gravity sewer, while most of the houses that drain away from the street will be served by Low Pressure Force Mains. This is a balanced design, as many of the houses to be served by Low Pressure Force Mains are likely to be pumped anyway in order to discharge sewage from the backyard to the front.

Alternative 3, although less expensive, is not recommended because it serves the entire project area with Low Pressure Force Mains, which may be considered only when a gravity sewer is not reasonably possible. The maximum number of houses connected to a single Low Pressure Force Main in Alternative 4 is about 50, whereas the maximum number of houses connected to a single Low Pressure Force Main in Alternative 3 is about 130.

Alternatives 1 and 2 are significantly more expensive and are therefore not recommended.

Alternative 4 addresses the WWIP goal of eliminating home sewage treatment systems. Alternative 4 is feasible within MSD minimum standards. Alternative 4 will require a PTI and new easements. Alternative 4 will not generate connection credits.

Alternatives 1A, 2A, and 3A, the pump stations alternatives, are not recommended because MSD policy prohibits construction of new pump stations if a gravity option is available.

A value engineering study is not recommended because the estimated construction cost is less than \$5 million.

## Section 6 – Execution Plan

### Section 6.1 Probable Opinion of Project Costs

#### 6.1.1 Cost Estimate

A planning level (class IV) estimate was completed for the recommended alternative by the cost estimating Section:

Planning/Study	\$0
Design	\$339,100
Pre-Construction Services	\$103,200
Miscellaneous Expense	\$258,500
Right of Way	\$274,100
Construction	\$3,440,300
Contingency	\$344,000
Construction Services	\$112,100
Interest/Financing	\$86,000
<b>Total Project Cost in (2015 dollars)</b>	<b>\$4,957,200 *</b>

Right of way costs have been provided by MSD's Right-of-Way Section.

\*Note: the cost estimate was prepared by Bruce Hemphill of the MSD cost estimating section. After the Alternatives Analysis phase, Bruce Hemphill left MSD. Subsequent changes to the concept plan, including details of the proposed Ravine Sewer, were not specifically accounted in the cost estimate.

#### 6.1.2 Legislative History

There is no prior known legislation associated with this project.

#### 6.1.3 Proposed Legislation & Funding Sources

The proposed funding source is MSD Capital Improvement Funds. Design funding is included in the 2016 CIP book conditioned upon acceptance of the Business Case Evaluation by County. Construction funding is proposed for 2019.

### Section 6.2 Schedule

The proposed schedule includes the following steps and proposed dates:

Design - 2016

Easement Acquisition – 2016 to 2018

Construction - 2019

This is a WWIP project with no stipulated penalties.

The consequence associated with delay of this project is that the effluent from the Home Sewage Treatment Systems will continue to discharge to the environment. This condition also detracts from quality of life within the project area and reduces economic value of the properties in the project area.

## Section 6.3 Scope

### 6.3.1 Summary of Project Scope

The scope of this project is to provide sewer service to the properties in the project area.

### 6.3.2 Functional Requirements and Design Basis

#### *Design Criteria*

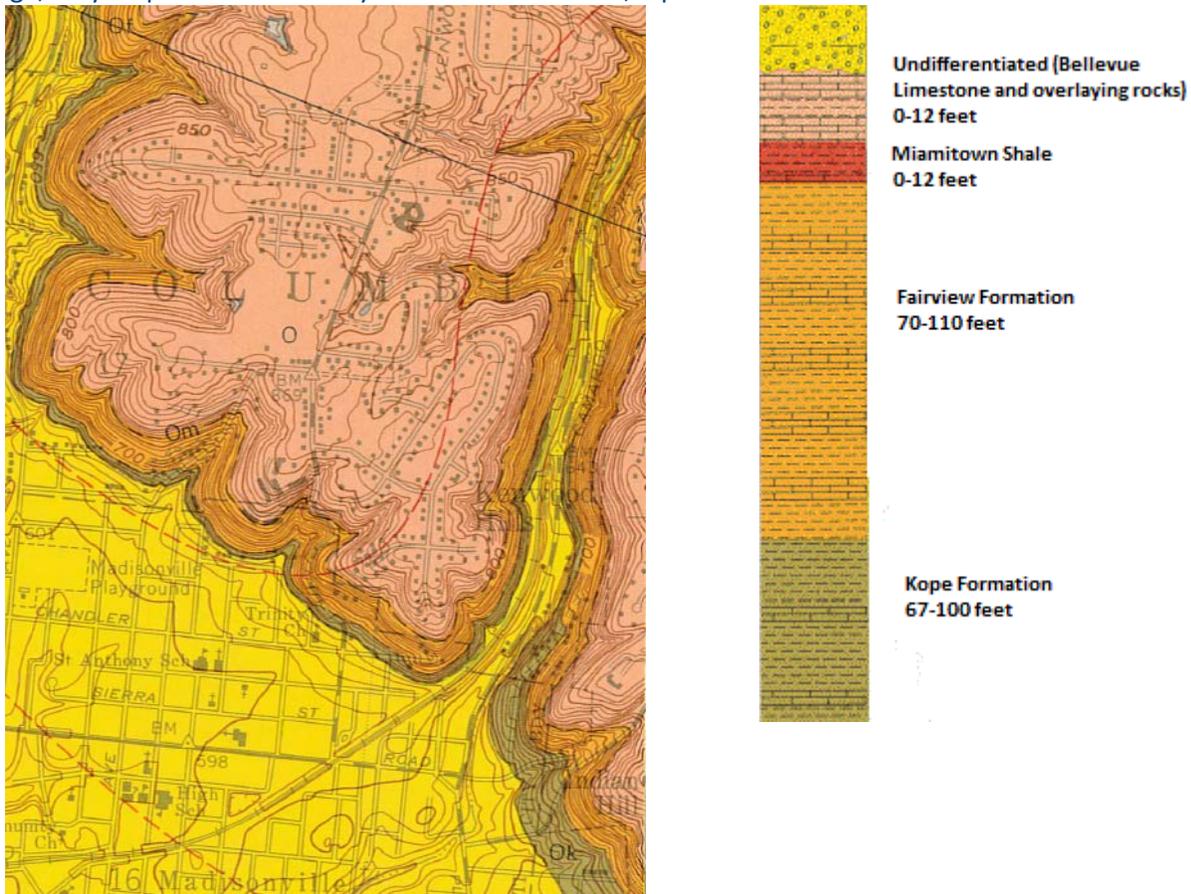
The proposed sewers shall be designed per the MSD Rules and Regulations.

#### *Alignment and Depth of Sewer*

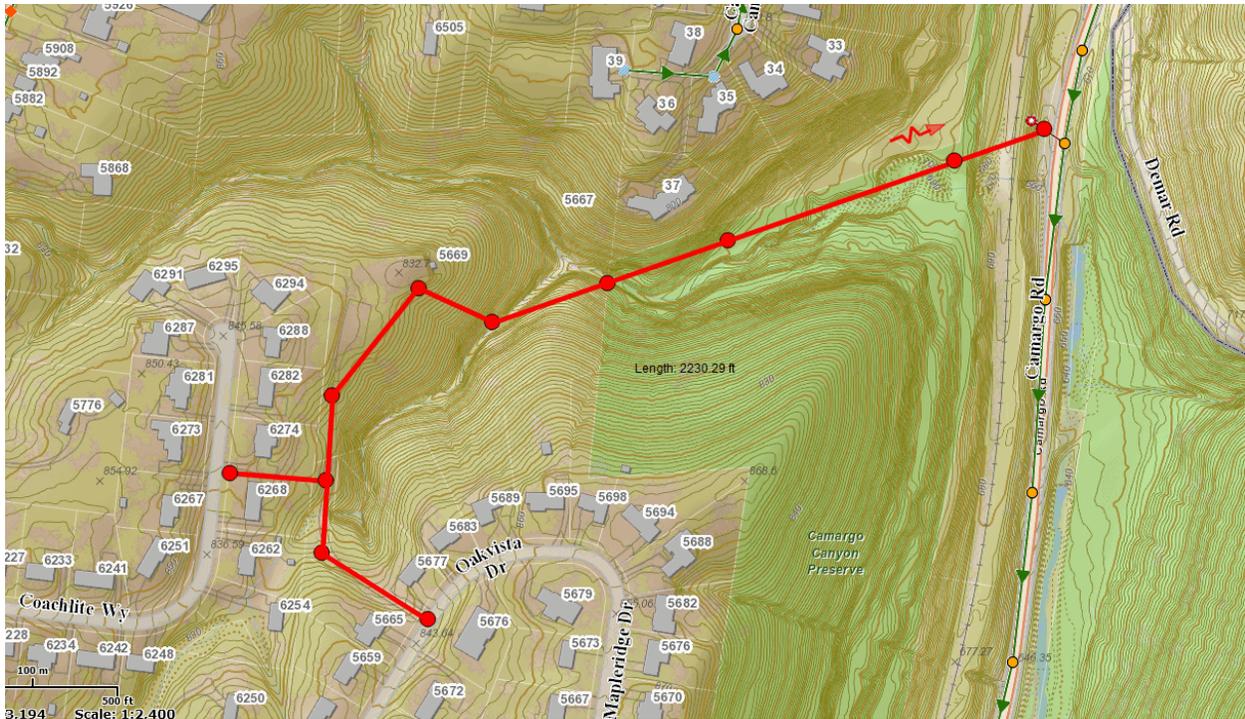
The alignment of the proposed sewer is shown in the sketch in Section 5.3.4, Alternative 4. The depth of the proposed gravity sewer has not been determined, but it should be deep enough to serve adjacent properties by gravity as long as the depth is not excessive.

The proposed sewer along the ravine will likely be the most challenging to design and construct. The ravine has very steep cross slopes. Topography indicates possible hillside slips, former quarrying operations, or both, in the lower half of the ravine. The proposed alignment includes a crossing of a former interurban railway right-of-way (Cincinnati & Columbus), as well as an active railroad (CSX Midland sub). A permit from CSX will be required.

According to Bedrock Geology of the Cincinnati East quadrangle, Robert H. Osbourne, 1974, Ohio Department of Natural Resources, Division of Geological Survey, the bedrock in the ravine is Bellevue Limestone, Miamitown Shale, and the Fairview Formation. These are generally stable geologic features, except where the hillsides have been disturbed by cutting and filling. The Kope Formation, which is associated with hillside slippage, may be present at the very bottom of the ravine, if present at all.



Due to the difficult topography, potential unstable hillsides, and an active railroad crossing, the use of trenchless technology for the lower half of the ravine should be considered. Horizontal Directional Drilling may be an appropriate technology. The elevation drop is great enough that minimum slope will not likely be an issue. A 12" branch is available as a tie-in point on the 30" Camargo Road trunk sewer.



Long trenchless installations in Cincinnati bedrock are feasible. Another project, Aston Oaks development, had a bored section of 18" sewer 1318' long constructed in 1996.

Source:

WWE:\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Planning 2015\ 03637G-007 Aston Oaks boring example

Dan Liotti of Midwest Mole contributed the following:

"Approximately 170' of fall from the pool to Camargo Road, Horizontal Directional Drilling (HDD) would work very well for this project. HDD is generally not used on gravity sewers due to the relatively flat slopes required but as this sewer could have slopes in excess of 10%, HDD would work well. Standard auger boring will be required under the RR tracks to install a steel casing and place the sewer inside of the casing.

Your alignment looks good.

The project could be split up into 3 crossings.

1. A short directional drill from the Pool to the first manhole.
2. A long directional drill from the first manhole to the RR Tracks
3. An auger bore under the RR track and then open cut into the existing manhole.

I would anticipate the following costs for the project:

1. Installing 8" HDPE pipe via HDD - \$150/foot
2. Installing approximately 100 L.F. of 24" steel casing under the RR tracks for an 8" sewer - \$350/foot

To these prices you would need to add the cost of furnishing and installing the manholes."



***Permits Anticipated***

Anticipated permits include a Permit to Install (PTI) from the Ohio EPA, a Railroad Permit from CSX for the proposed crossing, and a street opening permit from the City of Madeira.

A Nationwide Permit 12 is anticipated to cover the proposed ravine sewer; however, if the proposed sewer cannot meet the requirements of the Nationwide Permit 12, 401/404 permit may be required.

***Temporary By-Pass Plan***

The proposed sewer is new; the need for temporary by-pass pumping is not anticipated.

**6.3.3 Work Performed in Planning/Anticipated Work in Design*****Utility Information***

The project area contains underground gas mains, water mains, storm sewers, and home sewage treatment system effluent lines.

Duke Energy gas main drawings from 2008 are located in the project electronic file. Water mains are shown on CAGIS. Storm sewers and home sewage treatment effluent lines are shown on CAGIS.

***Survey and Fieldwork***

No land survey or fieldwork was performed during the planning phase of this project.

***Geotechnical***

No geotechnical work was performed for the planning phase of this project. Geotechnical reports for two nearby projects, the Kenwood Pump Station Elimination and the Camargo Canyon Pump Station Elimination are available in the project electronic file.

***Monitoring and Modeling***

No modeling was performed during the planning phase of this project.

***Environmental Site Assessment***

A Phase 1 Environmental Site Assessment was submitted to Matt Mullin of the City of Cincinnati Office of the Environment and Sustainability on 12-22-2015 and approved on 12-23-2015. A copy of the approval e-mail is in the project electronic file.

***Misc. Reports, Studies, Analysis, Etc.***

A study for the presence of federally or state protected species will need to occur in the design phase.

## Section 6.4 Roles and Responsibilities

The Technical Review Committee is composed of the following people:

Mark Belcik  
 Bill Wooton  
 Rob Kneip  
 Bill Lutz  
 Nate Tetrick  
 Deron Beer, WWC Reviewer  
 Tom Crawford  
 Pete Caldwell

The public portion of the project will be designed and constructed by MSD Engineering Management Division, and will be maintained by MSD Wastewater Collection Division. The private-side building sewers will be designed, constructed, and maintained by the individual property owners.

MSD Wastewater Collection Division has agreed to maintain the public assets.

## Section 6.5 Project Risks

### 6.5.1 Wet Weather Flows

Wet weather flows are not anticipated to be a concern.

### 6.5.2 Easements

Alternative 4 includes new easements, which may cause a schedule constraint if the easements require appropriation.

### 6.5.3 Geotechnical

This project includes normal construction risks associated with unknown underground soil conditions.

### 6.5.4 Noise, Odor, and Traffic

This project is located in a residential neighborhood. Excessive noise during construction is a concern. Odors are anticipated to be a concern at the outlet of the various Low Pressure Force Mains; proper design of the force mains should mitigate odors. Traffic control is anticipated to be a concern during construction, particularly on Kenwood Hills Drive between Oakvista Drive and Kenwood Road, and on the various no outlet streets, because alternate routes are not available. Flagmen may be required. Continued operation of the household sewage treatment systems and collector lines during construction and until all homes are connected to the sewer must be maintained.

### 6.5.5 Railroad Crossing

Alternative 4 includes a railroad crossing, which may cause a schedule constraint if the easement across railroad property or the railroad permit is delayed.

### 6.5.6 Cost estimate for ravine sewer

The cost estimate for the ravine sewer as listed in this document did not specifically include any trenchless construction, stream restoration, storm sewer, or endangered species studies. Care should be taken to ensure that all costs associated with the ravine sewer alignment are taken into account.

## Section 7 – MSD Review Signature Sheet

Submitted for Approval: Casey Walter 3-21-2016  
Casey Walter Date

## Engineering Management &amp; Planning Division, Collection Capital Asset Planning Section:

Concurrence: \_\_\_\_\_  
Tom Crawford, Principal Engineer Date

## Nominator/Operating Group:

Concurrence: Deron Beer 4-21-16  
Please see attached WWC comments. Deron Beer, WWC Reviewer Date

Concurrence: Mike Pittinger 4-21-16  
Please see attached comments. Mike Pittinger, Superintendent, WWC Date

## Engineering Management &amp; Planning Division, Conveyance Design Section:

Concurrence: Bill Wooton 4-22-2016  
Bill Wooton, Principal Engineer Date

## Engineering Management &amp; Planning Division:

Approval: Pat Arnette 4/25/16  
Pat Arnette, Sewers Chief Engineer Date

## Section 8 - Major References

### Petition Location:

Status: Completed

WWE\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Petition Polling 2014\

### Cost Estimate Location:

Status: Completed

WWE\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Planning 2015\cost estimates\10190315 PL A4 E1 R0 Estimate Report\Kenwood Hills Assessment Petition Signatures

Note: the cost estimate was prepared by Bruce Hemphill of the MSD cost estimating section. After the Alternatives Analysis phase, Bruce Hemphill left MSD. Subsequent changes to the concept plan, including details of the proposed Ravine Sewer, were not specifically accounted in the cost estimate.

### Plan & Profile Location:

Status: Not Applicable

### Modeling Report Location:

Status: Not Applicable

### Environmental Site Assessment Phase 1 location

Status: Completed

WWE\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Planning 2015\ESA Phase 1

WWE\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Planning 2015\ESA checklist

WWE\Assessments Local Sewers\zPROJECTS\PreDesign\KenwoodHills Local Sewer\Planning 2015\ESA phase 1 approval

**Section 9 – Appendix A****Correspondence with Dan Liotti of Midwest Mole**

**From:** Dan Liotti [mailto:danl@midwestmole.com]  
**Sent:** Tuesday, January 19, 2016 12:05 PM  
**To:** Walter, Casey  
**Cc:** Dan Liotti  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer

Hi Casey,

Looking at your project and that the fact that you have some tremendous elevation change with this project. Approximately 170' of fall from the pool to Camargo road, Horizontal Directional Drilling (HDD) would work very well for this project. HDD is generally not used on gravity sewers due to the relatively flat slopes required but as this sewer could have slopes in excess of 10%, HDD would work well. Standard auger boring will be required under the RR tracks to install a steel casing and place the sewer inside of the casing.

Your alignment looks good.

The project could be split up into 3 crossings.

1. A short directional drill from the Pool to the first manhole.
2. A long directional drill from the first manhole to the RR Tracks
3. An auger bore under the RR track and then open cut into the existing manhole.

I would anticipate the following costs for the project:

1. Installing 8" HDPE pipe via HDD - \$150/foot
2. Installing approximately 100 L.F. of 24" steel casing under the RR tracks for an 8" sewer - \$350/foot

To these prices you would need to add the cost of furnishing and installing the manholes.

I hope this helps with your design. Please let me know if you have any additional questions.

Regards,

Dan Liotti

Have a Blessed Day

Daniel L. Liotti, P.E.  
CEO  
Midwest Mole, Inc.  
6814 W 350 N  
Greenfield, IN 46140  
Ph: 317-545-1335 ext. 112  
Fx: 317-545-1558  
[www.midwestmole.com](http://www.midwestmole.com)



**From:** Walter, Casey [<mailto:Casey.Walter@cincinnati-oh.gov>]  
**Sent:** Monday, January 18, 2016 9:05 AM  
**To:** Dan Liotti <[danl@midwestmole.com](mailto:danl@midwestmole.com)>  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer

The surface elevation at Camargo Road is about 660. The surface elevation at the community pool is about 830. The surface elevation of the stream just downhill from the community pool is about 760.

Thank You  
Casey Walter  
244-5533

**From:** Dan Liotti [<mailto:danl@midwestmole.com>]  
**Sent:** Saturday, January 16, 2016 12:25 PM  
**To:** Walter, Casey  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer attachment 1/3

Casey,

I need to know what the maximum slope of the sewer can be from the pool to Camargo road can be to determine if directional drilling is an option. Do you know what the elevation is where the sewer will start at the pool and the elevation of the existing sewer where it will tie into at Camargo Road?

Thanks

Dan

Have a Blessed Day

Daniel L. Liotti, P.E.  
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Greenfield, IN 46140  
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**From:** Walter, Casey [<mailto:Casey.Walter@cincinnati-oh.gov>]  
**Sent:** Wednesday, January 13, 2016 3:35 PM  
**To:** Dan Liotti <[danl@midwestmole.com](mailto:danl@midwestmole.com)>  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer attachment 1/3

Project description attached.

**From:** Dan Liotti [<mailto:danl@midwestmole.com>]  
**Sent:** Wednesday, January 13, 2016 2:51 PM  
**To:** Walter, Casey  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer cost estimate request 2/3

Hi Casey,

I am working on this. I think I am missing one email with the prints. Maybe the file size was too big? Can you send again and send a separate message that you sent them to be sure I receive.

Thanks

Dan

Have a Blessed Day

Daniel L. Liotti, P.E.  
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Greenfield, IN 46140  
Ph: 317-545-1335 ext. 112  
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[www.midwestmole.com](http://www.midwestmole.com)



**From:** Walter, Casey [<mailto:Casey.Walter@cincinnati-oh.gov>]  
**Sent:** Monday, January 04, 2016 1:53 PM  
**To:** Dan Liotti <[danl@midwestmole.com](mailto:danl@midwestmole.com)>  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer cost estimate request 2/3

Hi Dan,

Thanks for responding. It would be great if you could get back to me by 1-15-2016. If there is any more information that you need, or if you would like to visit the site, please let me know.

Thank You  
Casey Walter  
244-5533  
[Casey.walter@cincinnati-oh.gov](mailto:Casey.walter@cincinnati-oh.gov)

**From:** Dan Liotti [<mailto:danl@midwestmole.com>]  
**Sent:** Monday, January 04, 2016 1:11 PM  
**To:** Walter, Casey  
**Subject:** RE: MSD Cincinnati - Kenwood Hills Local Sewer cost estimate request 2/3

Hi Casey,

Thanks for reaching out to us. I will take a look at the information and get back to you.

Are you in a hurry for this information or can I get back to you in the next couple of weeks?

Thanks

Dan

Have a Blessed Day

Daniel L. Liotti, P.E.  
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**From:** Walter, Casey  
**Sent:** Monday, December 21, 2015 3:53 PM  
**To:** '[info@midwestmole.com](mailto:info@midwestmole.com)'  
**Subject:** MSD Cincinnati - Kenwood Hills Local Sewer cost estimate request

Midwest Mole,

Construction of the Kenwood Hills Local Sewer is tentatively scheduled for 2020. At this point I would like to know if the proposed alignment is feasible, and if so, an approximate construction cost.

The length of the proposed 8" sewer, from the community pool to Camargo Road, is approximately 1500 feet. Of this length, part will be built using trenchless technology, and part by open cut, with the goal of minimizing total construction cost. The horizontal and vertical alignment is flexible, as long as it stays on property owned by the Kenwood Hills Cabana Club and the City of Madeira; comments on the alignment, and comments on the construction method, are welcome.

Please see attachments for more project information.

Thank You

Casey Walter

513-244-5533

[Casey.walter@cincinnati-oh.gov](mailto:Casey.walter@cincinnati-oh.gov)



## Statement from MSD WWC Regarding this project

From our perspective here at WWC—which is mainly an O&M perspective—either Alternative 3 or Alternative 4 is acceptable. Both Alternative #3 (Low Pressure Force Main) and Alternative #4 (Shallow Gravity & Low Pressure Force Main hybrid) will accomplish the goal of providing sewer service to the 160 benefits. This being said, we merely want to reiterate the main comments/concerns from a WWC perspective regarding both alternatives.

- Both Alternative 3 and Alternative 4 include the installation of LPFMs.
- The main O&M concern of WWC for any project including the installation of a LPFM is to ensure that we are not creating a problem with odors and high H<sub>2</sub>S concentration levels at the force main discharge manholes of any new LPFMs. We believe that any Alternative for this project that includes LPFMs must specifically note the design requirement to limit the level of system H<sub>2</sub>S at these discharge manholes such that there is no noticeable increase to the local customers.

# 100% Basis of Design Memorandum

To: Daniel Anderson, P.E.  
From: Allen Fathi, P.E.

CC: MSD Document Control [with 100% DesignSubmittal]

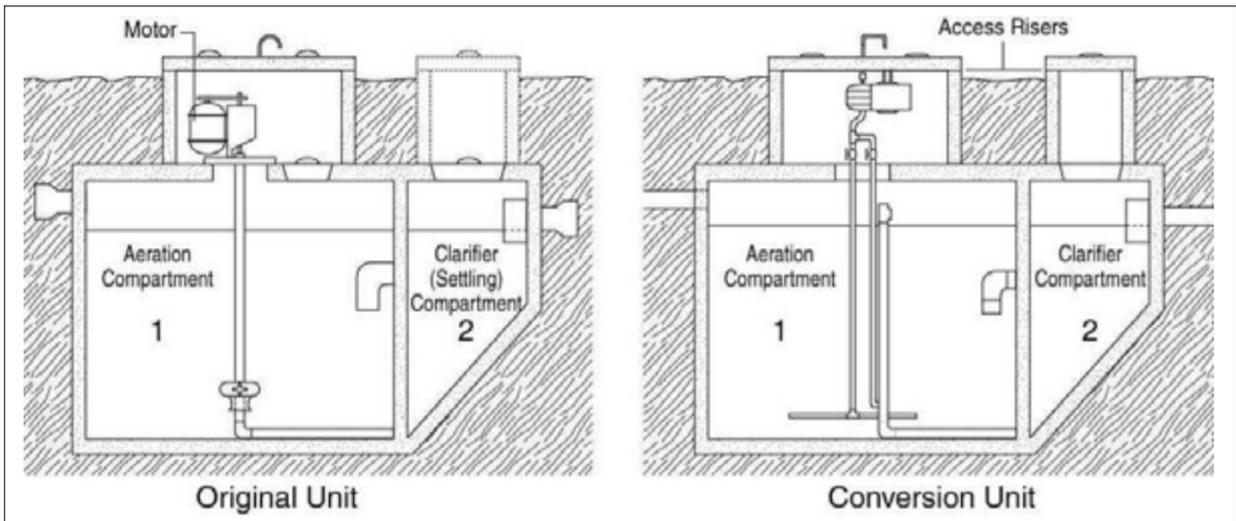
Date: June 21, 2024

Re: Project No. 10370025 Kenwood Hills Local Sewer – Task V.4.11 100% Design Submittal Draft Basis of Design Memorandum

## 1. Introduction

The objective of the Kenwood Hills Local Sewer project is to convert the 160 residences served by individual aerobic treatment (ATU) type Home Sewage Treatment Systems (HSTSs) to a central gravity sanitary sewer system with both direct lateral and low-pressure force main [LPFM] connections. Project area is the southernmost portion of the City of Madeira. The Business Case Evaluation [BCE], dated March 18, 2016, determined that Alternative 4 was the preferred alternative. Hamilton County Public Health [HCPH] Division of Water Quality declared Kenwood Hills a Priority Area in their 2008 Sanitary Survey, recommending construction of a sanitary sewer system. HCPH maintains a detailed county-wide septic system map available on their website via <https://tinyurl.com/yberjblk>. According to HCPH, collector line locations are not always accurate. According to the Greater Cincinnati Water Works Service Line information website, there are no lead service lines in the project area. GCWW has also confirmed the waterlines in the project area are not in the CIP for replacement.

Typical ATU cross section from the HCPH website:



MSDGC asked that the St. Louis MSD LPFM guidelines be reviewed and observations presented compared to the MSDGC LPFM design guidelines. Here is a quick summary:

	<b>Name</b>	<b>Private FM Isolation Valve</b>	<b>Chamber Piping</b>
<b>MSDGC</b>	LPFM – Low Pressure Force Main, Drawings  LPSS in Rules and Regulations, Section 613	Yes, ACC No. 49069 , no chamber  No, chamber drawing LPFM04	SCH 40 304 SS, threaded and flanged, with one coupling for alignment adjustments
<b>St. Louis MSD</b>	LPSS- Low Pressure Sewer System	Yes, with chamber	SCH 80 PVC grooved with Victaulic couplings for alignment adjustments at each fitting

## **2. Modeling**

Modeling was not performed during the design phase of the project. MSD Development Services provided the approval letter to MSD Engineering for sewer availability for Kenwood Hills on June 29, 2015.

## **3. Geotechnical**

Seven (16) boreholes were completed for the 30% design; Geotechnical report submitted separately as part of the Task V.1 30% Design Submittal. A17<sup>th</sup> borehole near the 12-inch stub and the area where the bore pit will be excavated, was completed after the 30% submittal.

## **4. Environmental**

A Phase 1 Environmental Site Assessment (ESA) was completed during the Proposed Preliminary Design Summary Report. No items of concern were mentioned.

## **5. Cultural**

There are no Cultural Issues regarding this project.

## **6. Alignment and Constructability**

**6.1 Kenwood Hills neighborhood** - One of the key enhancements was to reduce the overall length of low pressure force mains on the project. Many homes on a pumped connection will now discharge to a shallow gravity sewer rather than a low pressure force main. This has the benefit of reducing the maintenance needs and residence time in the low pressure force mains. It will also reduce the complication presented by a force main break or individual use outages. In general, the extended gravity sewer will also reduce the challenges of low-flow force mains in the early years as residents connect to the new system. The system has been designed to allow residents to continue discharging their ATU effluent to collector sewers and/or to daylight until they are ready to connect to the new system. As residents gradually tie into the system over a period of up to five years, MSDGC will need to

periodically flush the force mains through the terminal flushing and air release manhole connections.. Force main flows are described in the following paragraph.

Initially, the low-pressure force main diameters were selected to provide an optimal flushing velocity greater than 2 feet per second and optimized headloss for the planned service pumps (base model is E- One). The calculation assumes a statistical ratio of homes operating simultaneously relative to the total number of homes tributary to any given location. *Alternative Sewer Systems*, Second Edition, produced by the Water Environment Federation (WEF) in 2008, refers to this as the “probability method.” The following table indicates this ratio:

Each home’s pump is anticipated to generate 11 gpm of flow. Based on these flow rates, we optimized pipe diameters during 100% design to maximize solids re-entrainment flow rates and retention times while not exceeding anticipated maximum head pressures. With optimized pipe diameters in place, we will recommend a flushing regimen that will allow MSDGC WWC to simulate yet-to-be-connected users within the system.

Number of Pumps Connected	Maximum Number of Pumps Operating Simultaneously
1	1
2-3	2
4-9	3
10-18	4
19-30	5
31-50	6
51-80	7
81-113	8

The update to the design includes passive odor control measures for the three (3) LPFM systems. This involves extending the LPFMs to the next upstream manhole, utilizing gasketed bolt-down manhole covers for both the end manhole and the force main discharge manhole, and redesigning the force main discharge manholes to accommodate multiple pipes.

Constructability of the project around the Kenwood Hills neighborhood would include the typical constructability aspects for a residential area with existing utilities. Generally, the gas and water lines are on the opposite sides of the street, located behind the back of the curbs. One exception is near the transition from Oakvista and Mapleridge road at the horseshoe bend where the gas and waterlines cross the road and each other. The proposed sanitary sewer will cross the gas and water services which must be maintained during the construction. The existing network of stormwater lines and interconnected ATU discharge collector lines must remain in operation until the proposed system is constructed and accepted. Final resolution of ATU collector lines and combination stormwater/ATU collector lines, some of which are on private property, is not in the scope of this project. The City of Madeira will decide upon the final resolution for the existing network after the proposed sanitary sewer is fully operational.

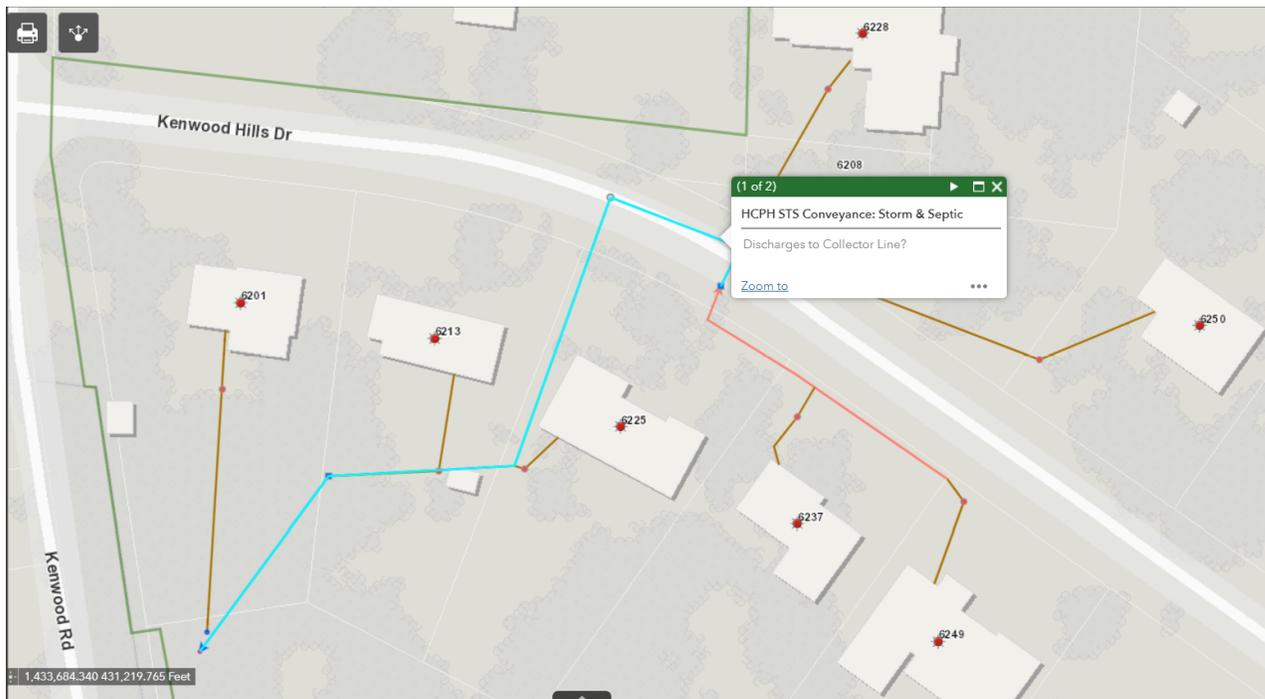
The alignment discussions begin with the streets in the neighborhood end with the ravine sewer to Camargo Road. Please refer to the updated drawings for current sanitary sewer alignment and updated locations of ATU discharge lines based on the CCTV locate work. Kenwood Hills Drive to Kenwood Road

Kenwood Hills Drive is both the entrance into the neighborhood and the east-west connector starting at the intersection with Kenwood Road and aligning to the east, crossing Oakvista Drive and ending in Mapleridge Drive. Eleven [11] ATUs are located at houses with a Kenwood Hills Drive address. The house at 6206 Kenwood Hills Drive had a service lateral installed in 2004. The ATUs on Kenwood Hills Drive west of Oakvista connect to a common stormwater/ATU collector line which aligns between 6213 and 6225 Kenwood Hills Drive and discharging onto 5569 Oakvista Drive. A pairs of storm inlets just east of the MH in Kenwood Hills Drive also have directly connected ATU discharges.

ATUs from four [4] of the five [5] houses on Kenwood Hills Drive between Oakvista Drive and Mapleridge Drive connect to a common stormwater/ATU collector line aligning between 6273 and 6285 Kenwood Hills and discharging onto 5586 Oakvista Drive. The ATU at 6273 Kenwood Hills Drive also discharges onto 5586 Oakvista Drive.

The houses on Kenwood Hills Drive will be serviced by LPFMs and gravity sewers. The gravity sewers on both Oakvista and Kenwood Hills Drives were adjusted to the maximum 20-foot depth and extended to reach houses on Kenwood Hills Drive.

### Example of the HCPH Septic System CAGIS data



#### 6.1.1 Coachlite Way to the Cabana Club driveway

The BCE Alternative 4 shows the 2 furthest west houses in the Project Area, 6213 and 6208 Coachlite Way, connecting to the existing 16-inch ductile iron pipe [DIP] sanitary sewer in Coachlite Way near the intersection with Kenwood Road. This sewer is nearing 20 feet deep and the proposed connection would require a manhole [MH] to be constructed around the existing 16-inch DIP. The current design includes picking up these 2 houses with the proposed sanitary in Coachlite Way which connects to the proposed sanitary sewer from the north end of Coachlite Way at the proposed MH between 6262 and 6274 Coachlite Way. The proposed sanitary the routes between the houses in a new sanitary sewer easement to the proposed sanitary sewer in the Cabana Club driveway, also in a new sanitary sewer easement.

The first stormwater system structures on Coachlite Way west from Kenwood Road are the pair of storm inlets upstream of the MH on the south side of the street at 6248 Coachlite Way. The next structure is a MH between 6262 and 6254 Coachlite Way, which takes the flow from the west and east [1 pair of inlets] and directs flow to the outlet at a headwall near the property line between 6254 and 6282 Coachlite Way. From this outlet, stormwater appears to flow overland to the 30-inch corrugated metal pipe under the Cabana Club driveway and into the ravine.

According to HCPH, the Coachlite Way ATU collector lines do not appear to be interconnected with the stormwater system. The houses east of 6223 and 6234 Coachlite Way have collector lines in the front yards on private property on the south side and the north side houses discharge to a common collector line in the rear yards on private property. These two collector lines join near the outlet which discharges the ATU flow into a vegetated ditch on the property at 5776 Kenwood Road. Another ATU collector line serving 13 homes is on the south and east sides of Coachlite Way from 6234 and wraps around the cul-de-sac. The common collector line is

between 6268 and 6274 Coachlite Way, on the 6268 property. The proposed sanitary sewer will be on 6274 and require permanent and temporary easements. Three properties have on-lot discharges and one ATU discharges to a collector line that begins on Margo Lane.

No LPFMs are anticipated for the homes on Coachlite Way.

### **6.1.2 Oakvista Drive from Kenwood Hills Drive north to Cabana Club driveway, including Margo Lane**

The proposed sanitary sewer would begin on Oakvista Drive just north of Kenwood Hills Drive, on the west side of the street opposite the waterline and align north to Cabana Club drive. The stormwater line in Oakvista Drive, which also serves as an ATU collector line, begins at a MH 5608 Oakvista Drive on the east side of the street. According to HCPH, this MH has two [2] directly connected ATU discharges and approximately 18 additional ATU discharge connections along the route to the Cabana Club driveway. Before the MH at the Cabana Club driveway, pairs of storm inlets with a MH are located near 5620 Oakvista, Margo Lane and the Cabana Club driveway.

Margo Lane is a no-outlet street with eleven [11] homes. The ATUs at 6259 and 6260 Margo Lane discharge to the stormwater/ATU collector line in Oakvista Drive and can be served by the proposed sanitary sewer, while 8 of the remaining houses discharge to a common collector line and will be served by LPFMs. The 11<sup>th</sup> house discharges on the lot and will be served by a LPFM.

### **6.1.3 Cabana Club driveway to the Ravine Sewer**

The stormwater/ATU collector lines from Oakvista Drive join at a MH on the east side of Oakvista across from the Cabana Club driveway, then align to a bend directing flow to a discharge located in the rear yard of 5677 Oakvista. This pipe was CCTV surveyed and located just north of the Cabana Club drive, between the edge of pavement and the fence. Two [2] storm drains, carrying both stormwater and ATU flows, cross the Cabana Club driveway from west to east. The proposed sanitary sewers from Mapleridge Drive and Oakvista Drive join at the proposed MH in Oakvista at the Cabana Club driveway. The proposed sanitary sewer then aligns along the driveway, crossing under both the storm drains before entering the MH which will be the start of the proposed sewer alignment in the ravine.

The Cabana Club is private property owned by the Kenwood Hills Cabana Club and will require both temporary and permanent easements.

### **6.1.4 Mapleridge Drive from Kenwood Hills Drive to the Cabana Club driveway, including Maplespur Lane and the portion of Oakvista Drive in the horseshoe**

Generally the proposed sanitary sewer will be installed on the side of the street opposite the existing waterline, at a location such that the existing curb and stormwater inlets are not disturbed during construction. The Stormwater/ATU collector system flowing north begins with a MH on the east side of the street at 5605 Mapleridge Drive, flows south from 5635 Mapleridge Drive, and collects a total of eight [8] ATUs. The MH at 5617 Mapleridge Drive is the low point and a pipe aligning to the east between 5614 and 5620 Mapleridge discharges in the rear yard of 5620. Stormwater enters the system via a pair of storm inlets at 5620.

The next piece of the stormwater/ATU collector system flowing north begins at a MH on the east side of the street at 5644 Mapleridge Drive. Two [2] ATUs connect to this pipe and enter a MH at 5658 Mapleridge Drive where a pair of storm inlets are also located. Another pair of storm inlets are located downstream at 5676 Mapleridge Drive. A MH is the next structure 25 feet downstream of the inlets and redirects the flow east between 5676 and 5682 Mapleridge Drive to an outlet on 5682. Eight ATUs are connected to the stormwater/ATU collector in this section.

The horseshoe section of Mapleridge Drive, which transitions to Oakvista Drive at 5695 Oakvista, has a single ATU connected to a collector line that aligns approximately 300 feet along the road to the MH at the in Oakvista Drive at the Cabana Club driveway. The remaining five [5] ATUs along the horseshoe discharge in the rear yards.

Five [5] houses with ATUs have addresses on Maplespur Lane, one of which discharges to the collector

line in Mapleridge Drive. The other four [4] discharge to the rear yards. Maplespur Lane slopes down to the east; at the intersection with Mapleridge Drive the crown of the roadway is at elevation is 876.71 while at the east end of Maplespur, 234 feet away, the elevation is 867.67, a difference of 9.04 feet. These four [4] houses on Maplespur will be served by LPFMs, via direct connections to the proposed sanitary sewer.

### **6.1.5 Mapleridge Drive from Kenwood Hills Drive south, including Vistaridge Lane**

The proposed sanitary sewer on Mapleridge Road was extended to the south to Vistaridge to allow direct connections for this area, LPFMs in the street are still required aligning south on Mapleridge and Vistaridge east and west. Twenty [20] houses are on Mapleridge Drive south of Kenwood Hills Drive, while Vistaridge Lane, an east-west dead-end road crossing Mapleridge, has twenty-two [22] houses. The house at 6256 Vistaridge Lane is serviced by a lateral installed in 2015. The five [5] houses on Mapleridge Drive just south of Kenwood Hills Drive are serviced by a common stormwater/ATU collector line with a pair of storm inlets and an MH at 5582 Mapleridge, directing flow between 5592 and 5582 Mapleridge for discharge onto 5592.

Vistaridge Lane east of Mapleridge has a pair of storm inlets at 6321 and 6331 Vistaridge and the storm conveyance pipe aligns between these houses and picks up the ATUs. The remaining ATUs in this area have on-lot discharges to the rear yard.

Five [5] of the houses on Vistaridge Lane west of Mapleridge Drive are connected to a common stormwater/ATU collector lines, with a pair of storm inlets connecting at 6268 Vistaridge and a storm MH in the yard of 6274. The remaining ATUs in this area have on-lot discharges to the rear yard.

### **6.1.6 Oakvista Drive from Kenwood Hills Drive south**

The proposed sanitary sewer was extended to replace the LPFMs direct connections for the homes on Oakvista south of Kenwood Hills Drive. The existing gas is behind the curb in on the west side of the roadway while the water is behind the curb on the east side. The ATUs discharge to the rear yards except for 5593 Oakvista Drive, which connects to the storm inlet at the hammer-head end of Oakvista, which discharges on 5566 Oakvista.

**6.2 Ravine Sewer** – The ravine sewer starts on the Cabana Club property and aligns across properties owned by the City of Madeira, CSX Railroad, and Camargo Greenspace, LLC before connection to the existing 12-inch ductile iron pipe stub from MH 50108007 on the Camargo Road Sewer, 10-feet off the edge of pavement and 6 feet deep – this location was potholed to confirm. Equipment access for construction for the ravine sewer will be very challenging. Midwest Mole, a regional trenchless technology contractor, was consulted at the BCE stage as well as during the 30% Design. Mr. Dan Liotti, PE, CEO of Midwest Mole first sent one of his employees to the site, meeting me for a complete walkdown from the Cabana Club drive to Carmargo Road. After hearing about the challenging site conditions, Mr. Liotti decided to visit the site for himself, submitting an email with his observations and recommendations:

Comments from site visit on 9/19/18

After visiting the site, I now see what a challenging project this is. The extreme grade change and lack of access makes this a very difficult project.

Some of the risks on this project are:

1. Steering concerns as you move through the layered shale and limestone
2. Breaking tooling
3. Frac outs
4. Pull back friction due to the long runs
5. Very limited access

Due to these risks we would need to add substantial “Extra” costs to our price in hopes that we are covered in case something would go wrong. I believe this would be an excellent project to build on a “cost plus” method of construction. In this scenario, the owner would only have to pay for the extra costs if difficulties were encountered.

Our proposed method of installation would be:

1. Set up on the low end of the project at the road and perform an auger bore under the RR track.
2. After the auger bore is complete set the directional drilling rig down in the bore pit to allow for a straight path through the casing. (Note – Our directional drilling rig is 38’ long and will need adequate right of way between the road and the RR track for the equipment)
3. Utilizing a mud-motor we would drill from the low end approximately 1,200’ to the upper level of the line.
4. The hole would be pre-reamed to approximately 14” OD.
5. After the reaming operation, the drill rods would be inserted through the hole and the 8” HDPE would be pulled through the ground and through the steel casing under the RR track.
6. The annular space between the casing and the 8” HDPE would be filed with cellular grout.

Additional notes:

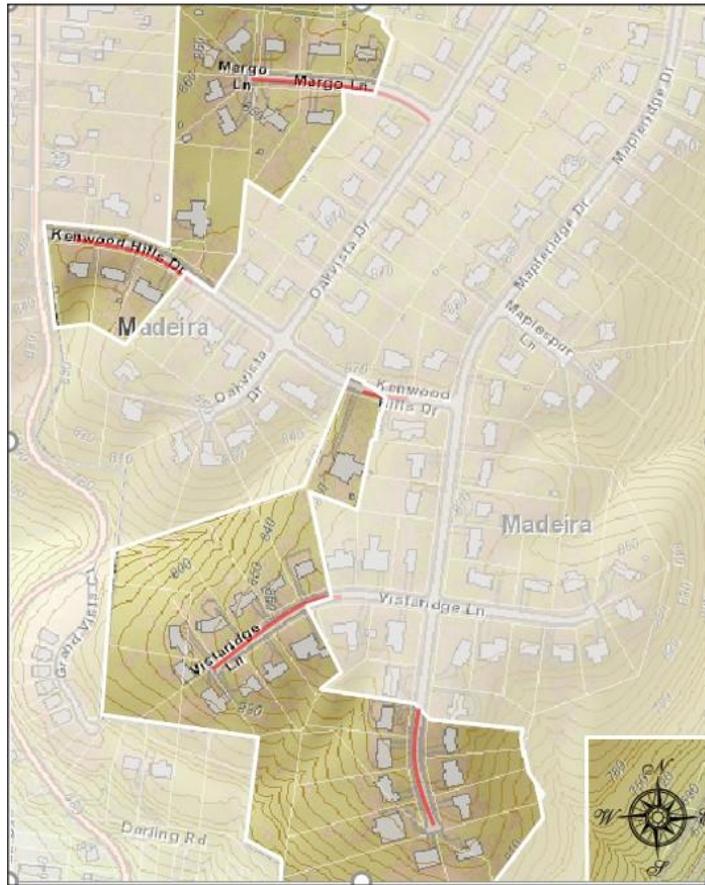
1. A RR crossing would need to be built over the RR track to allow for excavating equipment to get to the area of the receiving pit.
2. For the design of the drill we recommend a minimum radius of 1,000 Feet be used to allow for gradual steering corrections.
3. If permitted – delete the intermediate manholes due to difficult access.

The piece of equipment Mr. Liotti is recommending to complete the HDD is the Vermeer 4735 and is approximately 40 feet long and would be lowered into the 50-feet by 20-feet jacking pit for drilling up the ravine. Photo below:



### 6.3 Lower Pressure Force Mains –[added at 95%]

The low-pressure force main (LPFM) sewer system for the Kenwood Hills Local Sewer project is proposed to service 33 properties with 5 independent (unconnected) force mains.



Additional properties in the wider project area will have pumped service in part or whole, but they will connect directly to a gravity sewer.

#### Service Assumptions

Each property is assumed to pump 240 gallons per day which correlates to 90 gallons per capita per day with 2.69 residents per home (taken from 2014-2018 census projections for Madeira residences). A positive-displacement style pump (E/One) is assumed for residents connecting to the LPFMs. When active, the pumps deliver a flow of approximately 11 gallons per minute.

The design team has analyzed the LPFM from two perspectives:

1. The anticipated peak flow rate as it relates to headloss and hydraulic performance.
2. The anticipated residence time for sewage in the LPFMs as it relates to the potential for odors.

#### Peak Flow Rates

For purpose of analysis, each LPFM was divided into “zones” with 1-5 service connections. Using a probability method outlined in the WEF publication *Alternative Sewer Systems, Second Edition* (2008) the maximum number of pumps operating simultaneously can be estimated. The number of simultaneously active systems was multiplied by the max flow per pump (11 gpm) for each zone to check the peak velocity and corresponding headloss for each LPFM. All zones achieve about 2.5 feet per second or faster to keep solids in suspension when designing with HDPE DR-11 LPFM at the diameters shown on the plans. All corresponding head pressures were well below the maximum recommended pressure of 185 TDH for E/One’s selected SPD pump (see *Private Residence Pump Selection* below).

#### Residence Time

The design team considered sewage residence time for the LPFMs in both their ultimate full-service condition and the initial phase of operation. The analysis focused on flow travel time through a theoretical 250-foot long service

lateral and the most distant zone for each LPFM.

In the ultimate scenario with all homes connected, peak retention time was found to be four hours or less. The design team also reviewed the retention time in each LPFM for scenarios ranging from just one connection through 25%, 50%, and 75% connected. Even at one connection on the longest LPFM (Margo Lane), the corresponding retention time is estimated to be ten hours. By the time 25% of the users are connected to each LPFM, the retention times are 6.5 hours or less. We recommend MSDGC monitor the LPFMs at least weekly until more than 25% of the users are connected. A neighboring peer agency, the Butler County Division of Environmental Services, requires private force main connections to maintain retention times of 6 hours or less. Depending on the level of odors detected, MSDGC may consider flushing the LPFMs as needed until sufficient users are connected.

**Private Residence Pump Selection**

Although residential pump selection is not part of the project plans and specifications, residents and plumbers will inquire with MSDGC as to the expected pressures and flows for their pumps. For homes connected to a LPFM system, we recommend a positive-displacement-style pump which can deliver an essentially fixed flow regardless of pressure conditions in the main. As indicated above, we have based the design around E/One’s model SPD pumps. The maximum calculated head anticipated on the project is 83.3 feet (36 PSI) on the west leg of Vistaridge Lane. The table below presents the anticipated maximum head for each LPFM segment. If MSDGC doesn’t want to guide all residents to just one pump model, then we recommend a safety factor (such as the 2x below) when sharing anticipated pressures with residents.

**LPFM Minimum Pump Head Requirements**

LPFM Location	Maximum Anticipated Head (ft)	Pump Minimum Head Requirements (ft)
Kenwood Hills Drive (East)	28.3	57
Kenwood Hills Drive (West)	39.4	80
Vistaridge Lane (West)	83.4	167
Margo Lane	56.6	113
Mapleridge Lane	75.8	156

As discussed earlier, some residents will be serviced by a gravity sewer, but will have a lowest floor that cannot be captured by a gravity lateral. In these instances, where their pumps will not need to push against the head of an LPFM system, we believe that MSDGC can tell residents that **non-positive-displacement-style** can be considered (ie: centrifugal pumps would be an option).

**7. Operations and Maintenance**

MSDGC has historically performed operations and maintenance on the sanitary sewers in this area, and the replacement sewer should not adversely affect maintenance.

**8. Property and Easement Issues**

The alignment as shown will require easements on the following properties:

1. 33,34,35,37 Camargo Drive Permanent and Temporary Easements
2. 5795 Camargo Road – City of Madeira - Permanent and Temporary Easement
3. 5665 and 5677 Oakvista Drive Permanent and Temporary Easements
4. Railroad - CSX Transportation – Permanent and Temporary Easement [appropriation likely]
5. Camargo Road – Camargo Greenspace, LLC - Permanent and Temporary Easement

**9. Anticipated Regulatory Requirements**

## 9.1 Railroads

A non-environmental Right of Entry applications was made to CSX. Dynotec has made phone calls to CSX to alert them of the project and of the slope failure at the first storm structure. This photo was emailed to the CSX contact.



CSX Contact:

Rene Kurth  
Senior Real Estate Manager – Utilities Genesee &  
Wyoming Railroad Services, Inc. 13901 Sutton  
Park Drive South

Suite 160  
Jacksonville, Florida 32224  
904-900-6319  
[rene.kurth@gwrr.com](mailto:rene.kurth@gwrr.com)

## **9.2 OhioEPA, Army Corps of Engineers**

Applications have not been made for any other permits at this time. An Ohio PTI will be required for this project. Depending on location and work in the ravine, an NOI and SWPPP could be required. Army Corps of Engineers has been contacted regarding the site and no regulatory issues have been discussed.

## **9.3 City of Madeira**

Past City Manager Tom Moeller and Assistant City Manager Lori Thompson have been contacted several times regarding the project including general information and Right of Entry. The City posted an announcement via their listserv ahead of the geotechnical drilling. According to Past City Manager Moeller, the roads in the project area are scheduled for pavement rehabilitation around 2026. City of Madeira has adopted the rules and regulations of the Hamilton County Stormwater District and defaults to Hamilton County Engineer's Office for roadway matters. Mr. Moeller was notified regarding a collapsed pipe found during the CCTV locate work. The Current City Manager Michael Norton-Smith has been contacted regarding this project.

## **10. Utility Locates –Subsurface Utility Engineering**

The 12-inch DIP stub from existing MH 50108007 on the Camargo Road trunk sewer was located to SUE Level A including hydro-excavation and survey. The DIP has a plug and is generally as shown on the record drawings.



Several locations require SUE locating of existing underground utilities to refine the design for 60% as follows – the findings have been added for 60% BDM update. One pipe collapse on the stormwater system was found and reported to the City of Madeira.

1. CCTV/Locate the pipe from MH at 5694 Mapleridge to the MH at the Cabana Club driveway. This ATU discharge line aligns east and south just inside the ROW to the storm pipe between 5682 and 5676. Not in Street.
2. CCTV/Locate the pipe from MH at 6225 Kenwood Hills Drive to the storm inlets. Glenn decided the field survey work was sufficient for design in this location.
3. CCTV/Locate Level A the ATU discharge pipe from 5604 Maplespur Lane near the property line. ATU Discharge found to align to the east downstream of ATU and connects to the stormwater pipe between 6309 and 6315 Maplespur Lane, crossing 6309 private property
4. CCTV/Locate the ATU discharge pipe and collector lines at 5583 Mapleridge Drive. ATU Discharge pipe do not enter the street this location.
5. CCTV/Locate the ATU discharge pipe and collector lines at 6286 Vistaridge Lane. ATU discharges from 5557, 6292 and 6286 are collected together and are near the edge of the ROW.

6. CCTV/Locate the Stormwater/ATU collector line from the MH in Oakvista, along the Cabana Club driveway to the elbow to the discharge location. The stormwater ATU collector line is located between the edge of the Cabana Club Drive and the residential fence on 5677 Oakvista
7. CCTV Storm line to confirm ATU connections, starting 5626 Oakvista upstream towards Kenwood Hills Drive and then downstream, through MH near Margo Lane and onto MH in Oakvista to the Cabana Club Driveway. ATU connections confirmed, many are break-intaps.

**11. Opinion of Probable Construction Costs**

The OPCC was developed for the 100% construction drawings based on recent pricing from the bid Russell Heights, Means Construction data and other construction cost sources, as noted in the OPCC spreadsheet. The increase in the estimate is mainly due to the increase in proposed sanitary sewer and decrease in proposed LPFM. OPCC has been escalated for to November of 2026 using MSD Escalation Table. (1.097612).

1.	30% Design OPCC	\$6.73M
2.	60% Design OPCC	\$7.1M
3.	90% Design OPCC	\$7.4M
4.	100% Design OPCC \$	\$10M
5.	BCE OPCC	\$3.44M
6.	2016 CIP Construction	\$3.44M

## **Technical Specification Outline – 100% Technical Specs**

Subject	Title
SPECIFICATIONS	
00 1 01	Project Title Page
00 1 07	Seals and Certifications Page
00 01 10	Table of Contents
DIVISION 1 – GENERAL REQUIREMENTS	
01 11 00	Summary of Project
01 12 16	Construction Sequence
01 14 00	Control of Work
01 20 00	Measurement and Payment
01 26 00	Contract Considerations
01 31 19	Project Meetings
01 31 21	Site Safety Plan
01 32 16	Construction Progress Schedule
01 33 00	Submittals
01 33 19	Reference Forms
01 42 19	Applicable Codes
01 45 16	Contractor Quality Control Plan
01 45 29	Testing Laboratory Services
01 50 00	Temporary Facilities
01 71 23	Field Engineering
01 71 33	Restoration of Improvements
01 74 00	Cleaning
01 77 00	Contract Closeout
01 77 19	Substantial Completion
01 78 39	Record Documents
DIVISION 3	
03 30 00	Cast-In-Place Concrete
DIVISION 31	
31 23 00	Trenching and Backfill
31 70 00	Trenchless Pipe Installation

DIVISION 33

33 31 00 Sewer Pipe

33 39 00 Sewer Manholes

33 44 13 Catch Basins

## 12. Phase 2 Geotechnical Boring Reports

The Phase 2 Geotechnical Evaluation report will be available early January 2020 and the general recommendations have not changed. Purpose of Phase 2 borings was to obtain more information on the shale and limestone. Phase 2 Boring Location Map and Boring Logs are submitted as separate PDFs on the flash drive for the 60% submittal.

## 13. Peak Flow Calculation

Peak Flow calculations were performed per the MSDGC Rules and Regulations Section 601 Determination of the Amount of Sewage for Sanitary Sewers.

CRITERIA	AMOUNT	UNIT
Average flow per capita	100	Gallons per person
Persons per household	2.33	People per house
Total Houses in Project Area	160	Houses
Total people	372.8	People
Avg flow	37,280	Gallons per day
Peak Multiplier, <750 people = 4	149,120	Gallons per day
Infiltration Area	90	Acres
Infiltration Rate	90,000	Gallons/day
Total Peak Flow (Peak+Infiltration)	239,120	Gallons/day
Total Peak Flow (Peak+Infiltration)	166	Gallons/minute

14. Structure Table

Upstream Structure	Top of Casting	Invert Out Elevation	Cover Over Outlet Pipe	Downstream Structure	Top of Casting	Invert In Elevation	Cover Over Inlet Pipe	Length of Pipe	Size of Pipe	Slope of Pipe	Full Pipe Capacity	Full Pipe Velocity
	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	L (ft)	D (in)	S (%)	QC (cfs)	V (fps)
MH 24	869.64	863.00	5.98	MH 23	876.24	861.81	13.77	297.99	8	0.40	1.02	2.93
MH 23	877.50	861.81	15.03	MH 22	869.74	858.94	10.14	247.27	8	1.16	1.75	4.99
MH 22	869.95	858.94	10.35	MH 21	867.90	857.17	10.07	310	8	0.57	1.23	3.50
MH 21	867.90	857.17	10.07	MH 20	871.73	856.50	14.57	167.5	8	0.40	1.03	2.93
MH 20	871.73	856.50	14.57	MH 19	876.40	855.98	19.76	130.14	8	0.40	1.03	2.94
MH 19	876.40	855.98	19.76	MH 18	877.42	854.54	22.22	359.92	8	0.40	1.03	2.93
MH 18	877.42	854.54	22.22	MH 17	875.43	853.25	21.52	322.25	8	0.40	1.03	2.93
MH 17	875.43	853.25	21.52	MH 16	873.31	852.85	19.80	99.22	8	0.40	1.03	2.94
MH 16	873.31	852.85	19.80	MH 15	868.46	851.85	15.95	259.23	8	0.40	1.03	2.94
MH 15	868.46	851.85	15.95	MH 14	864.43	850.95	12.82	222.26	8	0.40	1.03	2.95
MH 14	864.43	850.95	12.82	MH 13	863.78	850.72	12.40	56.53	8	0.40	1.03	2.93
MH 13	863.78	850.72	12.40	MH 12	862.53	848.61	13.26	64.92	8	3.26	2.93	8.36
MH 12	862.53	848.61	13.26	MH 11	858.63	846.00	11.97	130.61	8	2.00	2.29	6.55
MH 11	858.63	846.00	11.97	MH 10	851.13	841.00	9.47	104.06	8	4.80	3.55	10.15
MH 10	851.13	841.00	9.47	MH 9	843.13	834.92	7.55	130.32	8	4.66	3.50	10.00
MH 9	843.13	834.92	7.55	MH 8	825.93	817.00	8.27	224.5	8	7.98	4.58	13.09
MH 8	825.93	817.00	8.27	MH 7	820.29	807.64	11.99	62.87	8	14.89	6.26	17.87
MH 7	820.29	807.64	11.99	MH 6	821.09	807.21	13.22	107.12	8	0.40	1.03	2.94
MH 6	821.09	807.21	13.22	MH 5	822.36	806.94	14.76	69.24	8	0.40	1.03	2.94
MH 5	822.36	806.94	14.76	MH 4	781.63	751.50	29.48	343.11	8	16.16	6.52	18.62
MH 4	781.63	751.50	29.48	MH 51	755.02	730.81	23.55	279.46	8	7.40	4.41	12.60
MH 51	755.02	730.81	23.55	MH 3	727.97	701.23	26.08	400	8	7.39	4.41	12.59
MH 3	727.97	701.23	26.08	MH 2	700.14	667.21	32.27	436.18	8	7.80	4.53	12.94
MH 2	700.14	667.21	32.27	MH 1	668.57	660.91	7.00	135.77	8	4.64	3.49	9.98
MH 32	859.41	853.75	5.00	MH 31	862.27	852.50	9.11	272.78	8	0.46	1.10	3.14
MH 31	862.27	852.50	9.11	MH 30	846.99	837.90	8.43	299.05	8	4.69	3.58	10.24
MH 30	846.99	829.17	17.16	MH 29	840.20	828.70	10.84	119.18	8	0.40	1.03	2.94
MH 29	840.20	828.70	10.84	MH 28	836.35	828.06	7.63	114.73	8	0.56	1.21	3.46
MH 28	836.35	828.06	7.63	MH 26	842.08	825.32	16.10	190.5	8	1.44	1.94	5.56
MH 26	842.08	825.32	16.10	MH 6	821.09	807.21	13.22	230.96	8	7.84	4.54	12.97
MH 27	845.67	826.40	18.61	MH 26	842.08	825.32	16.10	270.3	8	0.40	1.03	2.94
MH 39	858.59	852.14	5.80	MH 38	865.03	851.64	12.74	121.97	8	0.40	1.03	2.93
MH 38	865.03	851.64	12.73	MH 37	867.85	850.92	16.27	179.04	8	0.40	1.03	2.94
MH 37	867.85	850.92	16.27	MH 36	866.38	849.32	16.40	399.87	8	0.40	1.03	2.93
MH 36	866.38	849.32	16.40	MH 35	859.79	847.93	11.20	346.95	8	0.40	1.03	2.94
MH 35	859.79	847.93	11.20	MH 33	850.14	843.31	6.17	147.23	8	3.14	2.87	8.21
MH 33	850.14	843.31	6.17	MH 9	843.13	834.92	7.55	194.14	8	4.32	3.37	9.63
MH 41	857.94	852.14	5.14	MH 37	867.85	850.92	16.27	303.95	8	0.40	1.03	2.94
MH 43	868.25	857.48	10.11	MH 19	876.40	856.51	19.23	243	8	0.40	1.03	2.94
MH 46	871.34	862.74	7.94	MH 45	874.85	862.35	11.84	96.76	8	0.40	1.03	2.94
MH 45	874.85	862.35	11.84	MH 23	877.50	861.81	15.03	136.7	8	0.40	1.02	2.91
MH 48	870.66	865.00	5.00	MH 23	877.50	861.81	15.03	321.63	8	0.99	1.03	2.94

**Low Pressure Force Main Flow, Velocity and Residence Time Calculations [pdf also included in 100% submittal]**

		Pipe Size					Inner Diameters				
		DR-7	DR-7.3	DR-9	DR-11	DR-11	DR-11	DR-11	DR-11	DR-11	DR-11
		1	0.917	0.933	1.005	1.062	1.134	1.269	1.34	1.452	1.534
		1.25	1.157	1.178	1.269	1.34	1.452	1.534	1.656	1.685	1.816
		1.5	1.325	1.348	1.452	1.534	1.656	1.685	1.816	1.816	1.917
		2	1.656	1.685	1.816	1.917	2.018	2.119	2.220	2.321	2.422
		3	2.44	2.484	2.676	2.825	3.024	3.223	3.422	3.621	3.820

Street	Zone	Connects to Zone or Discharges	# of Pumps in Zone	Accum. Pumps	Gal/Day per pump	Max Flow per Pump (gpm)	Max Sim. Operation	Max Flow (gpm)	Pipe Size (in)	Max Velocity (fps)	Length of Main in Zone	Friction Loss Factor This Zone	Friction Loss This Zone	Accum. Friction Loss (ft)	Max Main Elevation	Min Pump Elevation	Static Head (ft)	Total Dynamic Head (ft)	TDH with Service (ft)
Kenwood Hills Drive (East)	J1	Discharges	1	1	240	11	1	11	1.34	2.502492	266	3.035823002	0.075289399	0.075289399	860.58	845	2.64	10.7152894	28.30484711
Kenwood Hills Drive (West)	H2	Discharges	4	4	240	11	3	33	1.917	3.6682533	314	4.066638133	12.76924374	12.76924374	855.72	846.7	9.02	21.78924374	39.37800144
Vistaridge Lane (West)	K4	5	4	4	240	11	3	33	1.917	3.6682533	140	4.066638133	5.693293386	5.693293386	866.06	820.4	45.66	51.35329339	68.94285109
Vistaridge Lane (West)	K5	6	4	8	240	11	3	33	1.917	3.6682533	140	4.066638133	5.693293386	11.38658677	866.06	820.4	45.66	57.04658677	74.63614448
Vistaridge Lane (West)	K6	Discharges	2	10	240	11	4	44	1.917	4.8910044	126	6.928226365	8.72956522	20.11615199	866.06	820.4	45.66	65.77615199	83.3657097
Margo Lane	G7	8	4	4	240	11	3	33	1.917	3.6682533	80	4.066638133	3.253310506	854.62	838	16.62	19.87331051	37.46286821	
Margo Lane	G8	Discharges	5	9	240	11	3	33	1.917	3.6682533	471	4.066638133	19.15388651	22.40717611	854.62	838	16.62	39.02717611	56.81673382
Mapleridge Lane	B9	10	4	4	240	11	3	33	1.917	3.6682533	130	4.066638133	5.286629573	5.286629573	863.5	819	44.5	49.78662957	67.37618728
Mapleridge Lane	B10	Discharges	5	9	240	11	3	33	1.917	3.6682533	206	4.066638133	8.377274554	13.66390413	863.5	819	44.5	58.16390413	75.75346183
Service lines	N/A	To Main	1	1	240	11	1	11	1.34	2.502492	250	3.035823002	7.589557706	7.589557706	810	800	10	17.58955771	

Street	Zone	Connects to Zone or Discharges	Accum. Pumps (100% Con)	Accum. Pumps (75% Con)	Accum. Pumps (50% Con)	Accum. Pumps (25% Con)	ADF per Pump	Pipe Size	Gallons per Lineal Foot	Length of Zone	Capacity of Zone (Gallons)	ADF (gpd) (100% Con)	ADF (gpd) (75% Con)	ADF (gpd) (50% Con)	ADF (gpd) (25% Con)	ADF (gpd) (1 pump)
Kenwood Hills Drive (East)	J1	Discharges	1	1	1	1	240	1.34	0.073260314	266	19.48724346	240	240	240	240	
Kenwood Hills Drive (West)	H2	Discharges	4	3	2	1	240	1.917	0.149935131	314	47.07963113	960	720	480	240	240
Vistaridge Lane (West)	K4	5	4	3	2	1	240	1.917	0.149935131	140	20.99091834	960	720	480	240	240
Vistaridge Lane (West)	K5	6	8	6	4	2	240	1.917	0.149935131	140	20.99091834	1920	1440	960	480	240
Vistaridge Lane (West)	K6	Discharges	10	8	5	3	240	1.917	0.149935131	126	18.89182651	2400	1920	1200	720	240
Margo Lane	G7	8	4	3	2	1	240	1.917	0.149935131	80	11.99481048	960	720	480	240	240
Margo Lane	G8	Discharges	9	7	5	3	240	1.917	0.149935131	471	70.6194467	2160	1680	1200	720	240
Mapleridge Lane	B9	10	4	3	2	1	240	1.917	0.149935131	130	19.49156703	960	720	480	240	240
Mapleridge Lane	B10	Discharges	9	7	5	3	240	1.917	0.149935131	206	30.88663699	2160	1680	1200	720	240
Service lines	N/A	To Main	1	1	1	1	240	1.34	0.073260314	250	18.31507844	240	240	240	240	240

Street	Zone	Connects to Zone or Discharges	Average Fluid Changes per Day (100% Con)	Average Fluid Changes per Day (75% Con)	Average Fluid Changes per Day (50% Con)	Average Fluid Changes per Day (25% Con)	Average Fluid Changes per Day (1 Pump)	Average Retention Time (hr) (100% Con)	Average Retention Time (hr) (75% Con)	Average Retention Time (hr) (50% Con)	Average Retention Time (hr) (25% Con)	Accum. Retention Time (hr) (100% Con)	Accum. Retention Time (hr) (75% Con)	Accum. Retention Time (hr) (50% Con)	Accum. Retention Time (hr) (25% Con)	Accum. Retention Time (hr) (1 pump)
Kenwood Hills Drive (East)	J1	Discharges	12.31574904	12.31574904	12.31574904	12.31574904	12.31574904	1.948724346	1.948724346	1.948724346	1.948724346	1.948724346	1.948724346	1.948724346	1.948724346	1.948724346
Kenwood Hills Drive (West)	H2	Discharges	20.39096389	15.29323792	10.19549195	5.097745973	5.097745973	1.176990778	1.569321038	2.3539816	4.707963113	1.176990778	1.569321038	2.3539816	4.707963113	4.707963113
Vistaridge Lane (West)	K4	5	45.73406387	34.3005479	22.86703193	11.43351597	11.43351597	0.524772958	0.699697278	1.0495459	2.099091834	2.099091834	2.099091834	2.099091834	2.099091834	2.099091834
Vistaridge Lane (West)	K5	6	91.46812774	68.6010958	45.73406387	22.86703193	11.43351597	0.262386479	0.349846639	0.524773	1.049545917	2.099091834	2.099091834	2.099091834	2.099091834	2.099091834
Vistaridge Lane (West)	K6	Discharges	127.0390663	101.631253	63.51953315	38.11171989	12.70390663	0.188918265	0.236147831	0.3778365	0.62972755	1.089182651	0.976077703	1.285693748	1.952155406	3.7783653
Margo Lane	G7	8	80.03461177	60.02595883	40.01730588	20.00865294	20.00865294	0.299870262	0.399827016	0.5997405	1.199481048	1.199481048	1.199481048	1.199481048	1.199481048	1.199481048
Margo Lane	G8	Discharges	30.58647584	23.78948121	16.99248658	10.19549195	3.398497315	0.784660519	1.008849239	1.4123889	2.353981557	7.06194467	1.084530781	1.408676255	2.012129458	3.5534626
Mapleridge Lane	B9	10	49.25206878	36.93905159	24.62603439	12.3130172	12.3130172	0.487289176	0.649718901	0.9745784	1.949156703	1.949156703	1.949156703	1.949156703	1.949156703	1.949156703
Mapleridge Lane	B10	Discharges	69.93315591	54.3924546	38.85175329	23.31105197	7.770390657	0.343184855	0.441237671	0.6177327	1.029545566	3.088663699	0.830474031	1.090956572	1.592311091	2.9787113
Service lines	N/A	To Main	13.10395698	13.10395698	13.10395698	13.10395698	13.10395698	1.831507844	1.831507844	1.831507844	1.831507844	1.831507844	1.831507844	1.831507844	1.831507844	1.831507844

Street	Zone	Total Ret. Time (hr) (100%)	Total Ret. Time (hr) (75%)	Total Ret. Time (hr) (50%)	Total Ret. Time (hr) (25%)	Total Ret. Time (hr) (1 pump)
Kenwood Hills Drive (East)	J1	3.780232191	3.780232191	3.780232191	3.780232191	3.780232191
Kenwood Hills Drive (West)	H2	3.0084988623	3.400828882	4.185489401	6.539470958	6.539470958
Vistaridge Lane (West)	K4					Not most distant zone.
Vistaridge Lane (West)	K5					Not most distant zone.
Vistaridge Lane (West)	K6	2.807585547	3.117201593	3.78366325	5.609873145	7.918874163
Margo Lane	G7					Not most distant zone.
Margo Lane	G8	2.916038625	3.240184099	3.843637302	5.384970449	10.09293356
Mapleridge Lane	B9					Not most distant zone.
Mapleridge Lane	B10	2.661981875	2.922464417	3.423818936	4.810219113	6.869326246

THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY

PROPOSED PROJECT NO. 10370025  
KENWOOD HILLS  
LOCAL SEWER

STANDARDS:  
(SEE MSDGC STANDARD DRAWINGS)

NOTES:

**MANHOLES:** ALL PROPOSED MANHOLES AND DROP MANHOLES SHALL BE TYPE "S". ALL MANHOLES LOCATED OUTSIDE OF ROAD RIGHT-OF-WAY AND OUTSIDE OF MAINTAINED RESIDENTIAL YARDS SHALL HAVE MANHOLE TOPS 18" ABOVE GROUND. THE STANDARD PRECAST MANHOLE BASE WITH FLEXIBLE MANHOLE JOINTS SHALL BE USED WITH P.V.C. PIPE. IF THE CONTRACTOR PROVIDES PRECAST MANHOLES, THE CONTRACTOR SHALL ASSUME ANY RISK OF MAKING FIELD MODIFICATIONS TO THE PRECAST MANHOLES, DUE TO FIELD CONDITIONS

**PIPE JOINTS:** ALL PROPOSED CONDUIT SHALL HAVE RESILIENT AND FLEXIBLE JOINTS.

**HOUSE CONNECTIONS:** ALL HOUSE CONNECTIONS SHALL BE TYPE "I" CONDUIT WITH RESILIENT AND FLEXIBLE JOINTS, EITHER P.V.C. OR ABS CONDUIT, SDR35 WITH ASTM D-3212 FLEXIBLE ELASTOMERIC SEALS.

**UNDERGROUND STRUCTURES:** LOCATION OF UNDERGROUND STRUCTURES ARE NOT GUARANTEED. APPROXIMATE LOCATION OF GAS, WATER & ELECTRIC SERVICE LATERALS ARE SHOWN IN PLAN VIEW ONLY.

**OVERHEAD UTILITY LINES:** LOCATION OF ABOVEGROUND UTILITY LINES ARE NOT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL VISIT PROJECT SITE PRIOR TO BIDDING TO VERIFY OVERHEAD UTILITIES.

ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER SYSTEMS ARE PROHIBITED.

THE CONTRACTOR SHALL FURNISH ALL MANHOLE FRAMES AND COVERS.

ALL FENCING DAMAGED BY SEWER CONSTRUCTION SHALL BE REPLACED IN KIND BY THE CONTRACTOR AND ALL ASSOCIATED COSTS SHOULD BE INCLUDED WITH VARIOUS CONTRACT ITEMS.

BENCH MARKS:

BM #1:  
HAMILTON COUNTY/CITY OF CINCINNATI MONUMENTS  
HAMILTON COUNTY 2009, 2012, 2420, 4086, 8031, 8405  
CITY OF CINCINNATI MONUMENT 6913

DATUM:

HORIZONTAL: NAD 83  
VERTICAL: NGVD 29

DESIGN EXCEPTION

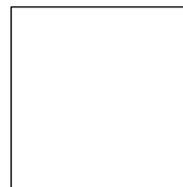
SLOPE OF 0.40% IS EXCEPTION TO THE MSDGC STANDARD OF 0.70%  
0.40% MEETS THE MINIMUM SLOPE FOR THE 10 STATE STANDARDS.

DISTANCE BETWEEN MANHOLES IS MEASURED FROM CENTER TO CENTER.

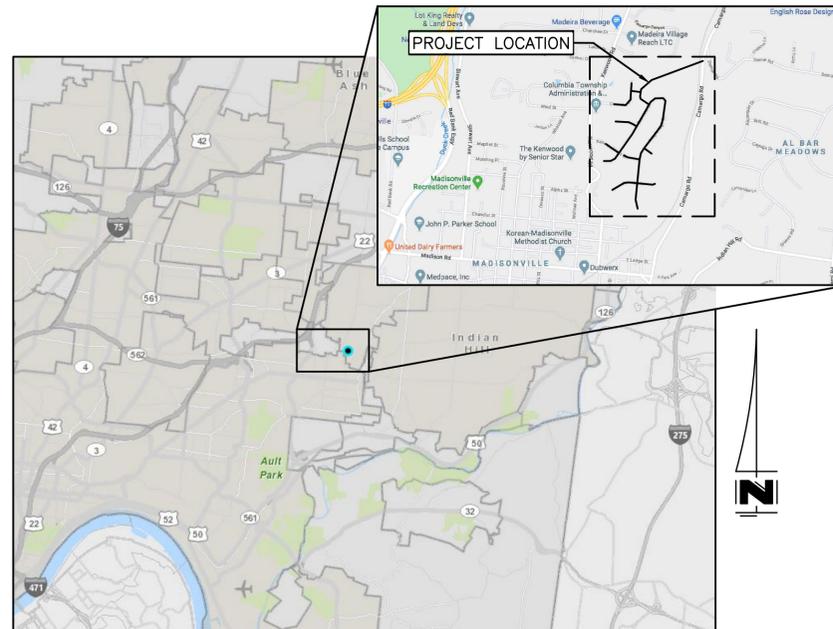
RECEIVING MANHOLES SHALL CONFORM TO STANDARD DRAWING ACCESSION # 49063  
LOW PRESSURE FORCE MAIN TYPICAL RECEIVING MANHOLE EXCEPT THE MANHOLE SHALL BE CONSTRUCTED OF POLYMER CONCRETE (POLYCRETE, OR EQUAL) OR RECEIVE A CURED-IN-PLACE LINING.

FOR A SERVICE CONNECTION TO A LOW PRESSURE FORCE MAIN THE CONTRACTOR FOLLOW STANDARD DRAWING ACCESSION # 49069 STANDARD BUILDING CONNECTION TO A LOW PRESSURE FORCE MAIN EXCEPT THE CONTRACTOR SHALL DISREGARD THE "5'0" MAX." COVER DIMENSION.

DESIGNED BY: GEW  
DRAWN BY: GAU



ENGINEERS SEAL



VICINITY MAP  
NO SCALE  
100% DESIGN SUBMITTAL  
SUBJECT TO REVISION

DESCRIPTION

ACCESSION NO.

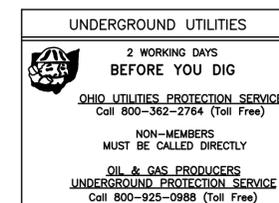
STANDARD DROP MANHOLE	49003
TYPICAL INVERTS	49004
STANDARD CASTINGS FOR MANHOLES	49005
STANDARD CONCRETE COLLARS ON CONDUITS	49031
CONTROL DIMENSIONS FOR TYPICAL TRENCHES FOR CONDUITS	49032
TYPICAL BUILDING SEWERS AND STACKS	49033
STANDARD, (TYPE "S") MANHOLE	49037
STANDARD CONCRETE CRADLE AND ENCASEMENT	49044
STANDARD MANHOLE FOR SANITARY CONDUITS ON STEEP SLOPE	49046
MODIFIED, (TYPE "S") MANHOLE	49049
WATERTIGHT MANHOLE	49051
STANDARD PRECAST CONCRETE MANHOLE BASE	49056
TYPICAL INSTALLATION OF BUILDING SEWER LATERAL	49060
LOW PRESSURE FORCE MAIN TYPICAL RECEIVING MANHOLE	49063
STANDARD BUILDING CONNECTION TO A LOW PRESSURE FORCE MAIN	49069
STANDARD SYMBOLS	49072 TO 49076
STANDARD TWO WAY CLEANOUT FOR BUILDING SEWERS	61979
STANDARD CASTINGS OVER TWO WAY CLEANOUT	61979-A
1" TO 2-1/2" LPFM TERMINAL FLUSHING CHAMBER DETAIL	LPFM24
1" TO 2-1/2" LPFM AIR RELIEF CHAMBER	LPFM30

CONTENTS:

SHEET NO.

DESCRIPTION

1	TITLE SHEET
2	SHEET INDEX
3-31	PLAN AND PROFILES
32-33	PROJECT DETAILS AND CONTACTS
34	RAILROAD EASEMENT



SUBMITTED: \_\_\_\_\_  
CHIEF ENGINEER

APPROVED: \_\_\_\_\_  
DIRECTOR OF SEWERS

DATE: \_\_\_\_\_

LAYOUT CONTROL COORDINATES				
TRAVERSE PT	NORTHING	EASTING	ELEV	DESCRIPTION
PT 1	432134.15	1433863.13	858.29	IPIN T1
PT 3	432041.82	1434660.49	837.37	IPIN T3
PT 5	432628.96	1434704.26	845.82	MAG T5
PT 7	431139.50	1434050.14	855.99	IPIN T7
PT 8	430910.60	1434402.87	868.53	IPIN T8
PT 9	430752.89	1434618.35	863.44	MAG T9
PT 10	430735.97	1434846.55	866.93	MAG T10
PT 11	431006.67	1434986.83	876.79	MAG T11
PT 12	431397.90	1435319.81	878.02	MAG T12
PT 13	431859.78	1435492.04	868.11	MAG T13
PT 14	432174.34	1435422.32	862.16	MAG T14
PT 15	432075.55	1435154.08	845.28	MAG T15
PT 19	430154.77	1434820.62	875.86	MAG T19
PT 51	432918.17	1436389.02	663.67	IPIN T51
PT 52	433348.03	1436490.56	675.51	IPIN T52

RECEIVING MANHOLES		
MANHOLE ID.	NORTHING	EASTING
MH #23	430165.70	1434794.48
MH #35	431506.74	1434812.25
MH #37	430897.10	1434376.14
MH #50	432693.03	1435462.43

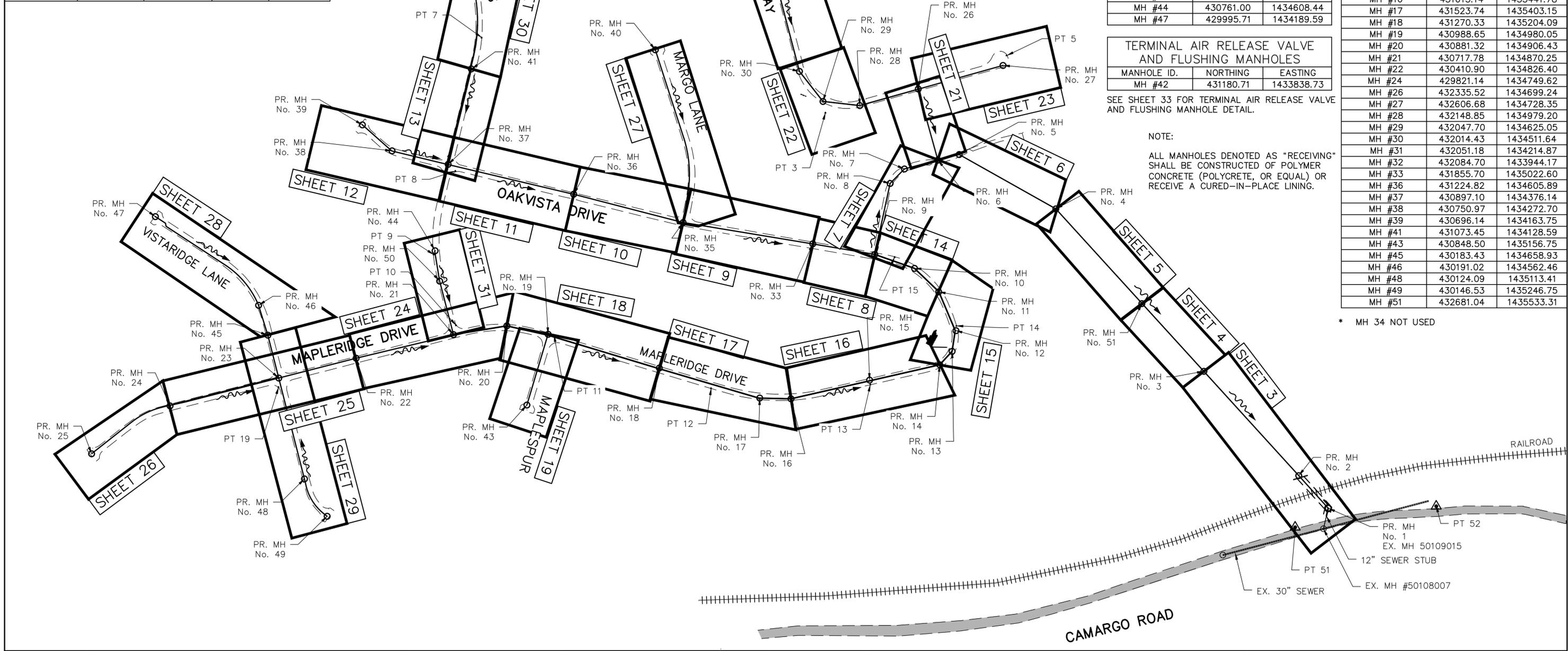
MANHOLES		
MANHOLE ID.	NORTHING	EASTING
MH #1	433035.08	1436372.22
MH #2	432987.60	1436244.99
MH #3	432834.04	1435836.75
MH #4	432594.39	1435200.61
MH #5	432378.65	1434933.82
MH #6	432310.92	1434925.46
MH #7	432204.60	1434912.33
MH #8	432146.96	1434937.44
MH #9	432021.50	1435123.60
MH #10	432119.77	1435209.24
MH #11	432163.03	1435303.88
MH #12	432165.75	1435434.46
MH #13	432132.94	1435490.47
MH #14	432081.95	1435514.87
MH #15	431862.34	1435480.62
MH #16	431615.14	1435441.78
MH #17	431523.74	1435403.15
MH #18	431270.33	1435204.09
MH #19	430988.65	1434980.05
MH #20	430881.32	1434906.43
MH #21	430717.78	1434870.25
MH #22	430410.90	1434826.40
MH #24	429821.14	1434749.62
MH #26	432335.52	1434699.24
MH #27	432606.68	1434728.35
MH #28	432148.85	1434979.20
MH #29	432047.70	1434625.05
MH #30	432014.43	1434511.64
MH #31	432051.18	1434214.87
MH #32	432084.70	1433944.17
MH #33	431855.70	1435022.60
MH #36	431224.82	1434605.89
MH #37	430897.10	1434376.14
MH #38	430750.97	1434272.70
MH #39	430696.14	1434163.75
MH #41	431073.45	1434128.59
MH #43	430848.50	1435156.75
MH #45	430183.43	1434658.93
MH #46	430191.02	1434562.46
MH #48	430124.09	1435113.41
MH #49	430146.53	1435246.75
MH #51	432681.04	1435533.31

TERMINAL FLUSHING MANHOLES		
MANHOLE ID.	NORTHING	EASTING
MH #25	429540.65	1434797.08
MH #40	431624.59	1434284.45
MH #44	430761.00	1434608.44
MH #47	429995.71	1434189.59

TERMINAL AIR RELEASE VALVE AND FLUSHING MANHOLES		
MANHOLE ID.	NORTHING	EASTING
MH #42	431180.71	1433838.73

SEE SHEET 33 FOR TERMINAL AIR RELEASE VALVE AND FLUSHING MANHOLE DETAIL.

NOTE:  
ALL MANHOLES DENOTED AS "RECEIVING" SHALL BE CONSTRUCTED OF POLYMER CONCRETE (POLYCRETE, OR EQUAL) OR RECEIVE A CURED-IN-PLACE LINING.



REVISIONS			
BY:	DATE:	DESCRIPTION:	

**DYNOTEC**  
THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

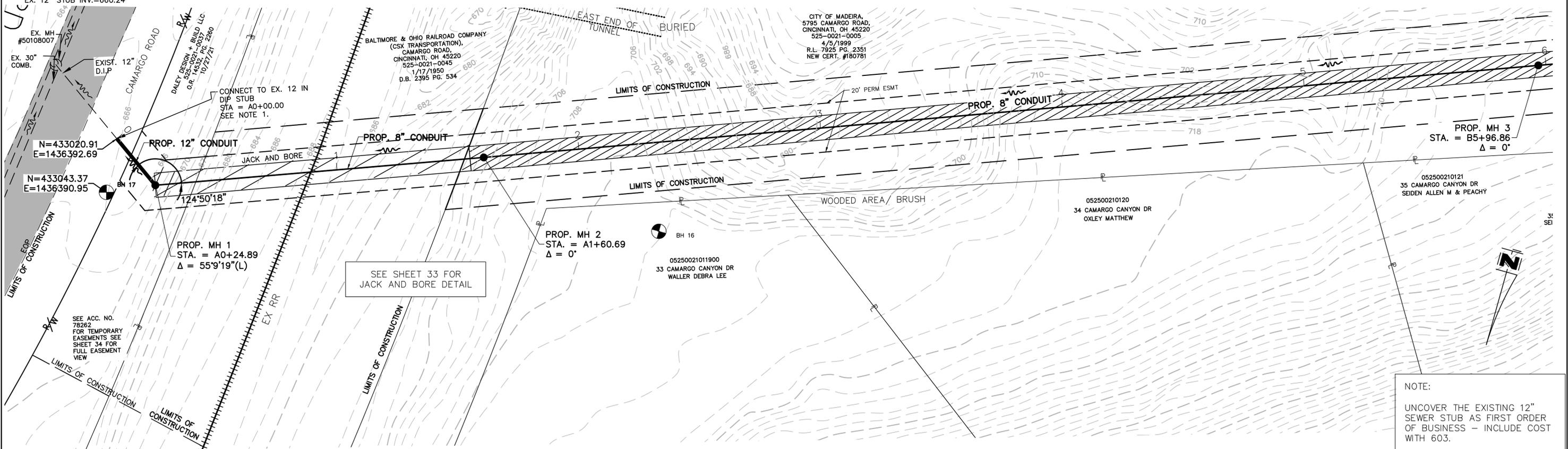
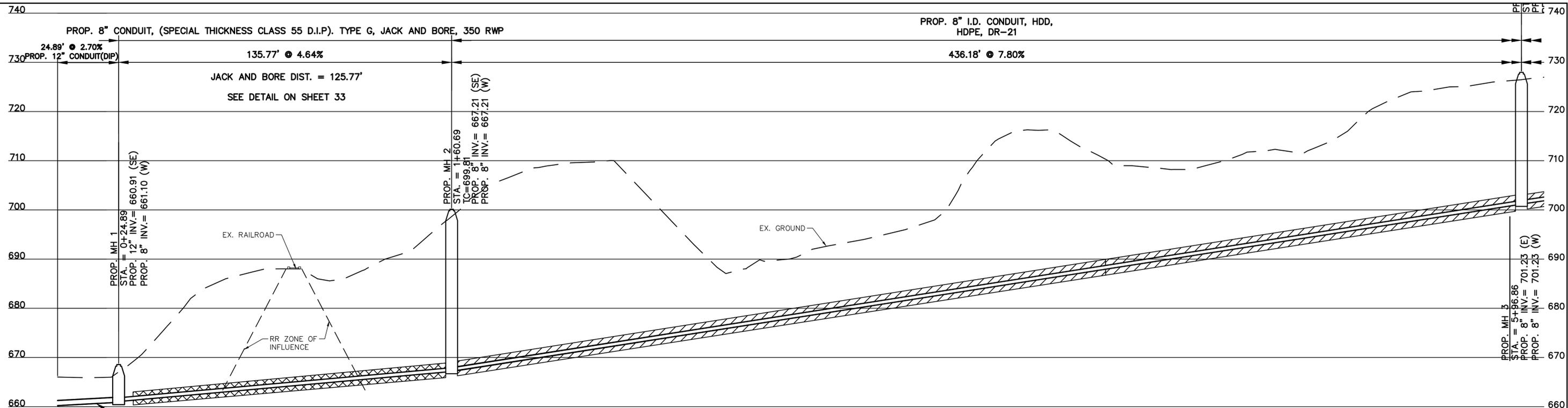
**M S D**  
WASTEWATER  
ENGINEERING

**PROPOSED PROJECT NO. 10370025**  
FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
COACHLITE

SCALE: HORIZ. 1"=150'

**SHEET INDEX**  
**SHEET INDEX**

PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER\_WASTEWATER\600 CAD\SSA\BASE\KENWOOD\_HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:27 PM  
 PLOTTED BY: RUMMINS



NOTE:  
UNCOVER THE EXISTING 12" SEWER STUB AS FIRST ORDER OF BUSINESS - INCLUDE COST WITH 603.

REVISIONS			
BY:	DATE:	REVISIONS	DESCRIPTION:



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**M S D**  
WASTEWATER  
ENGINEERING

**PROPOSED PROJECT NO. 10370025**

FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG COACHLITE

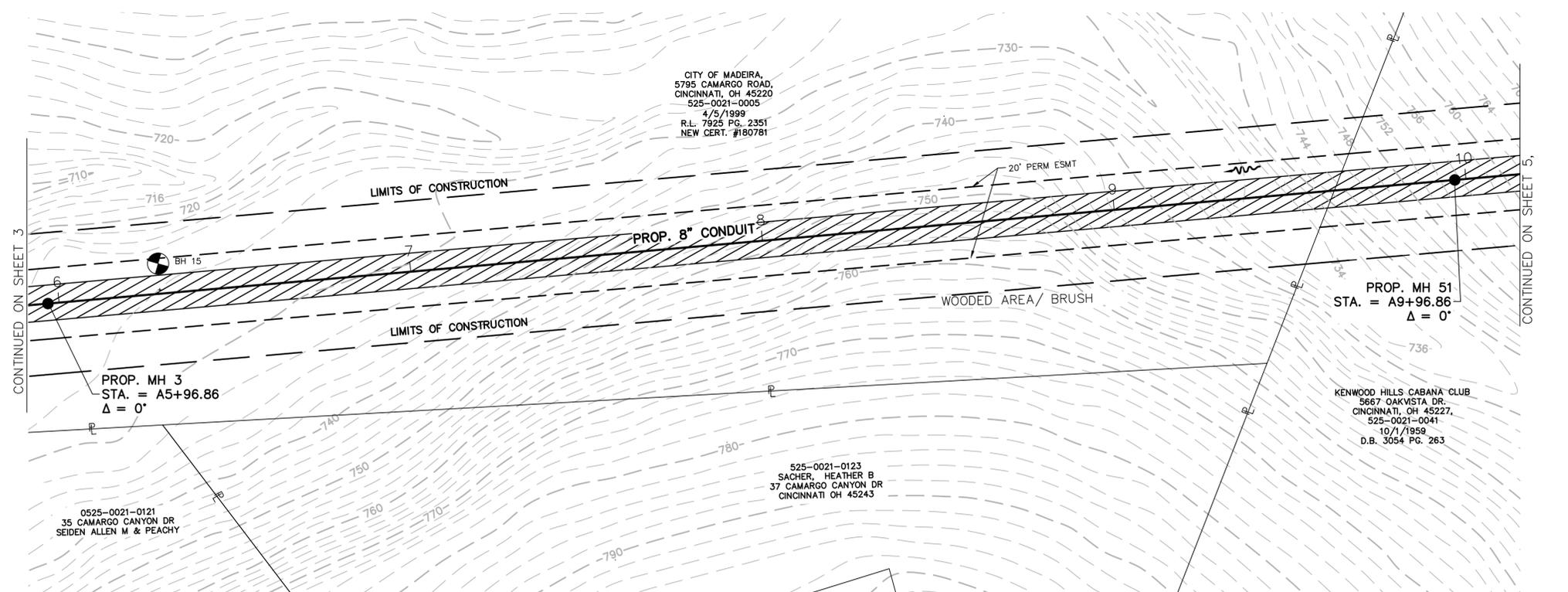
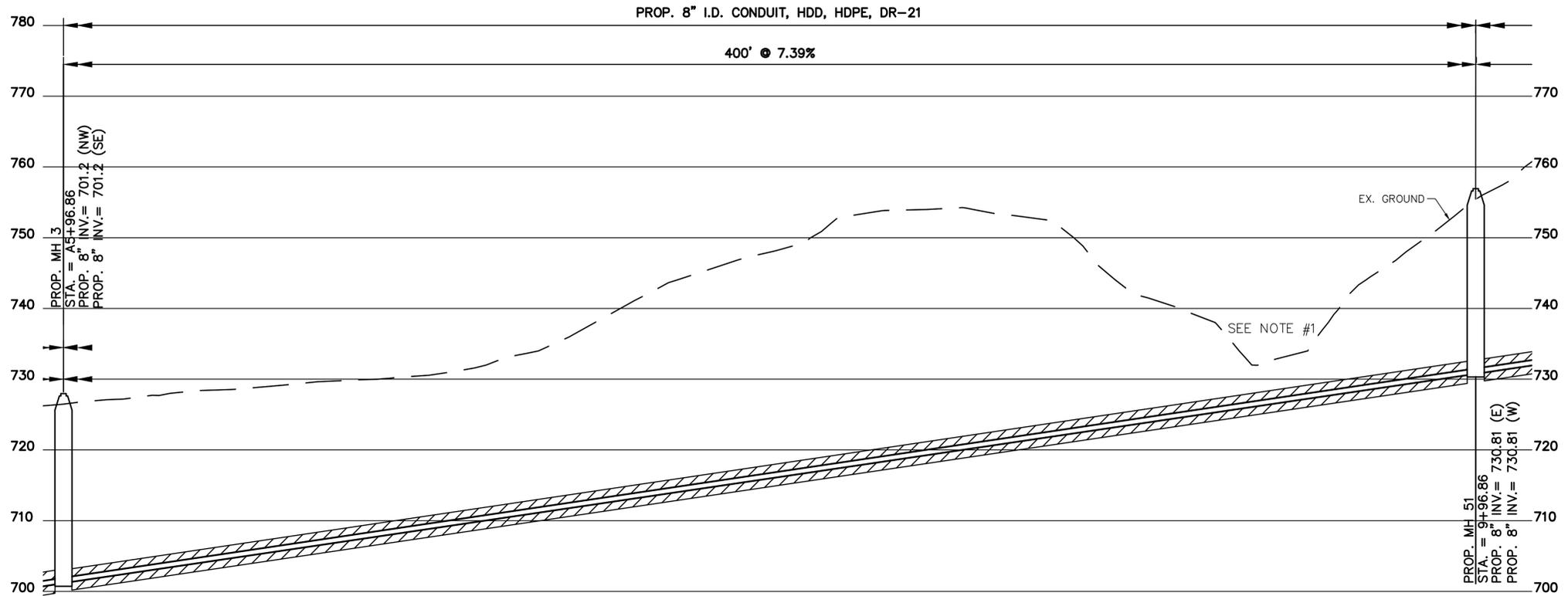
SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

**MH 1 TO MH 3**

**PLAN AND PROFILE**

PATH: N:\JOBS\2018\18926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:28 PM  
 PLOTTED BY: RUMMINS

CONTINUED ON SHEET 4, STA. 5+95



NOTES  
 1. DIRECTIONAL DRILLING RISK OF FRAC-OUT IN THIS AREA. CONTRACTOR TO PROVIDE MITIGATION/MONITORING PLAN BEFORE DRILLING IS STARTED

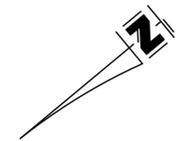
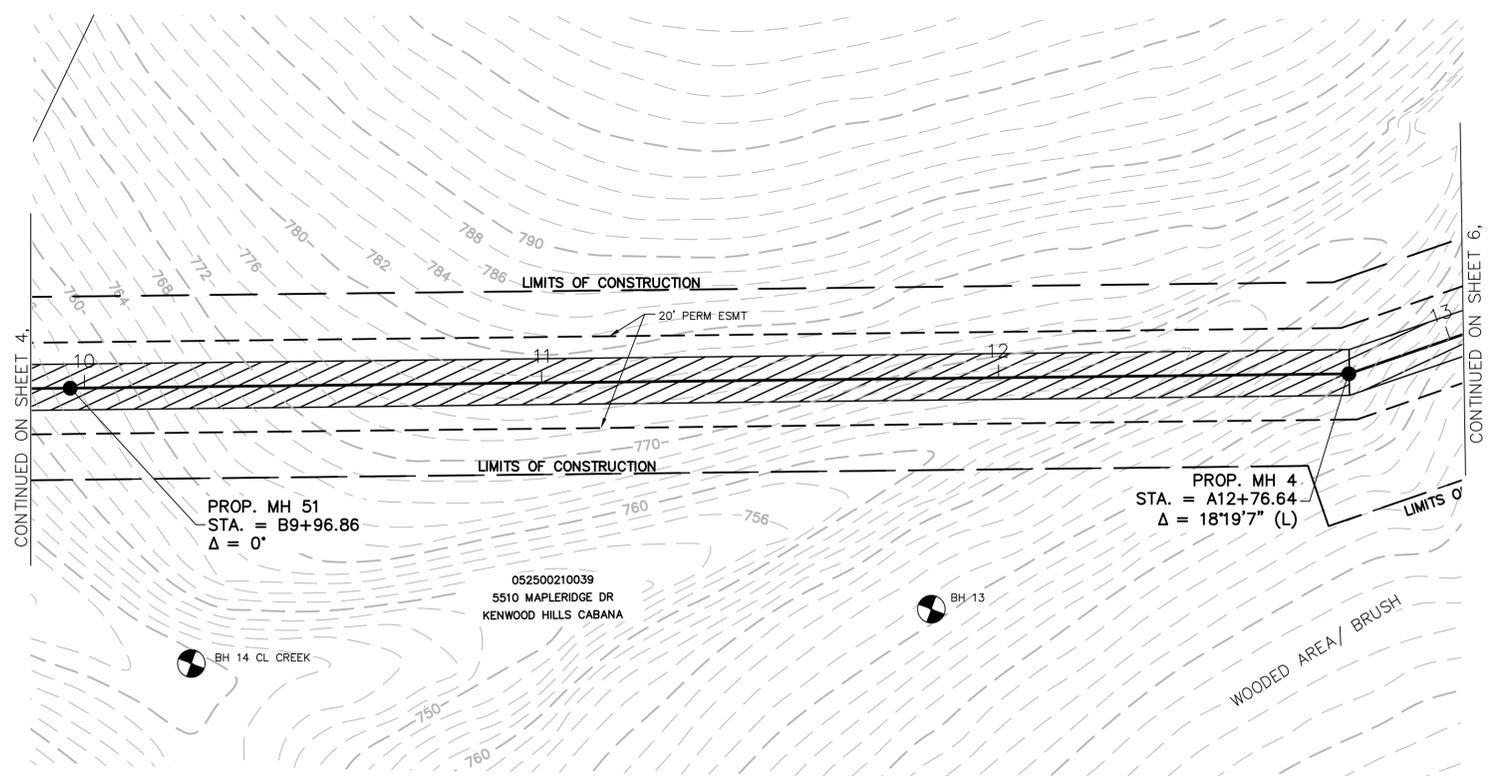
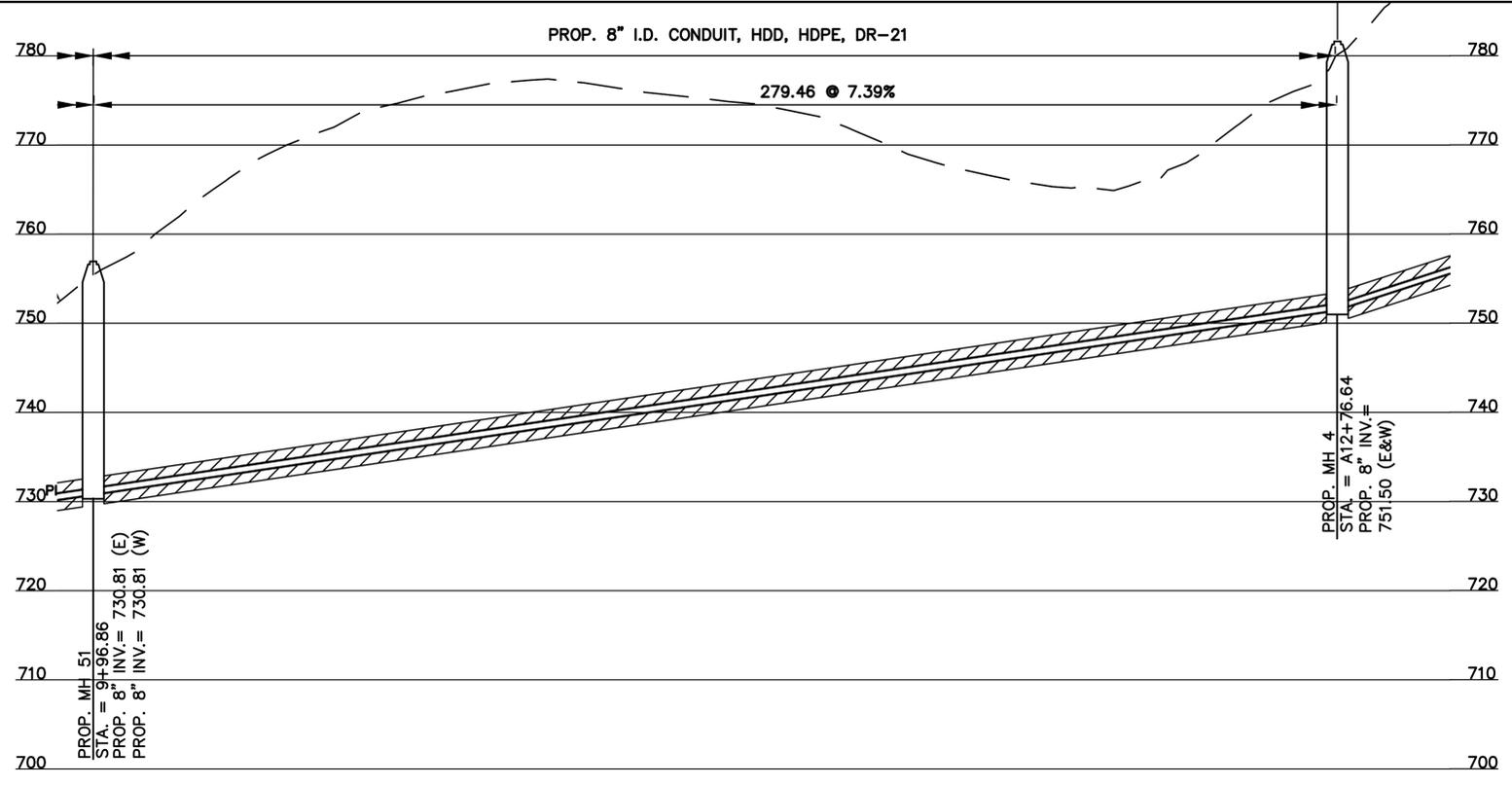
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 DATE: Sep 11, 2024 - 03:28 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	DESCRIPTION:	
DRAWN BY: GAU			

THE METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**MH 3 TO MH 51**  
**PLAN AND PROFILE**



PATH: N:\JOBS\2018\18926 - KENWOOD HILLS LOCAL SEWER WATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:29 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
DRAWN BY: GAU			

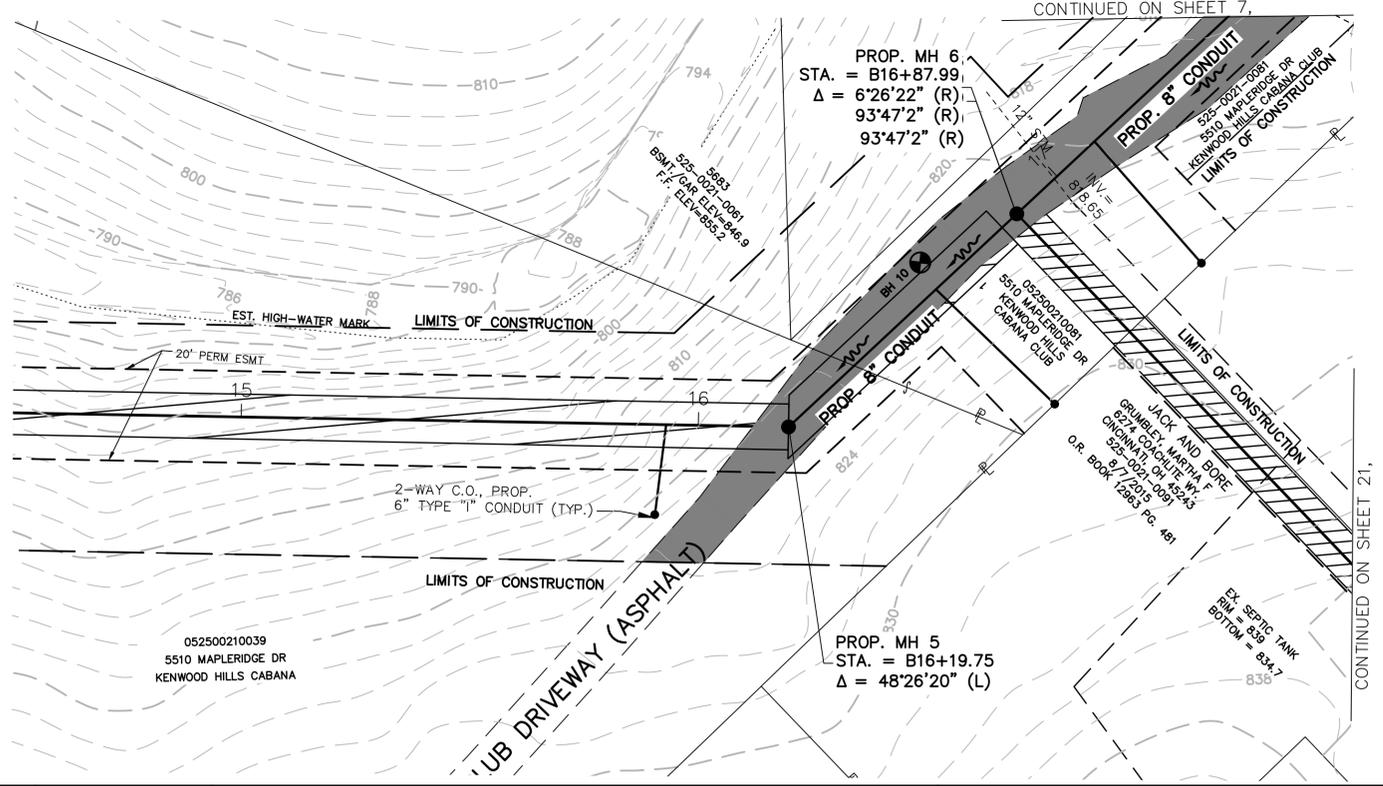
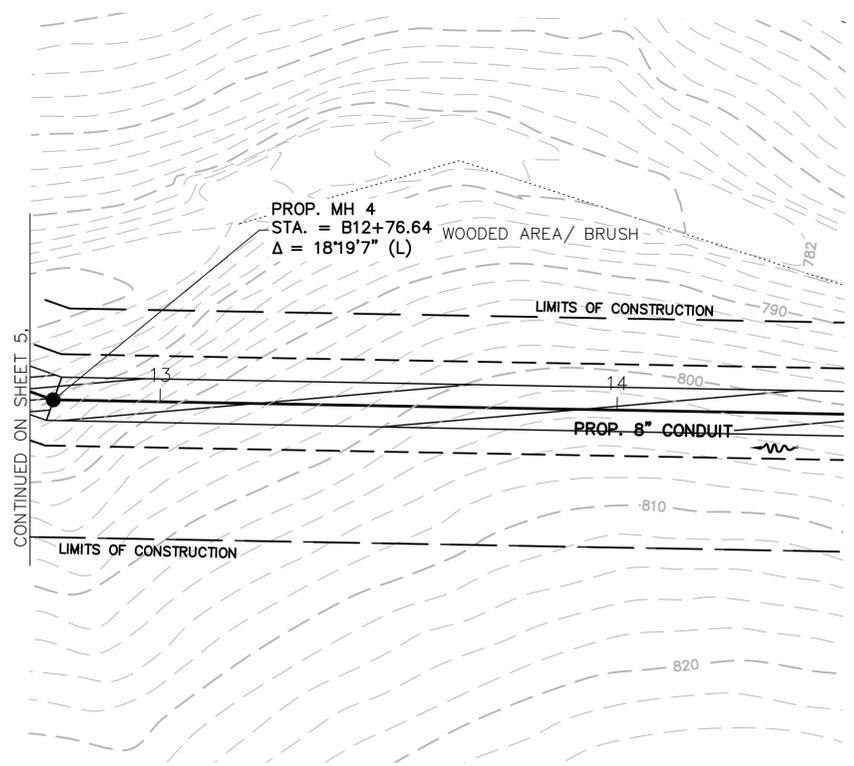
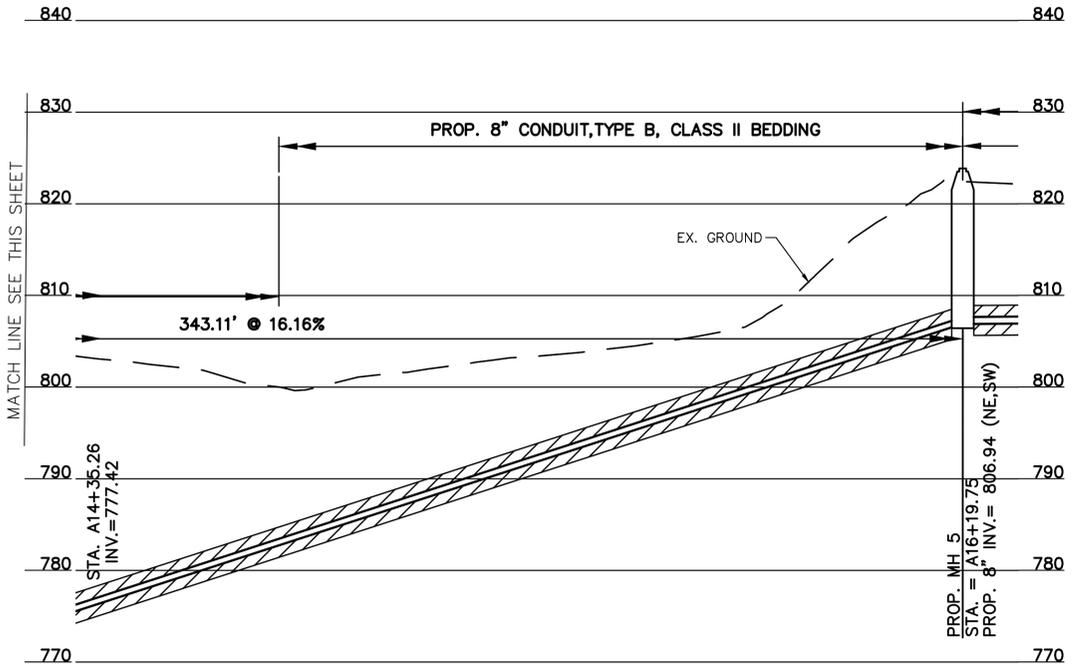
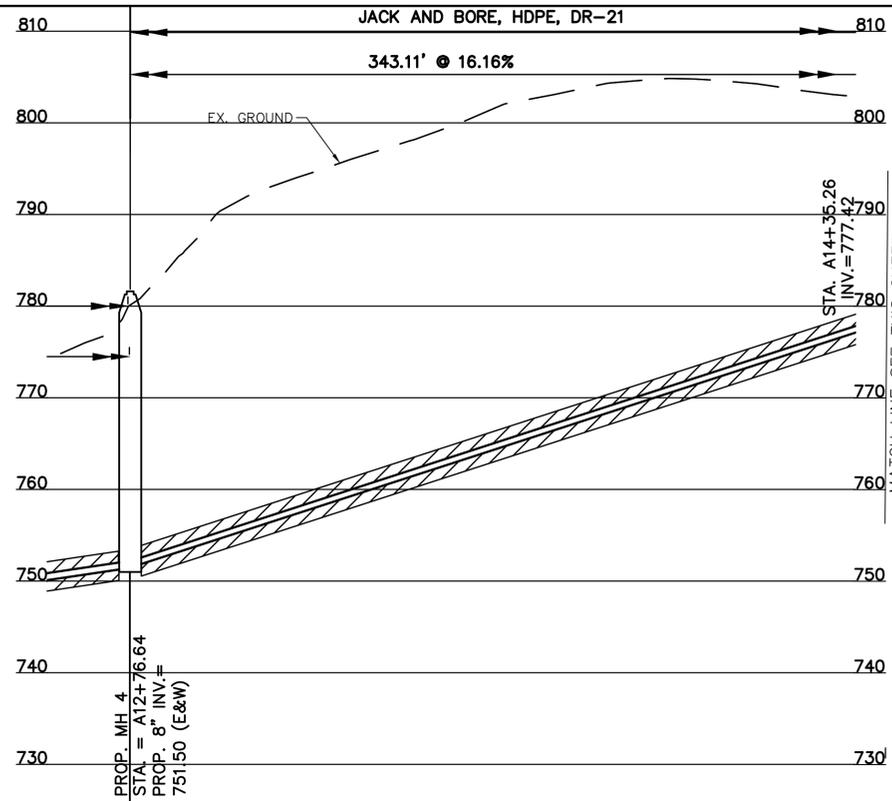


THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**CABANA CLUB DRIVE**  
**PLAN AND PROFILE**



PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:30 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
DRAWN BY: GAU			



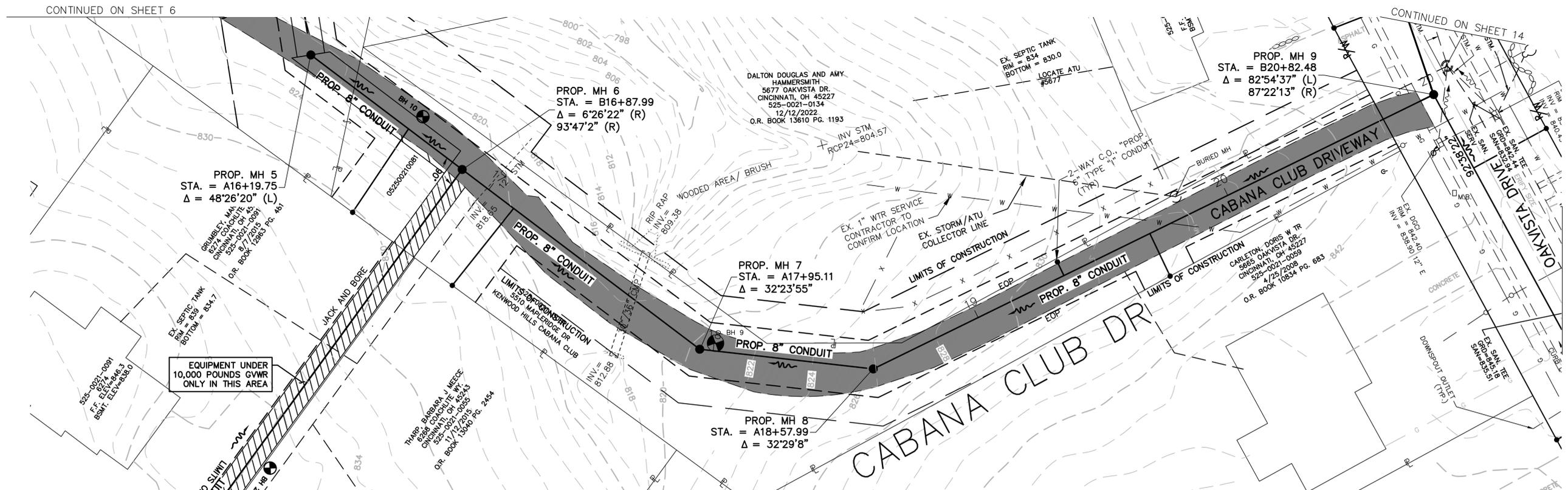
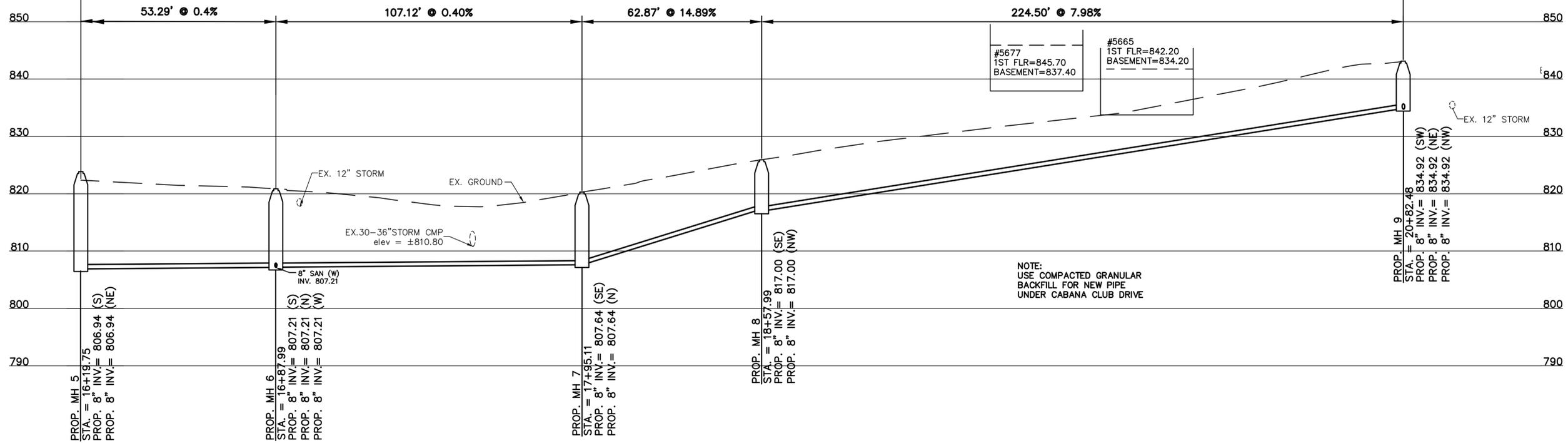
THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO



**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**CABANA CLUB DRIVE**  
**PLAN AND PROFILE**

PROPOSED 8" CONDUIT, TYPE B, CLASS II BEDDING



DESIGNED BY:	BY:	DATE:	REVISIONS	DESCRIPTION:
GEW				
DRAWN BY:	GAU			



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

M S D  
WASTEWATER  
ENGINEERING

**PROPOSED PROJECT NO. 10370025**

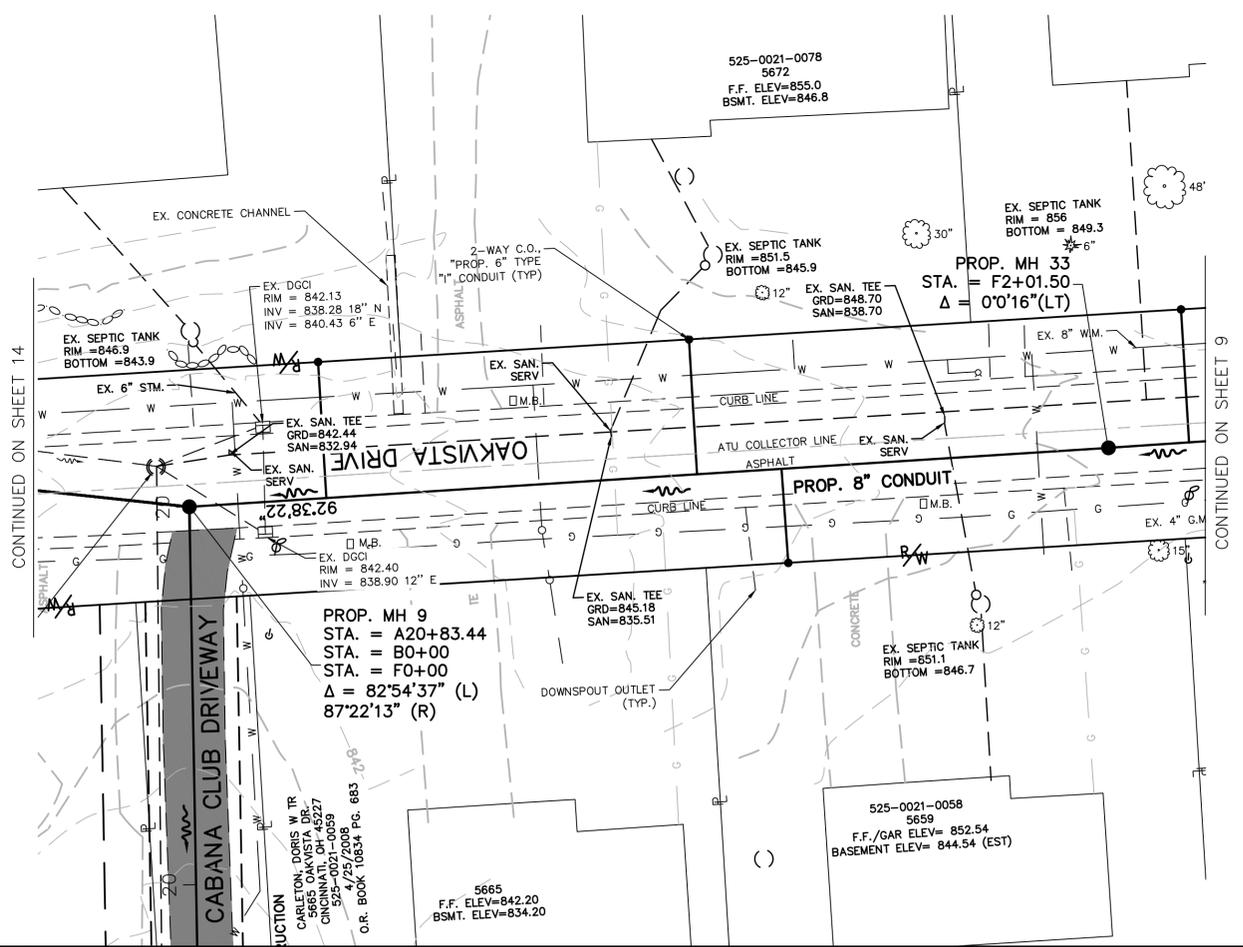
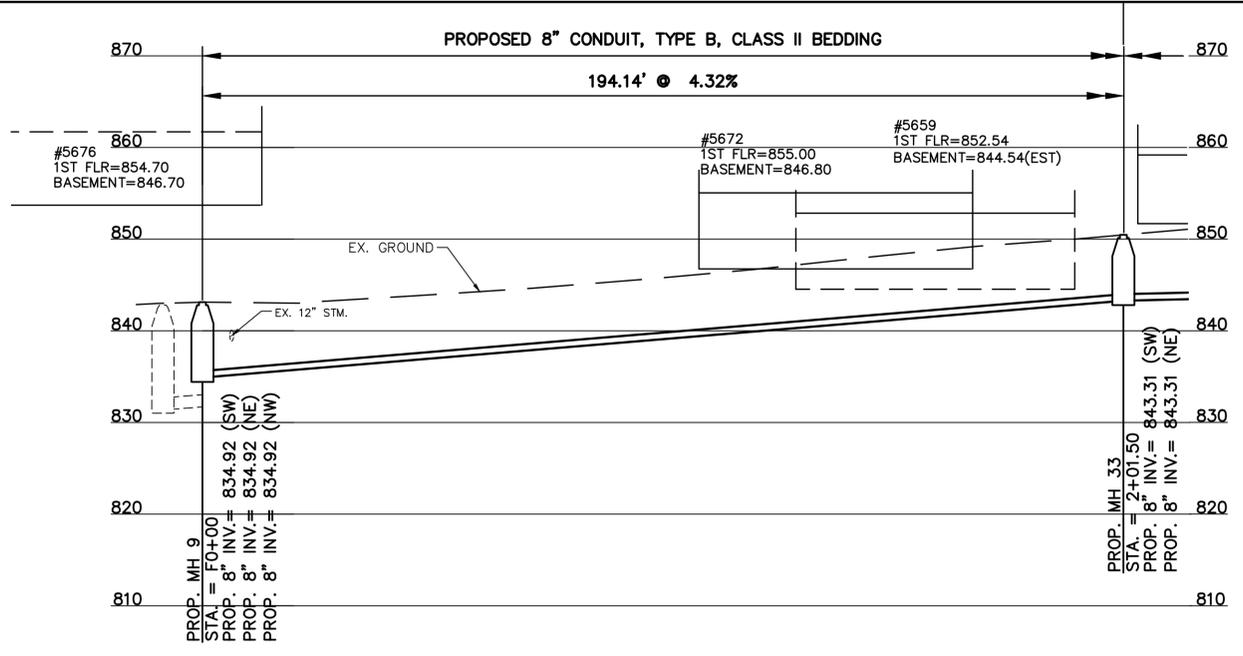
FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
COACHLITE

SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

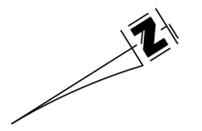
**CABANA CLUB DRIVE**

**PLAN AND PROFILE**

PATH: N:\JOBS\2018\18926 - KENWOOD HILLS LOCAL SEWER WATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:31 PM  
 PLOTTED BY: RUMMINS



NOTE:  
 OAKVISTA DRIVE REQUIRES  
 FULL WIDTH MILL AND PAVE.



DESIGNED BY: GEW	REVISIONS		
	BY:	DATE:	DESCRIPTION:
DRAWN BY: GAU			



THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

M S D  
 WASTEWATER  
 ENGINEERING

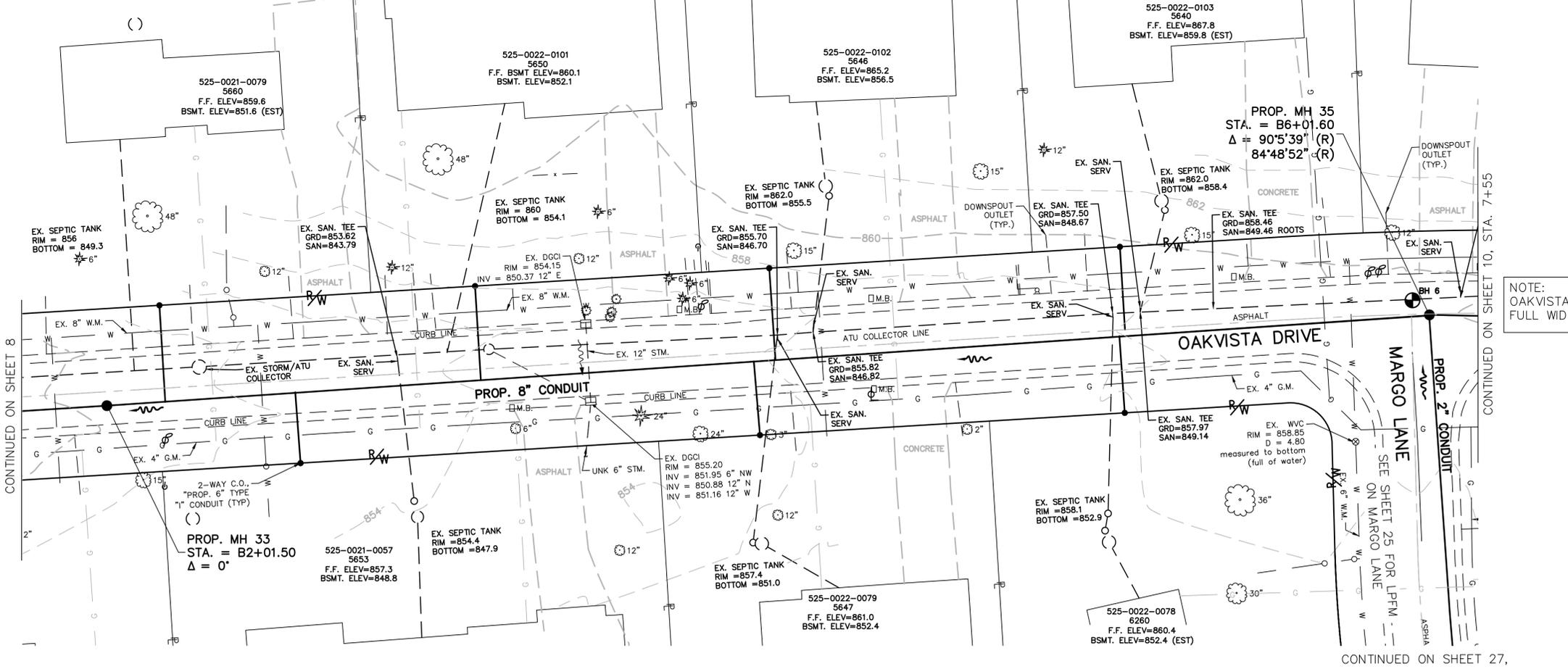
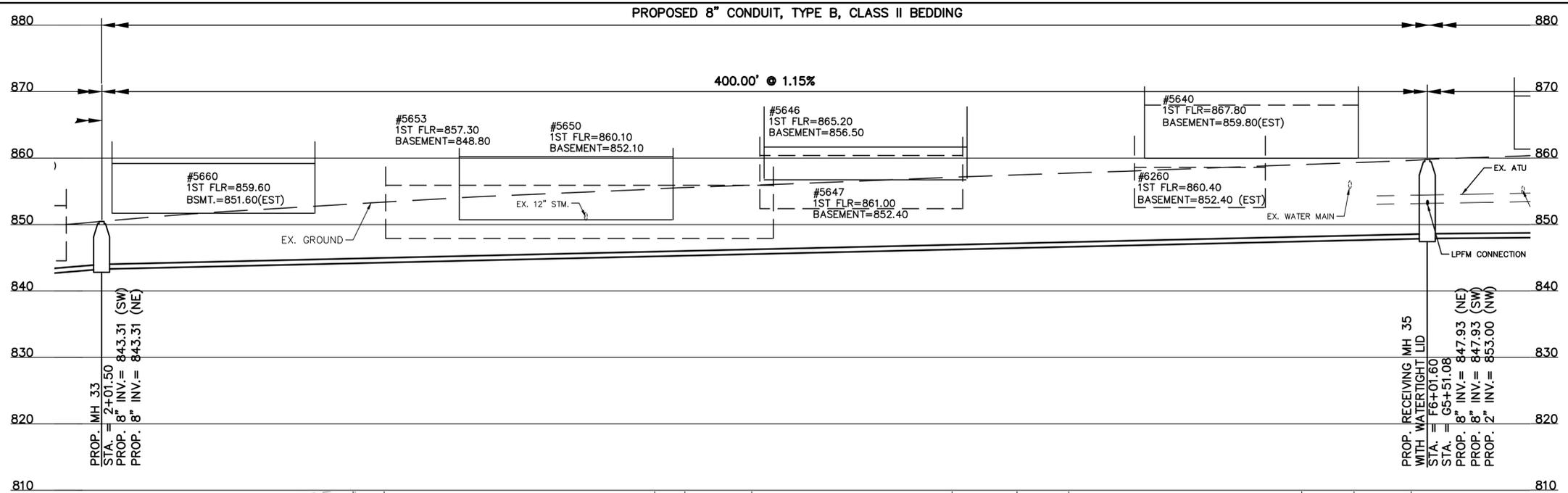
**PROPOSED PROJECT NO. 10370025**

FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**OAKVISTA DRIVE**

**PLAN AND PROFILE**



PATH: N:\085\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:31 PM  
 PLOTTED BY: RUMMINS

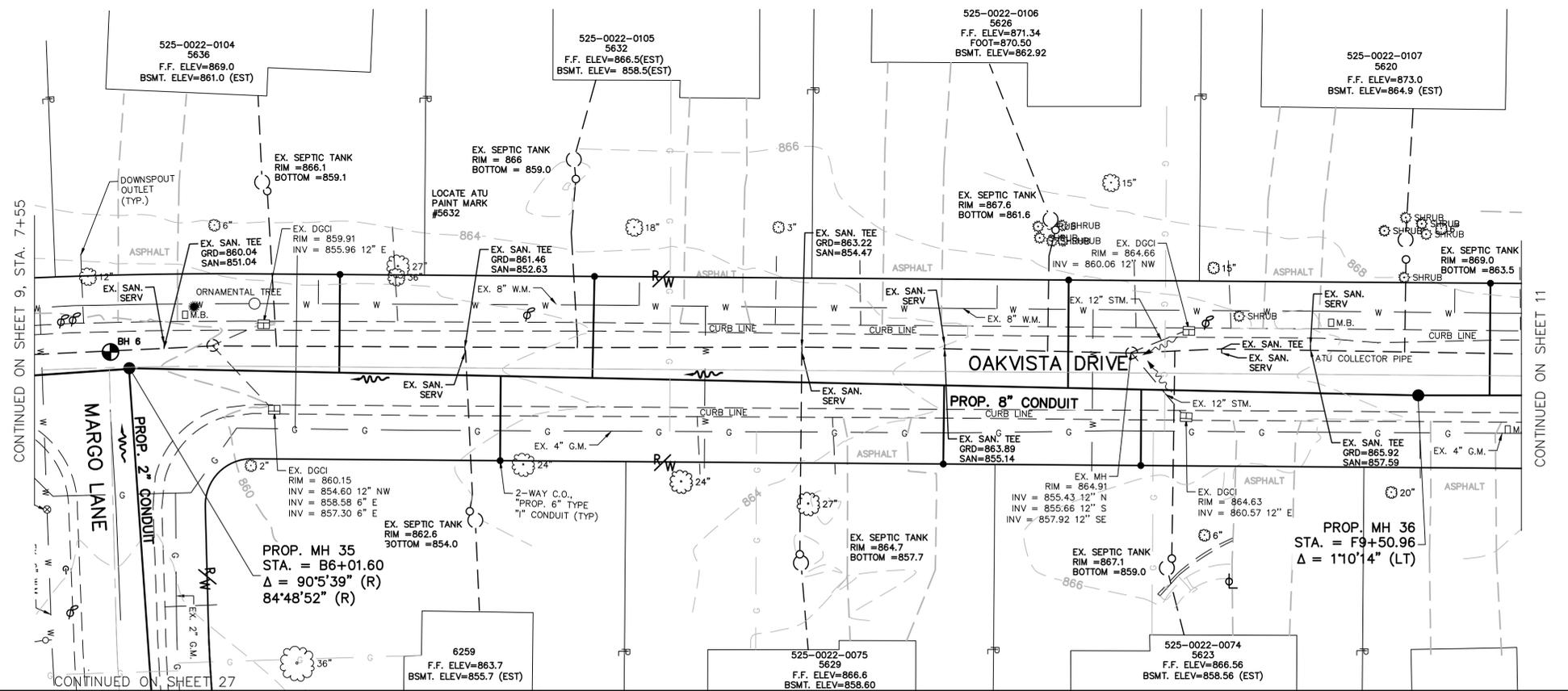
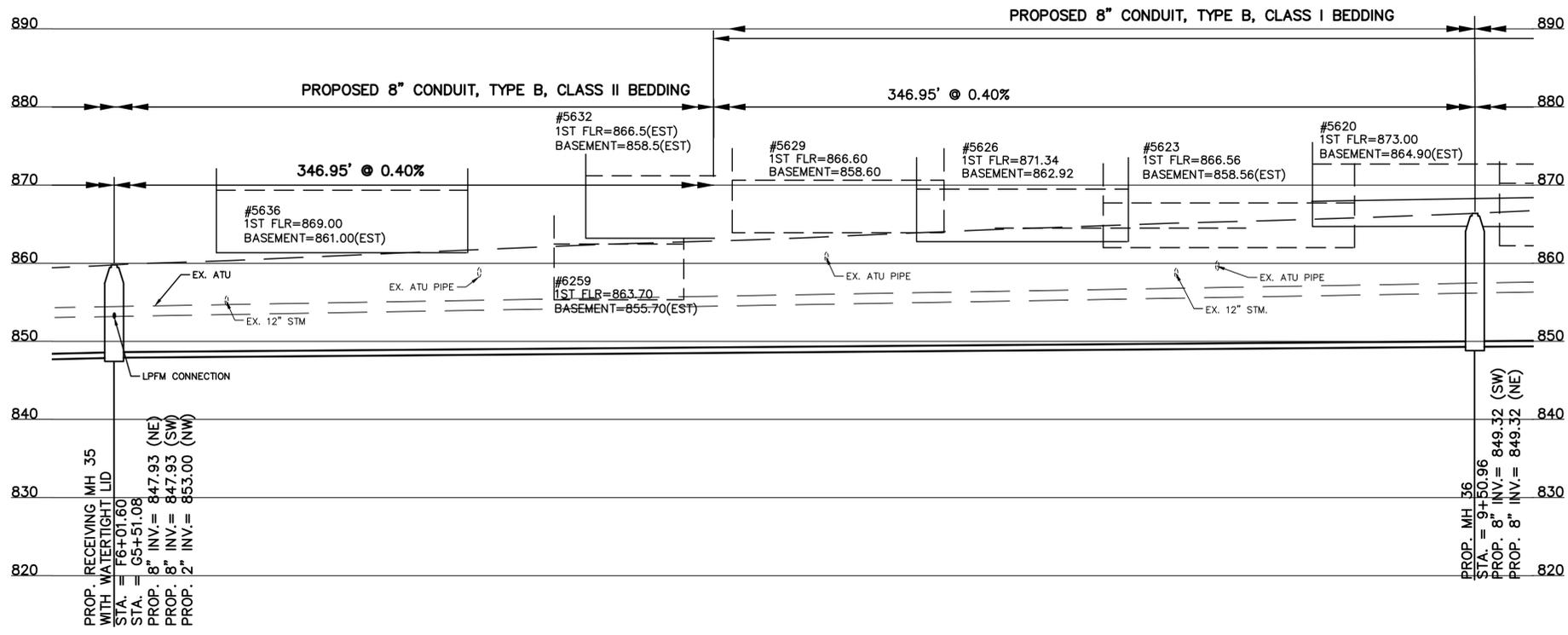
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BY:	DATE:		DESCRIPTION:



THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**OAKVISTA DRIVE**  
**PLAN AND PROFILE**



NOTE:  
OAKVISTA DRIVE REQUIRES  
FULL WIDTH MILL AND PAVE.

PATH: N:\085\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
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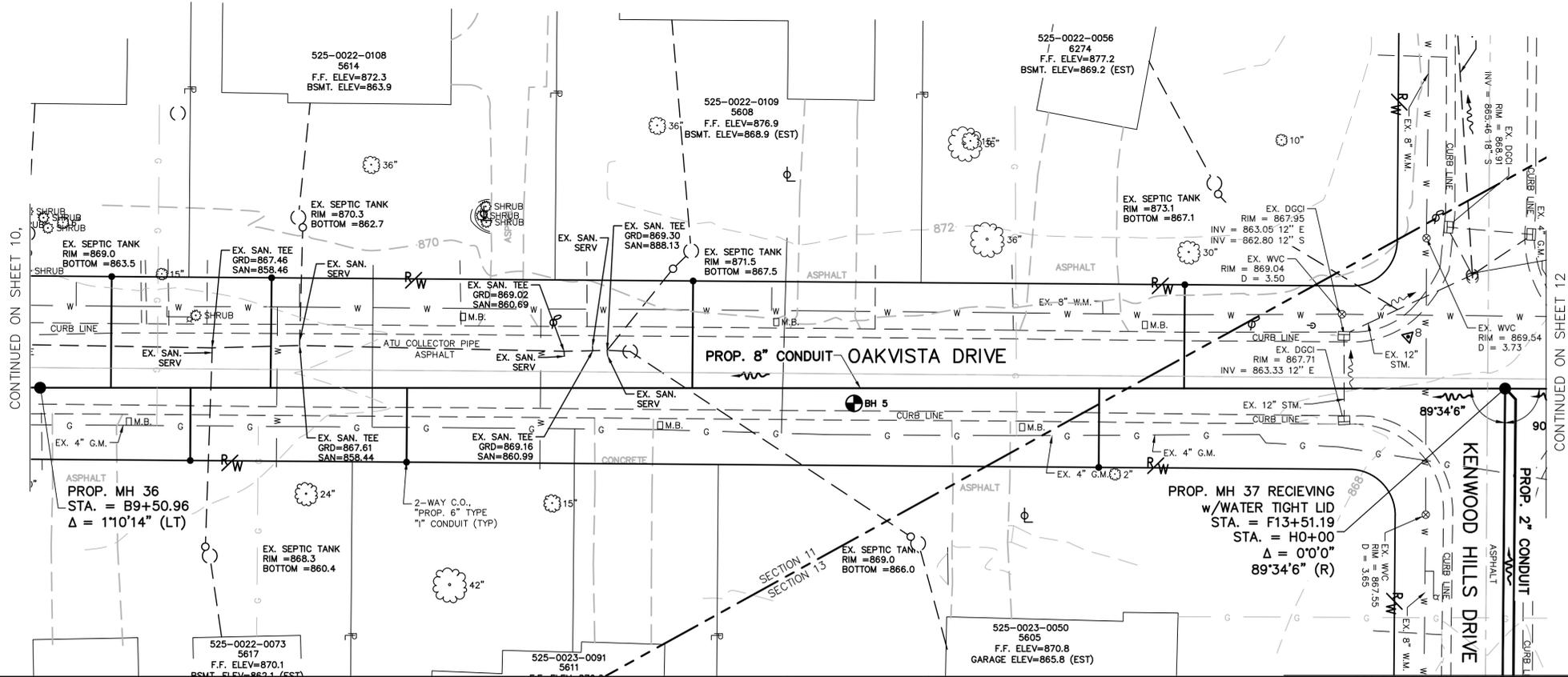
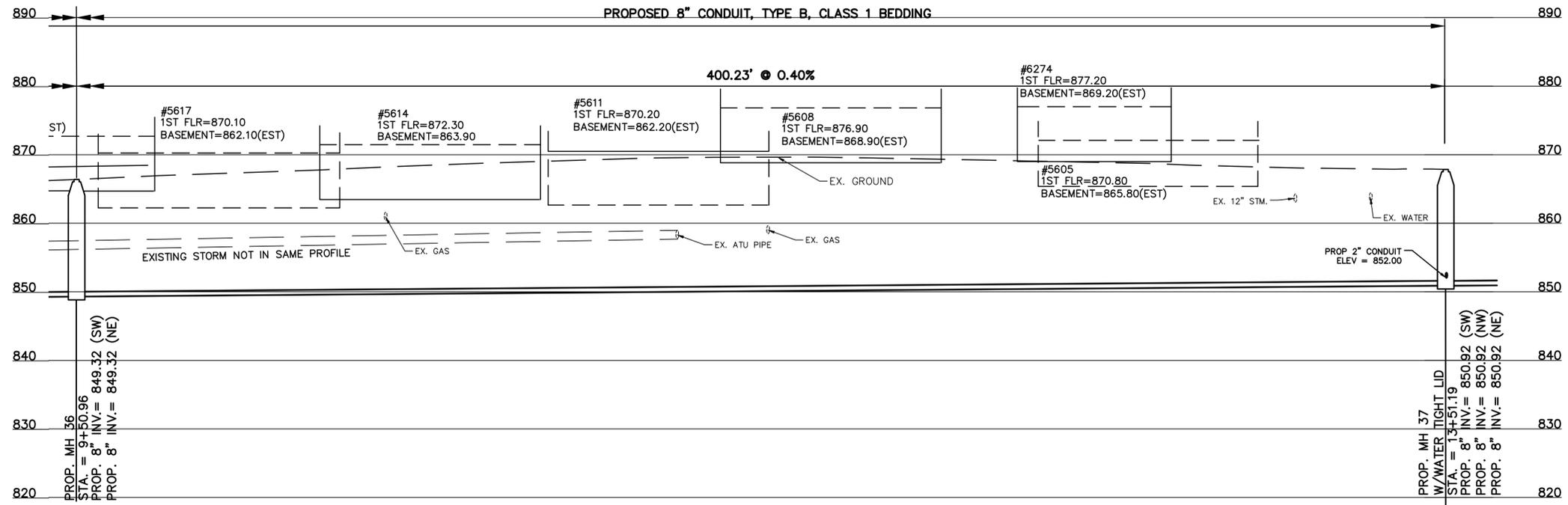
DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
GAU			



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**OAKVISTA DR AT MARGO LANE**  
**PLAN AND PROFILE**



NOTE: OAKVISTA DRIVE REQUIRES FULL WIDTH MILL AND PAVE.

PATH: N:\085\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:33 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:

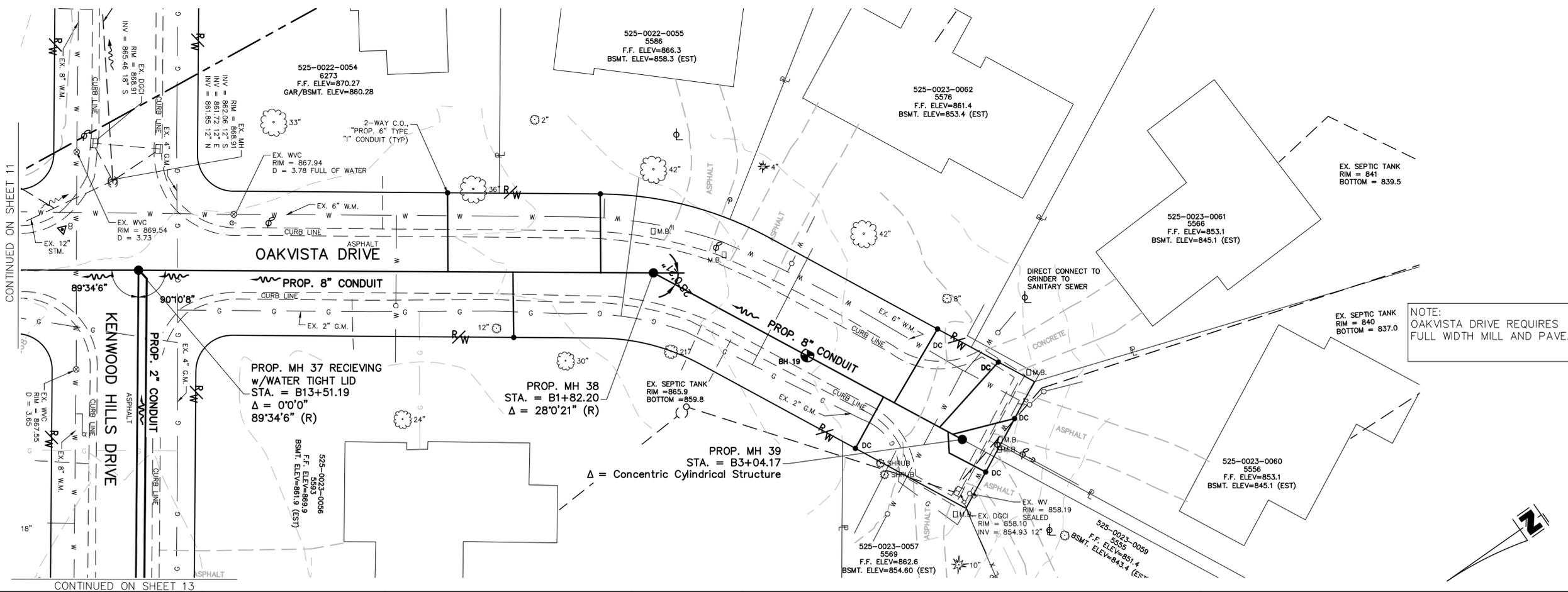
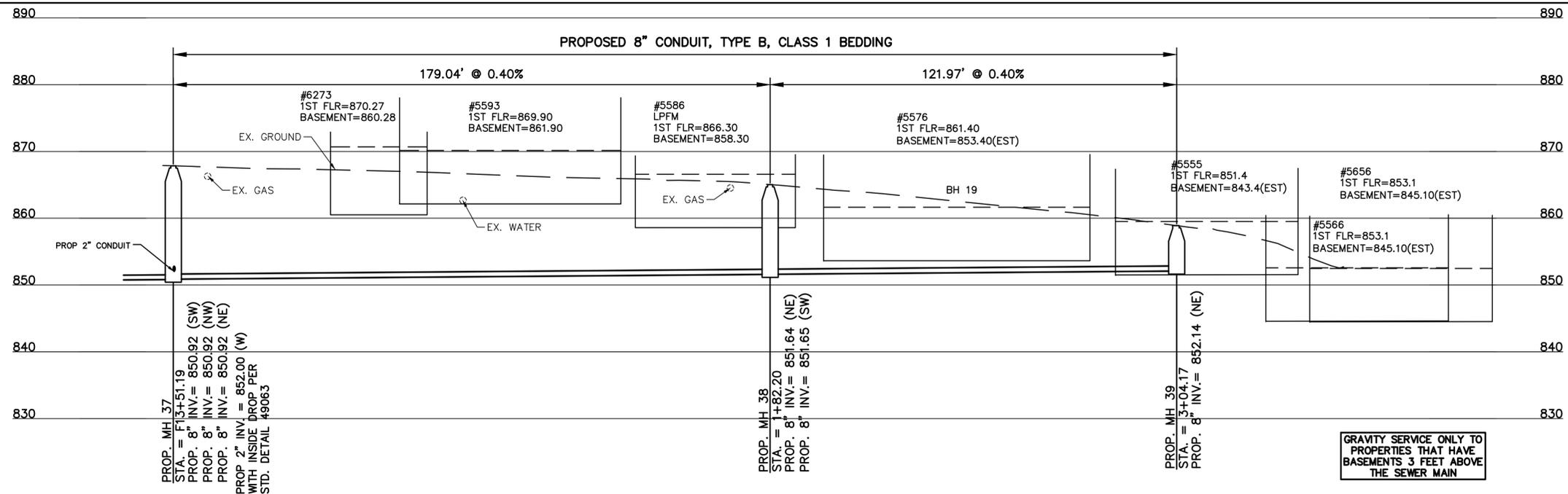


THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

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 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**OAKVISTA DR AT MARGO LANE**  
**PLAN AND PROFILE**



CONTINUED ON SHEET 13

CONTINUED ON SHEET 11

PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:33 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
DRAWN BY: GAU			



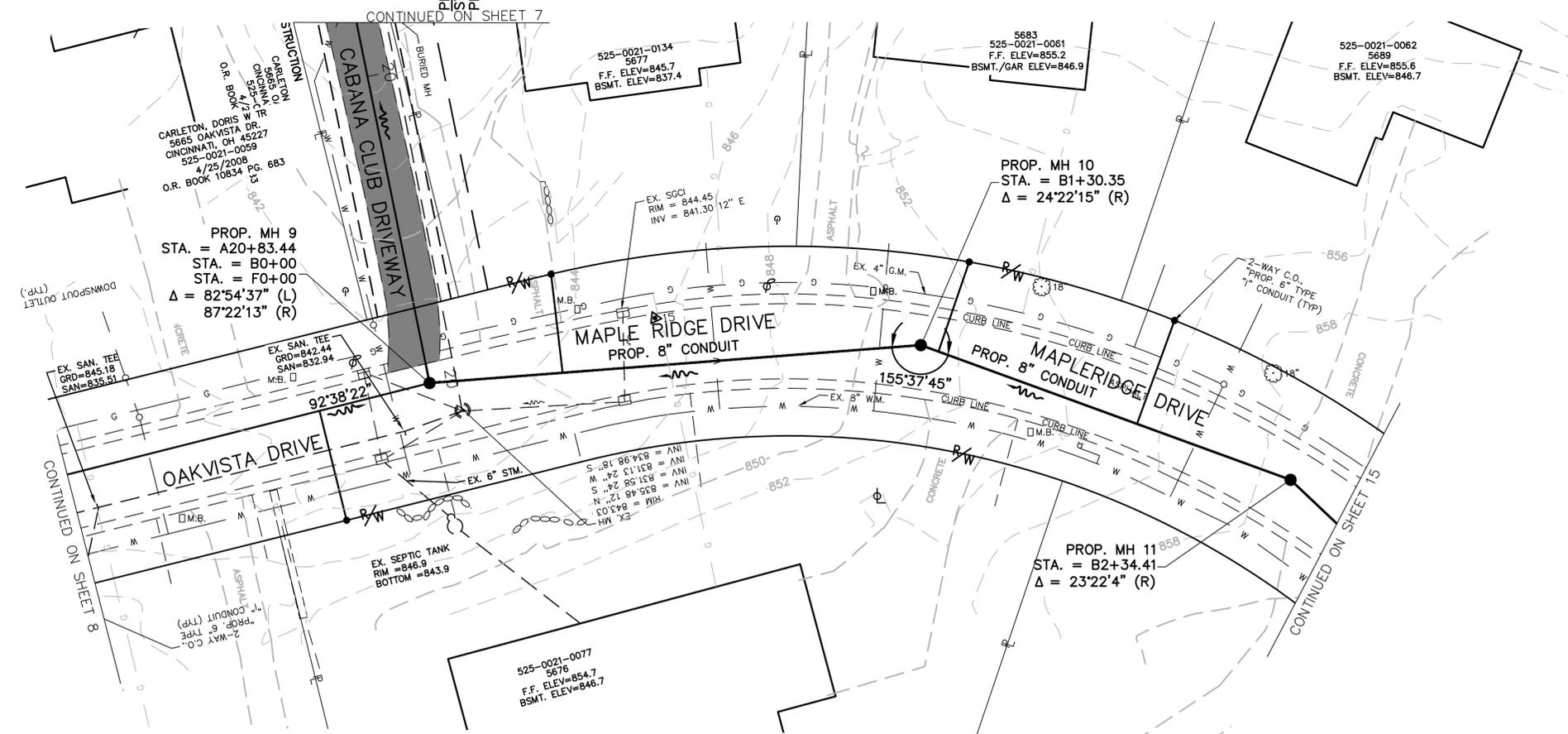
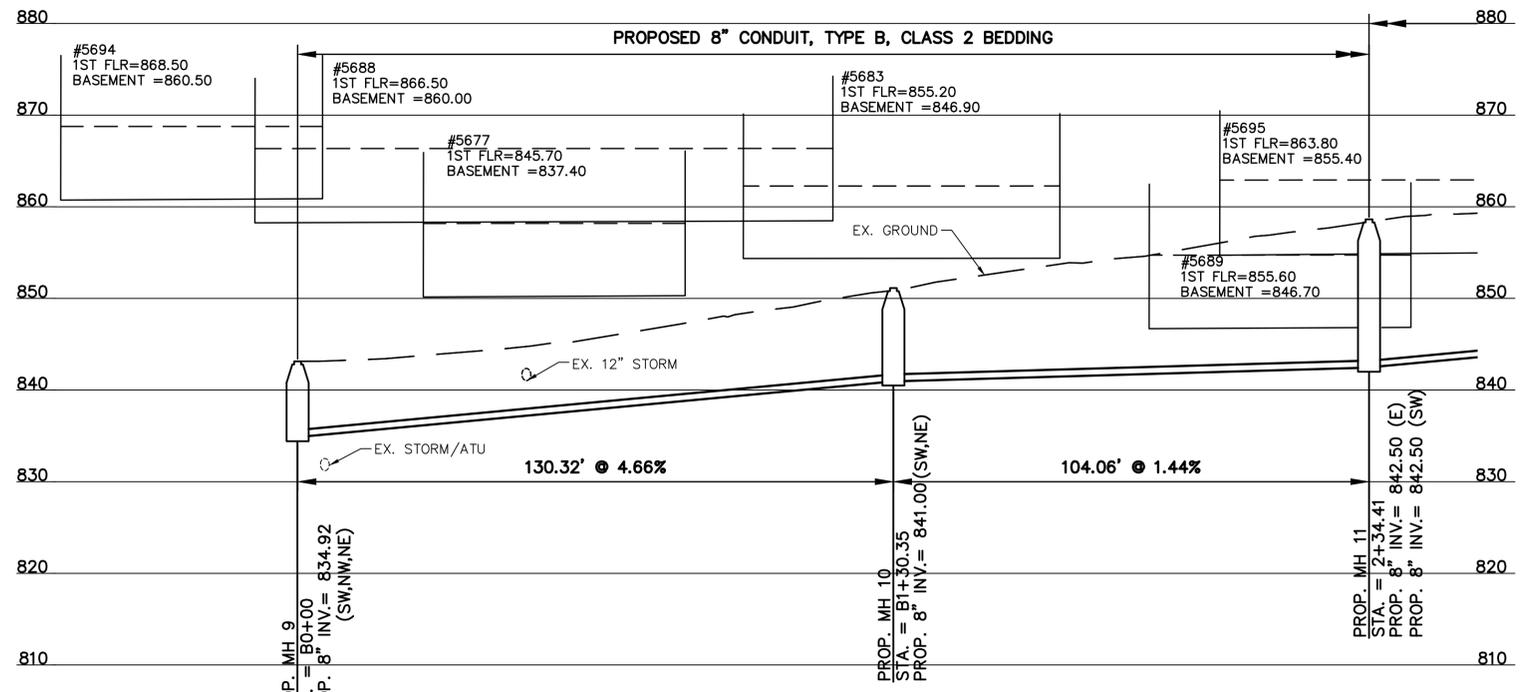
THE METROPOLITAN SEWER DISTRICT  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**OAKVISTA DRIVE**  
**PLAN AND PROFILE**





PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:34 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	DESCRIPTION:	
DRAWN BY: GAU			

**DYNOTEC**

THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**MSD**  
WASTEWATER  
ENGINEERING

**PROPOSED PROJECT NO. 10370025**

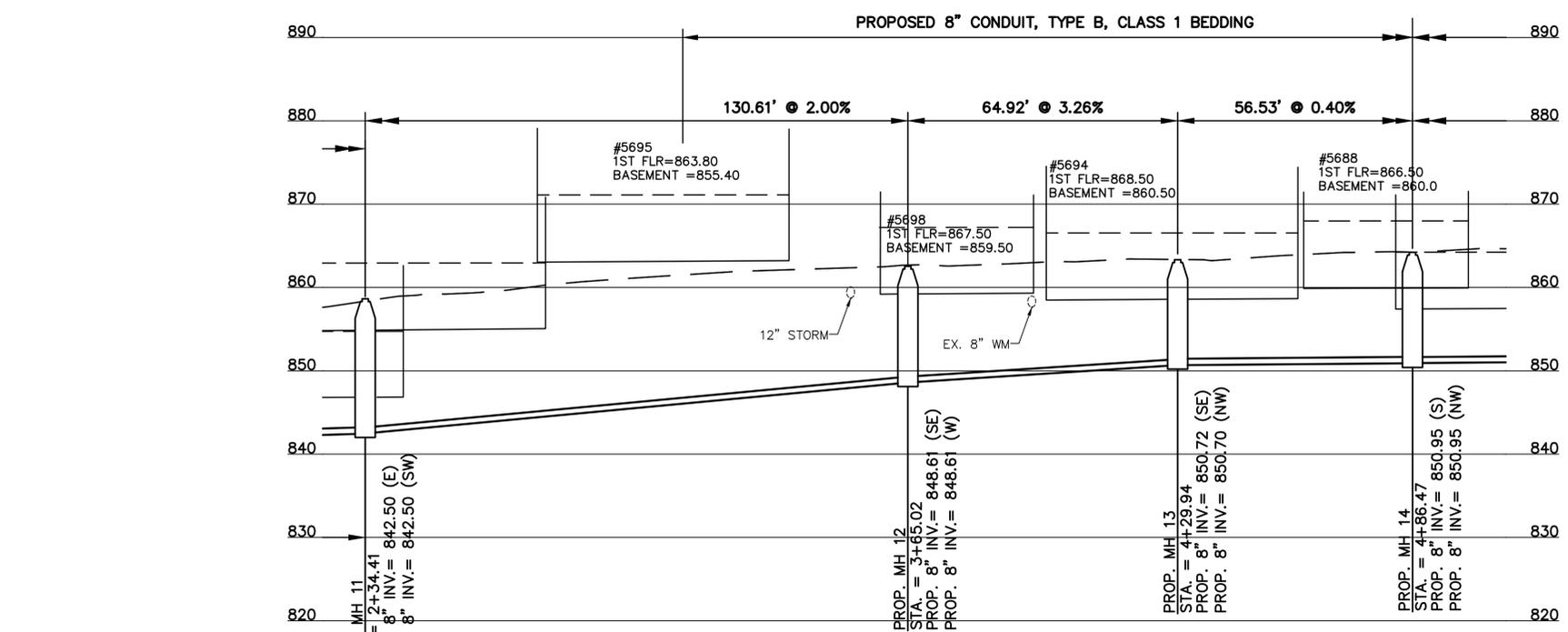
FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
COACHLITE

SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

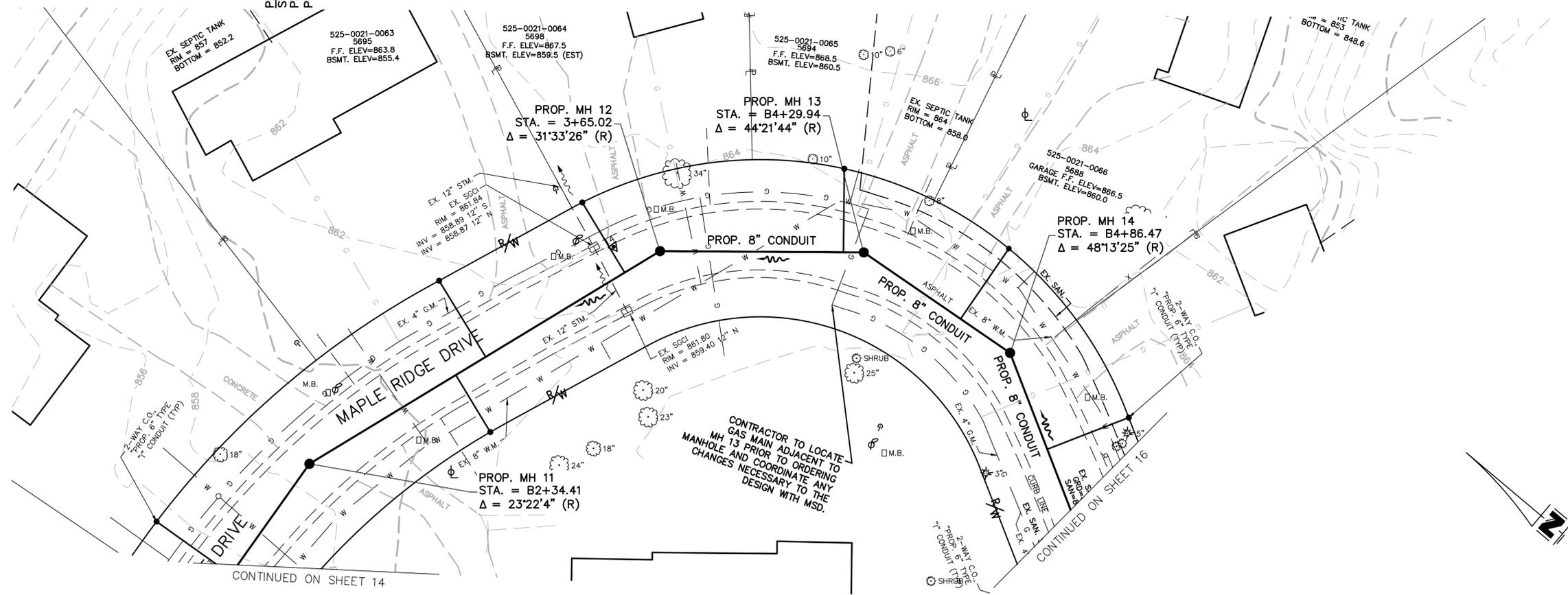
**MAPLERIDGE DRIVE AT NORTH END**

**PLAN AND PROFILE**

PATH: N:\085\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:34 PM  
 PLOTTED BY: RUMMINS



NOTE:  
 MAPLE RIDGE DRIVE REQUIRES  
 FULL WIDTH MILL AND PAVE.



DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:



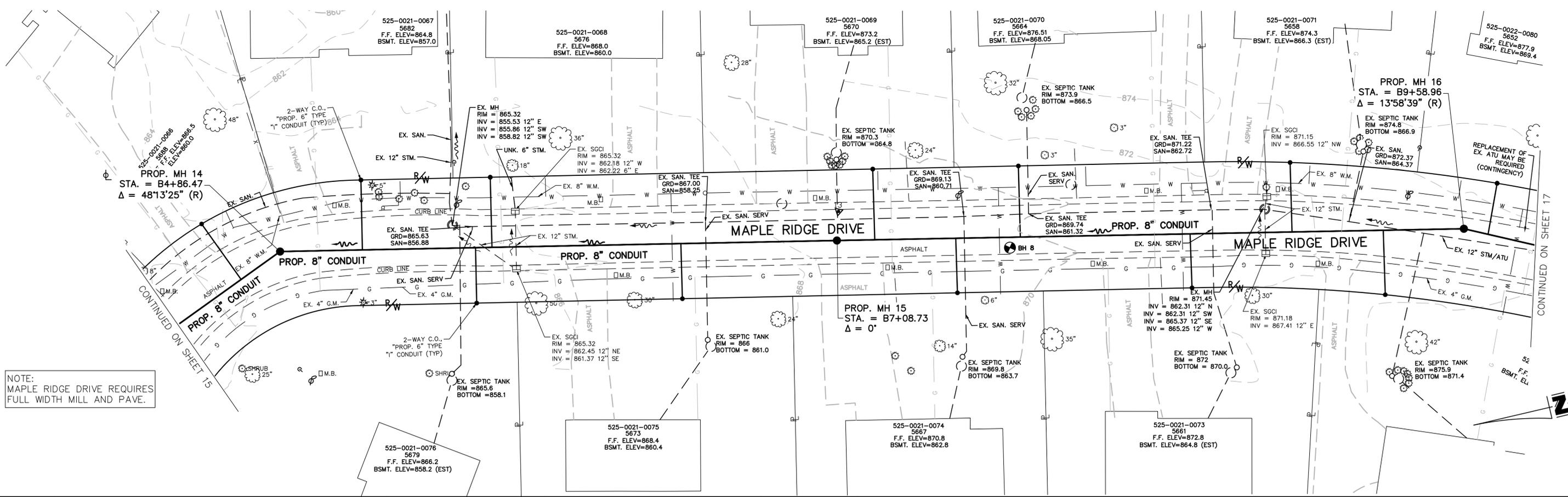
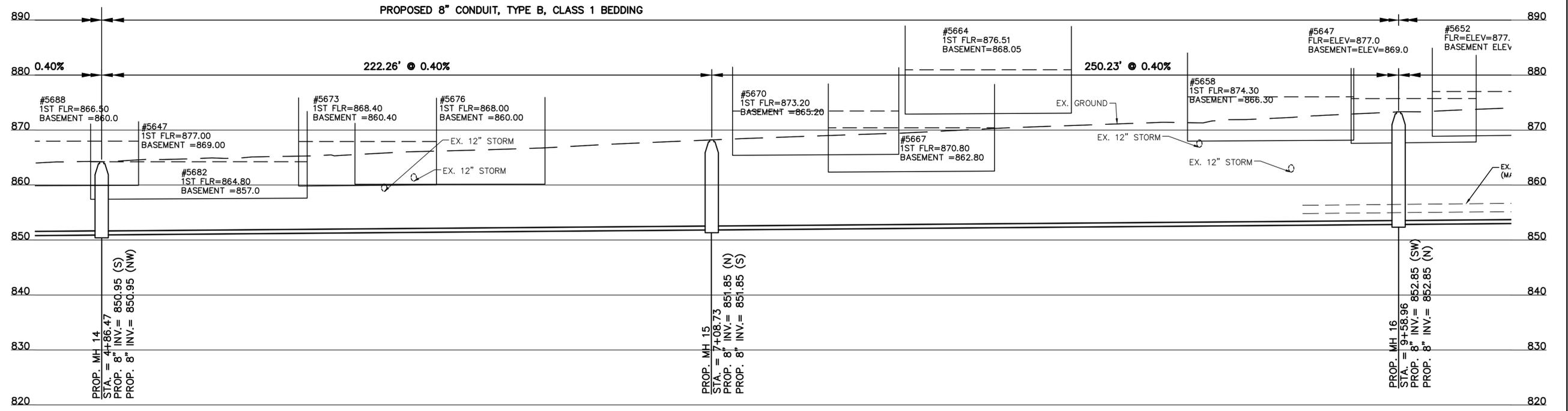
THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
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 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**MAPLERIDGE DRIVE AT NORTH END**

**PLAN AND PROFILE**



NOTE:  
MAPLE RIDGE DRIVE REQUIRES  
FULL WIDTH MILL AND PAVE.

PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:35 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:		DESCRIPTION:



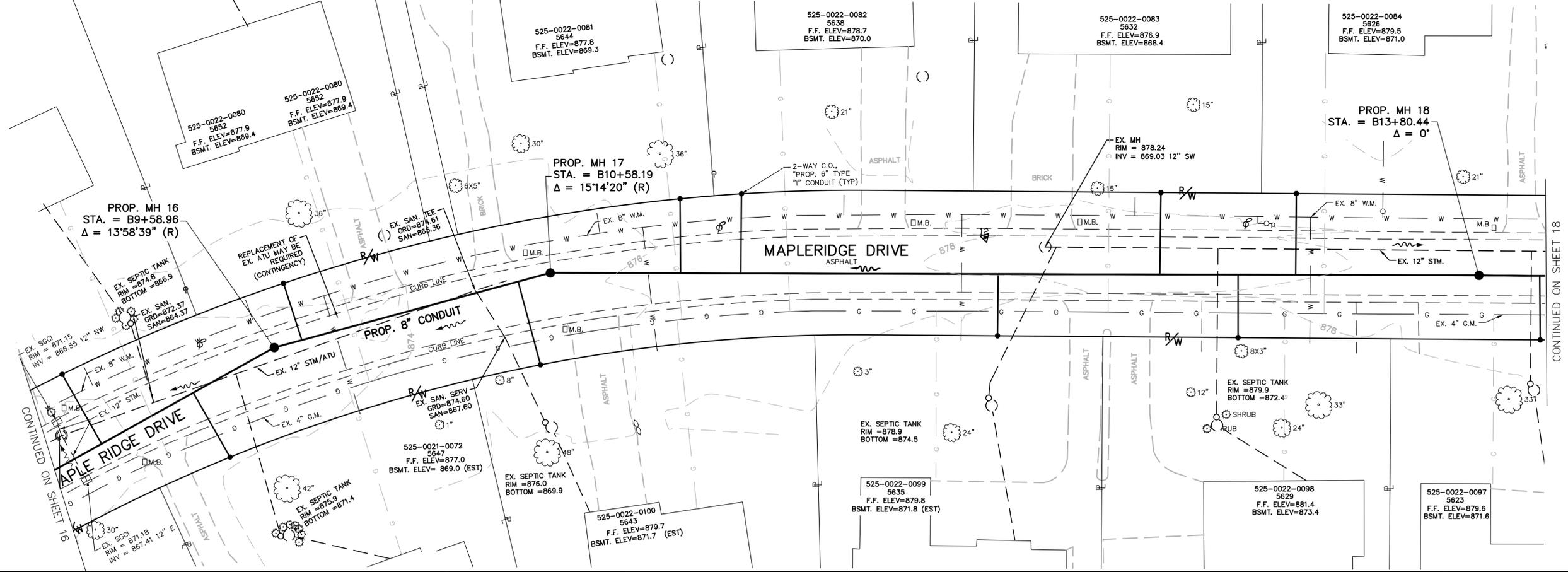
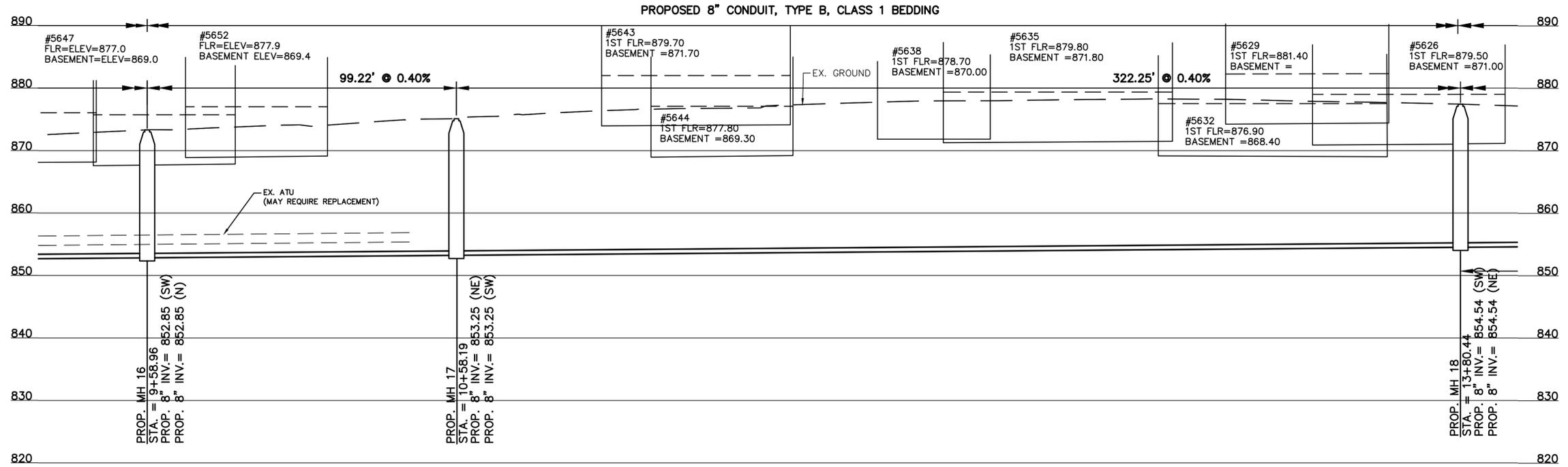
THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO



**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**MAPLERIDGE DRIVE**  
**PLAN AND PROFILE**

PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:35 PM  
 PLOTTED BY: RUMMINS



NOTE:  
 MAPLE RIDGE DRIVE REQUIRES  
 FULL WIDTH MILL AND PAVE.

CONTINUED ON SHEET 18

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
GAU			

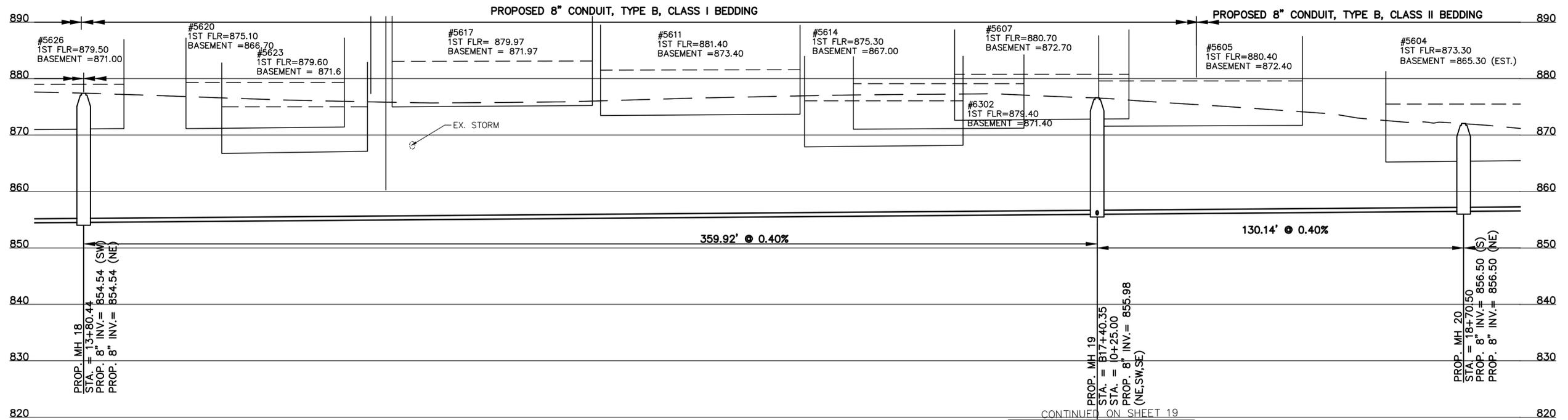


THE METROPOLITAN DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

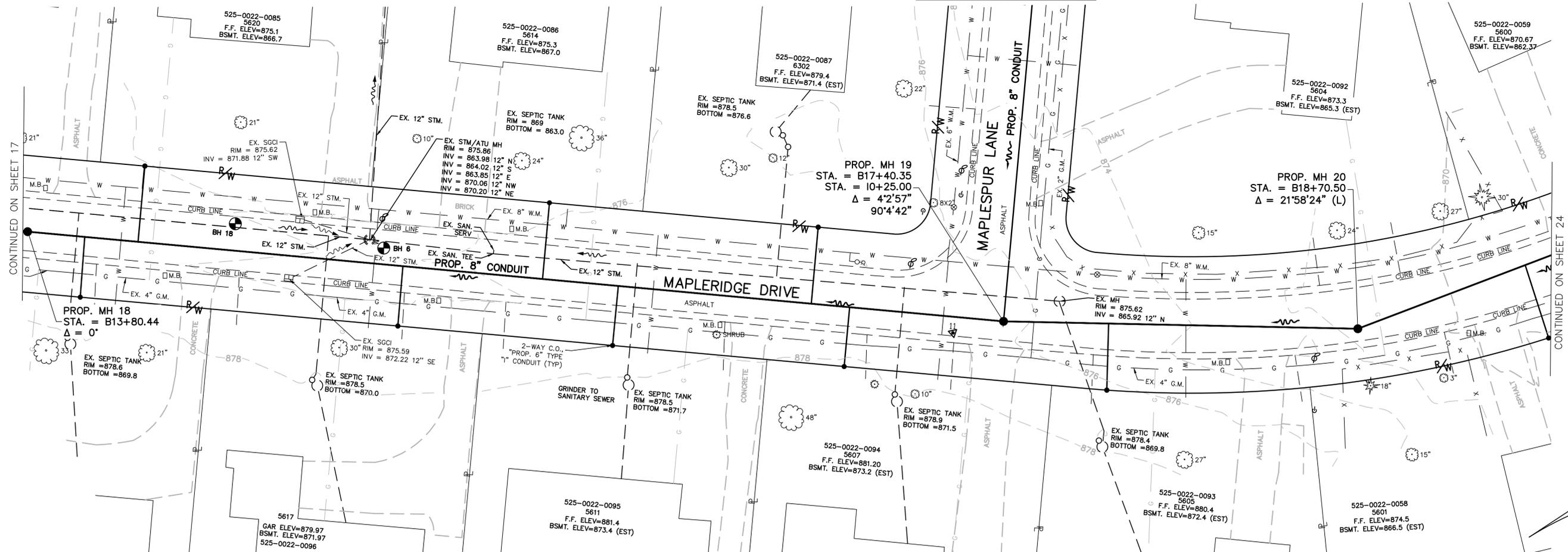


**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**MAPLERIDGE DRIVE N of  
 MAPLESPUR**  
**PLAN AND PROFILE**



NOTE:  
MAPLE RIDGE DRIVE REQUIRES  
FULL WIDTH MILL AND PAVE.



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 DATE: Sep 11, 2024 - 03:36 PM  
 PLOTTED BY: RUMMINS

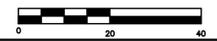
DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
GEW			
GAU			


  
 THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

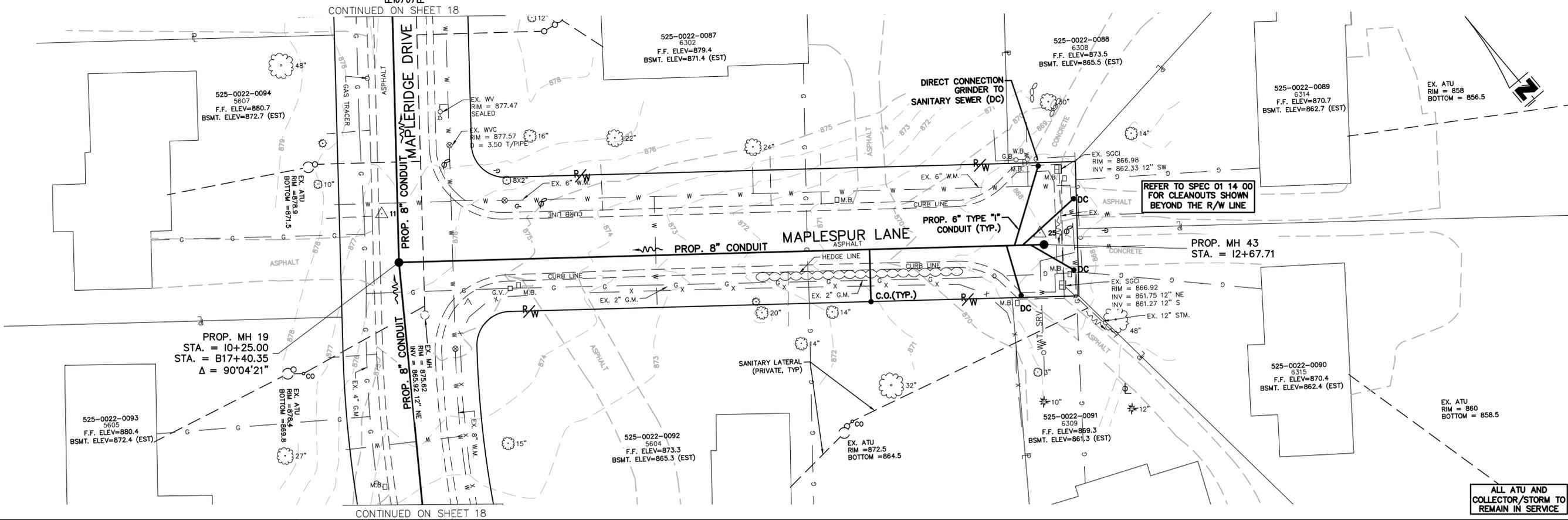
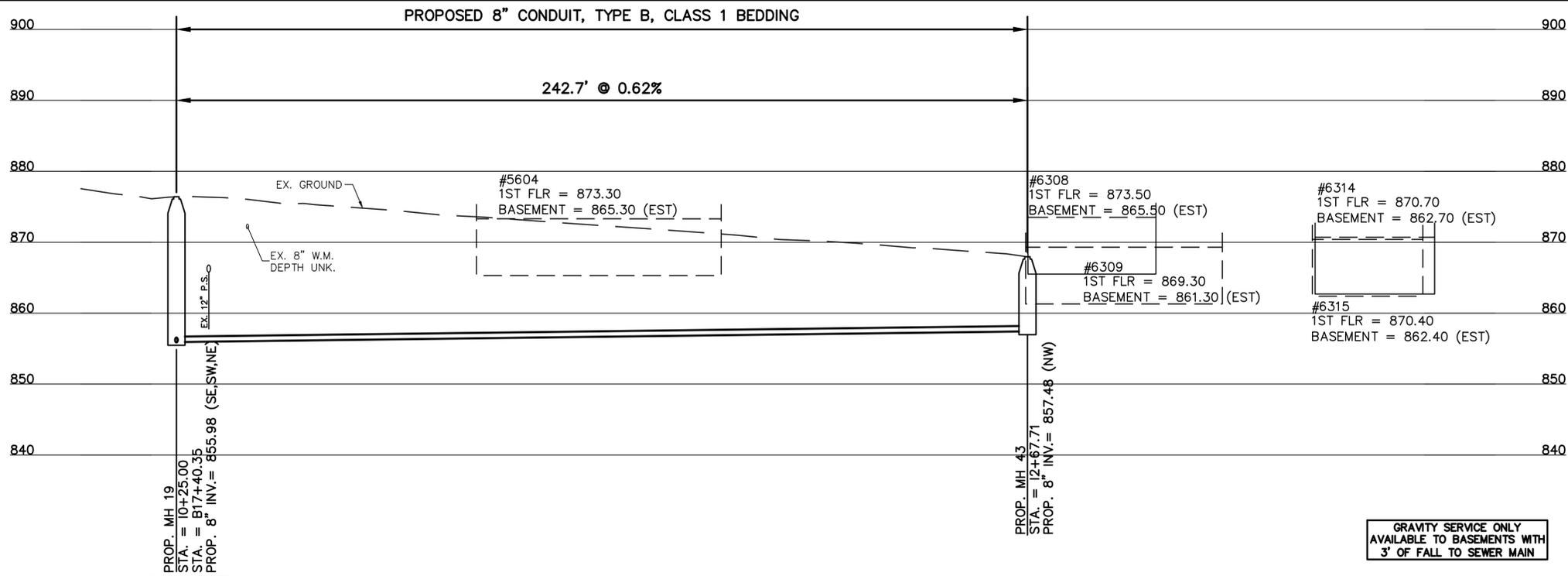

  
 WASTEWATER  
 ENGINEERING

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
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 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'



**MAPLERIDGE & MAPLESPUR**  
**PLAN AND PROFILE**



PATH: N:\PROJECTS\2018\18026 - KENWOOD HILLS LOCAL SEWER\WATER\_WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 - 03:37 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**

FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG COACHLITE

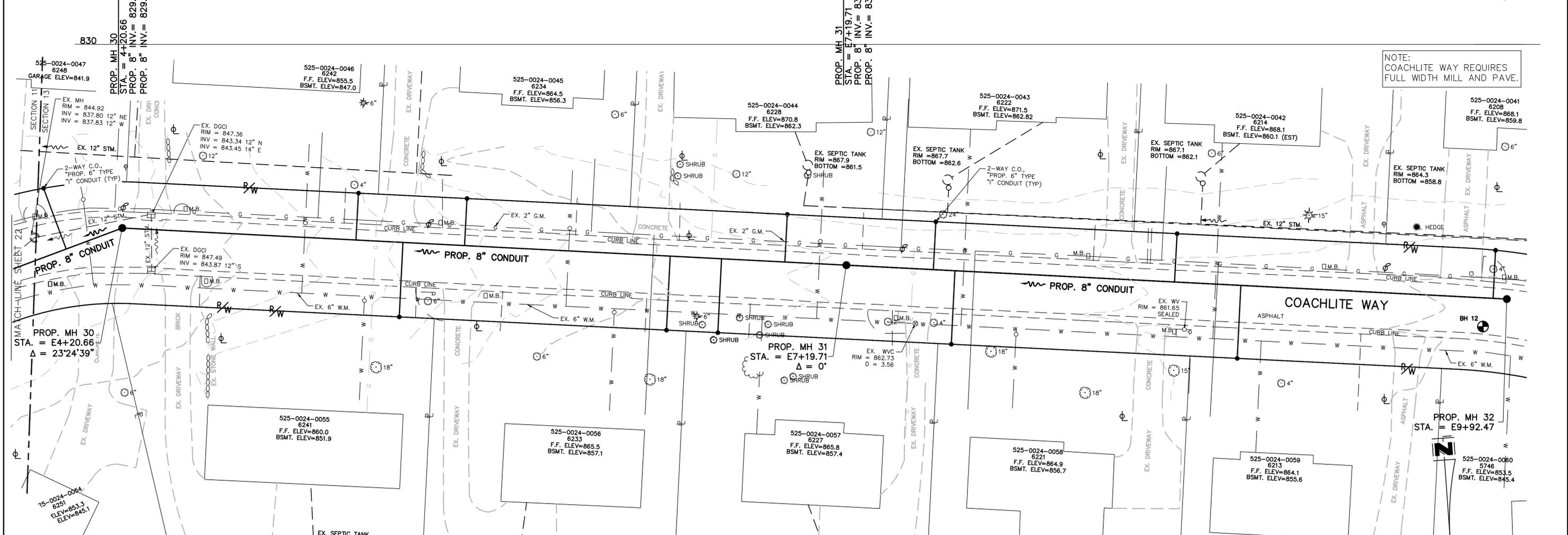
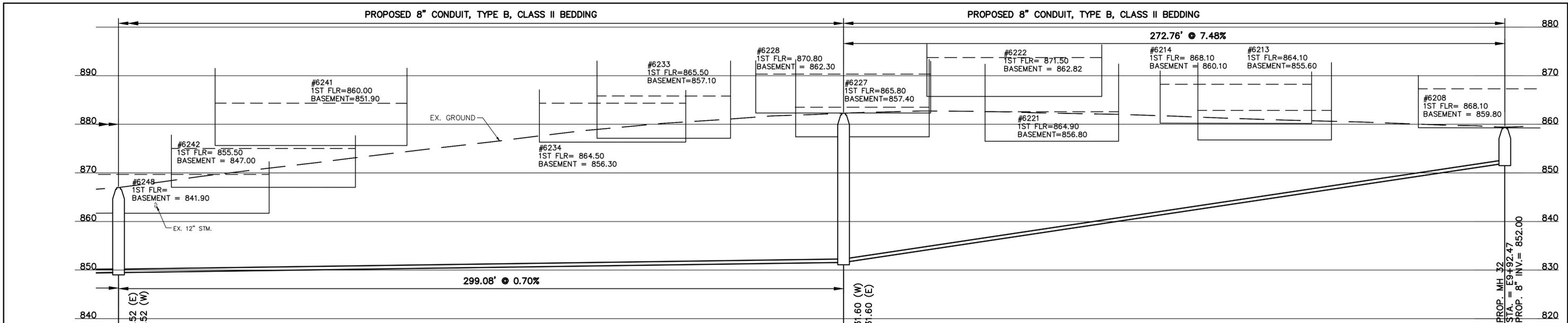
SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

**PLAN AND PROFILE**

ACC. NO. 78246

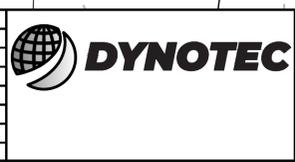
SHEET 19 OF 34

SS# 5933



NOTE:  
COACHLITE WAY REQUIRES  
FULL WIDTH MILL AND PAVE.

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
DRAWN BY: GAU			



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
COACHLITE

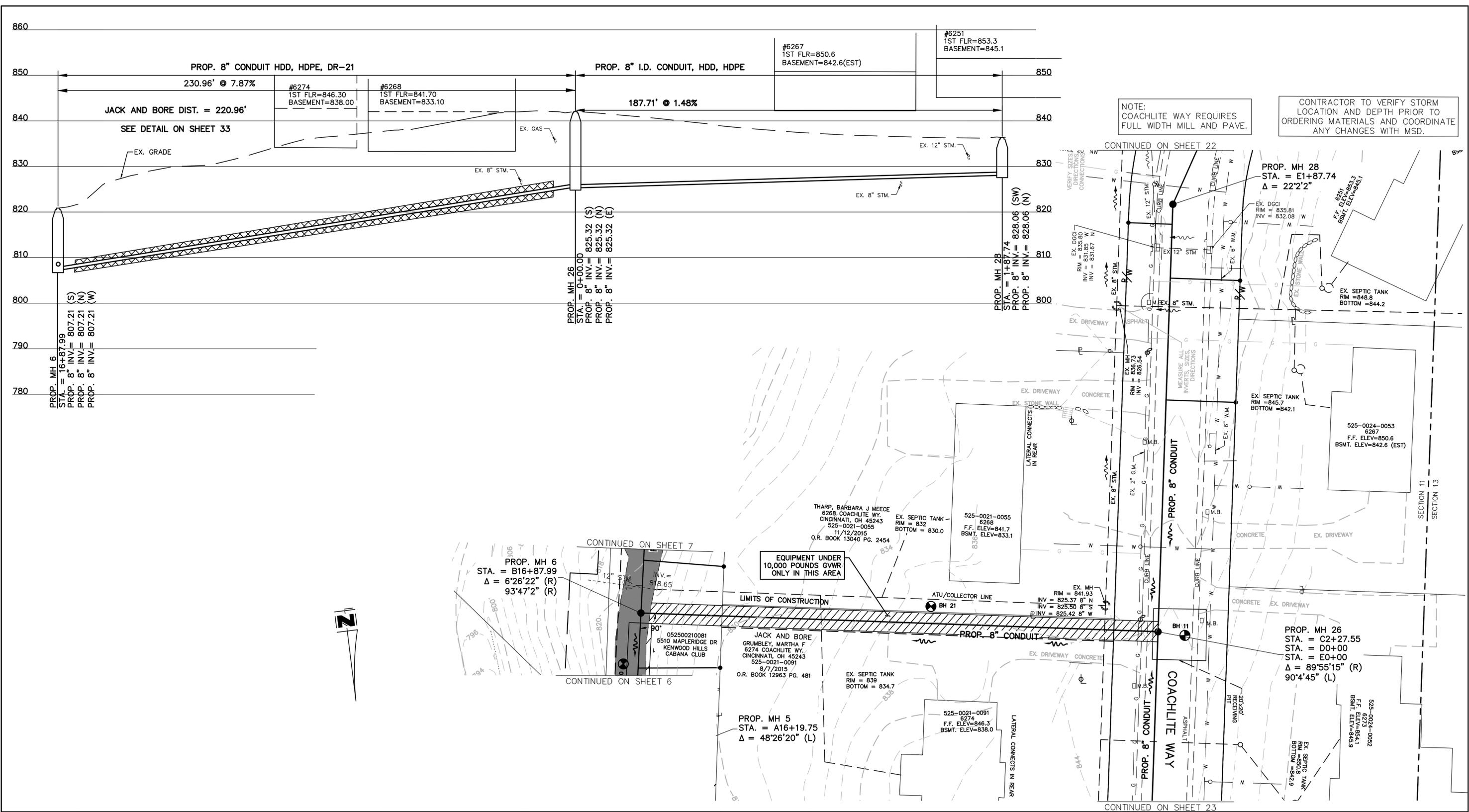
SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

**COACHLITE WAY**

**PLAN AND PROFILE**

PATH: C:\CADD\10370025 - KENWOOD HILLS LOCAL SEWER WATER - WASTEWATER\10370025 - KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:37 PM  
 PLOTTED BY: RUMMINS

PATH: N:\JOBS\2018\18026 - KENWOOD HILLS LOCAL SEWER WATER\_WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:38 PM  
 PLOTTED BY: RUMMINS



NOTE:  
 COACHLITE WAY REQUIRES  
 FULL WIDTH MILL AND PAVE.

CONTRACTOR TO VERIFY STORM  
 LOCATION AND DEPTH PRIOR TO  
 ORDERING MATERIALS AND COORDINATE  
 ANY CHANGES WITH MSD.

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
GEW			
GAU			



THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

MSD  
 WASTEWATER  
 ENGINEERING

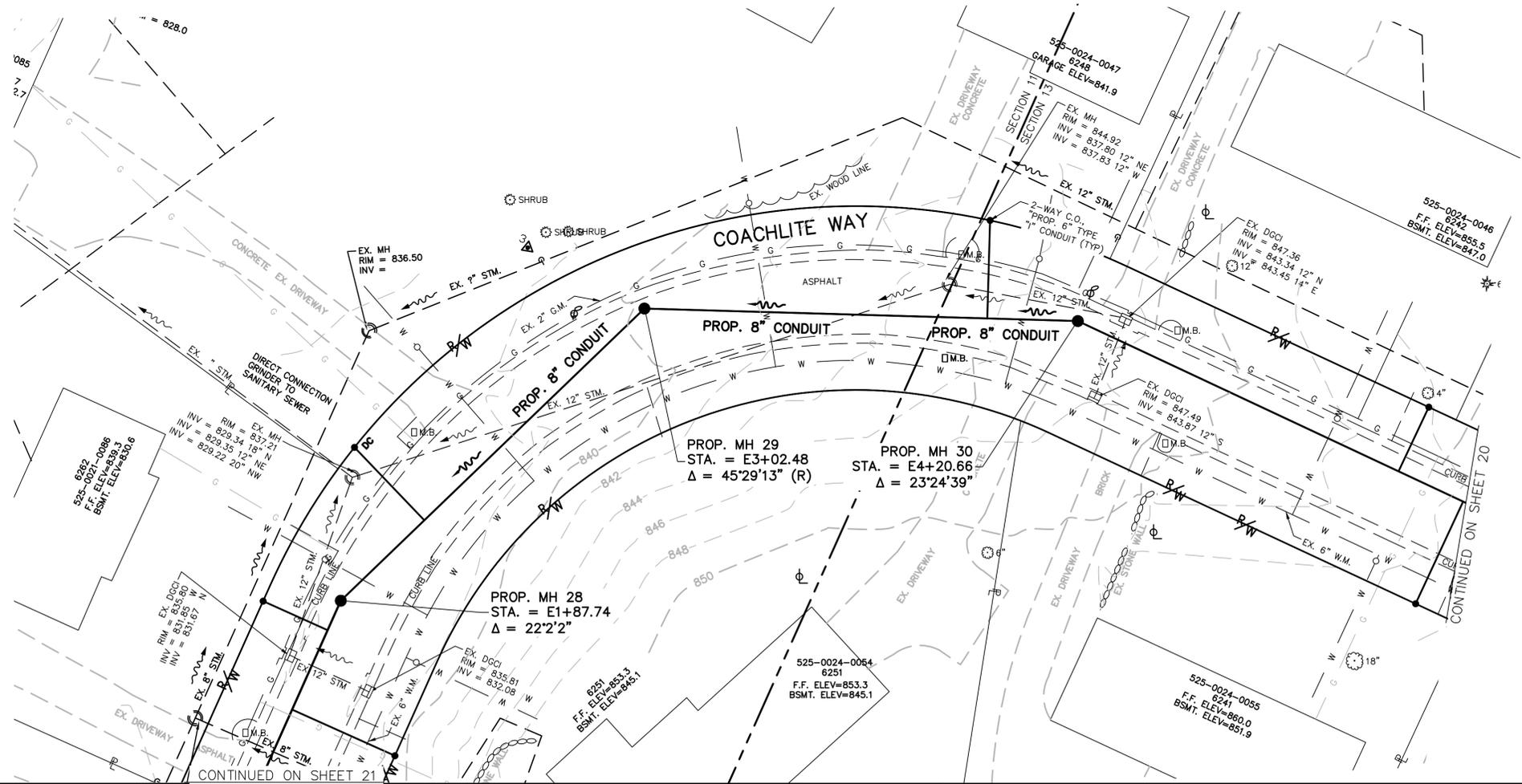
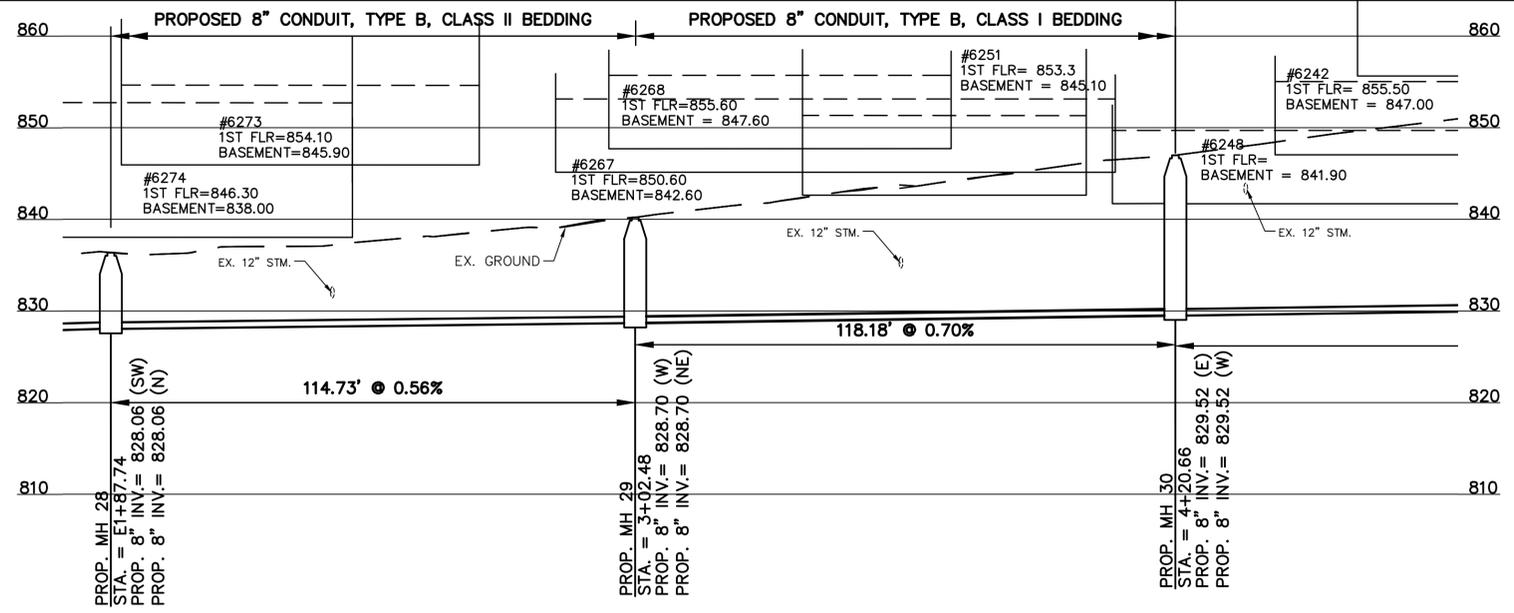
**PROPOSED PROJECT NO. 10370025**

FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**COACHLITE WAY to CABANA CLUB DR.**

**PLAN AND PROFILE**



NOTE:  
COACHLITE WAY REQUIRES  
FULL WIDTH MILL AND PAVE.



PATH: N:\085\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:38 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
DRAWN BY: GAU			

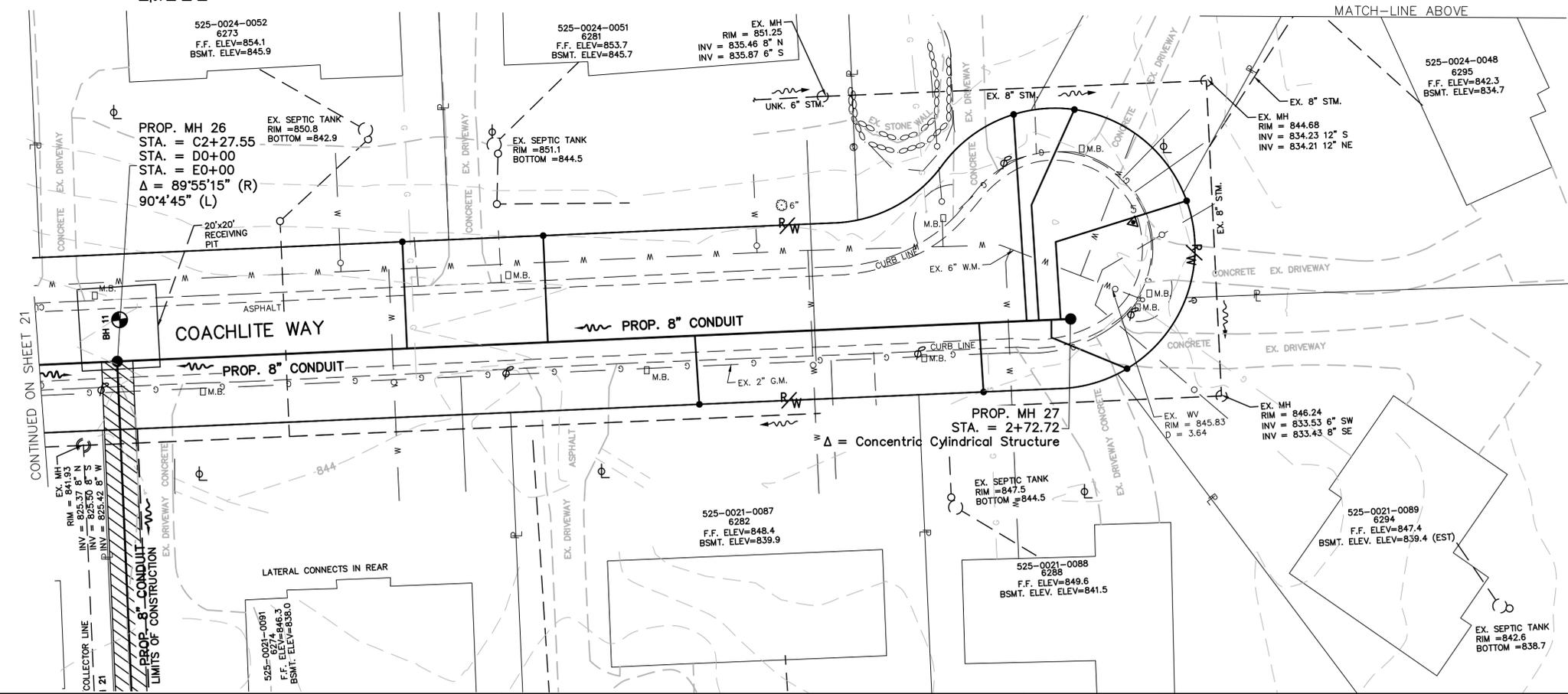
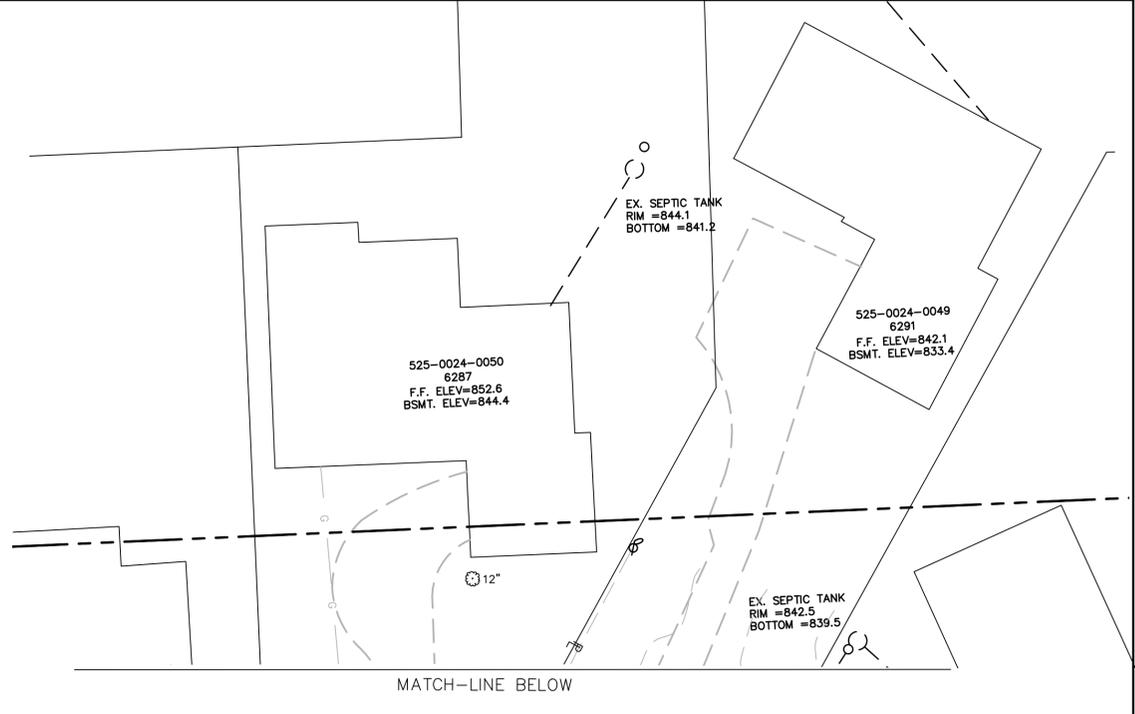
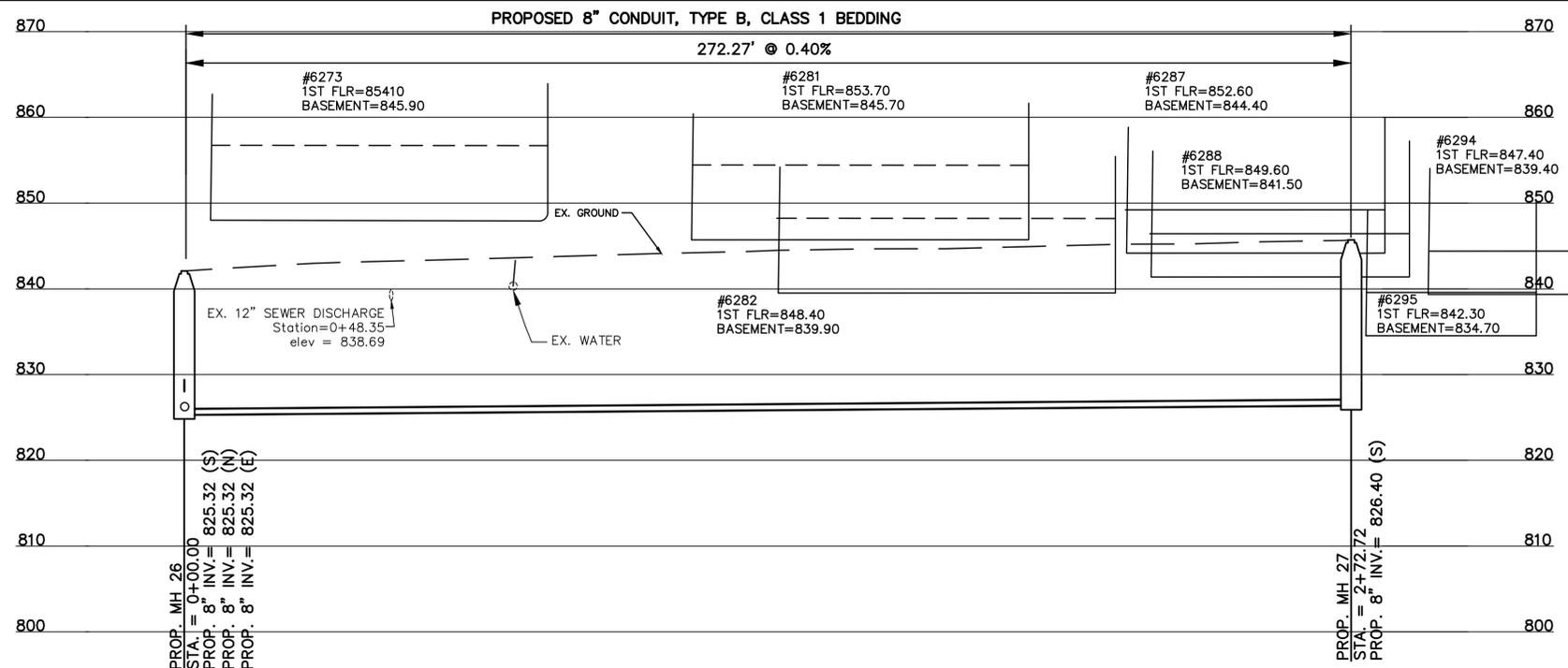
THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

WASTEWATER  
 ENGINEERING

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
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 COACHLITE

SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**COACHLITE WAY**  
**PLAN AND PROFILE**



NOTE:  
COACHLITE WAY REQUIRES  
FULL WIDTH MILL AND PAVE.



PATH: N:\JOBS\2018\8926 - KENWOOD HILLS LOCAL SEWER WATER WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
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BY:	DATE:	NO.	DESCRIPTION:
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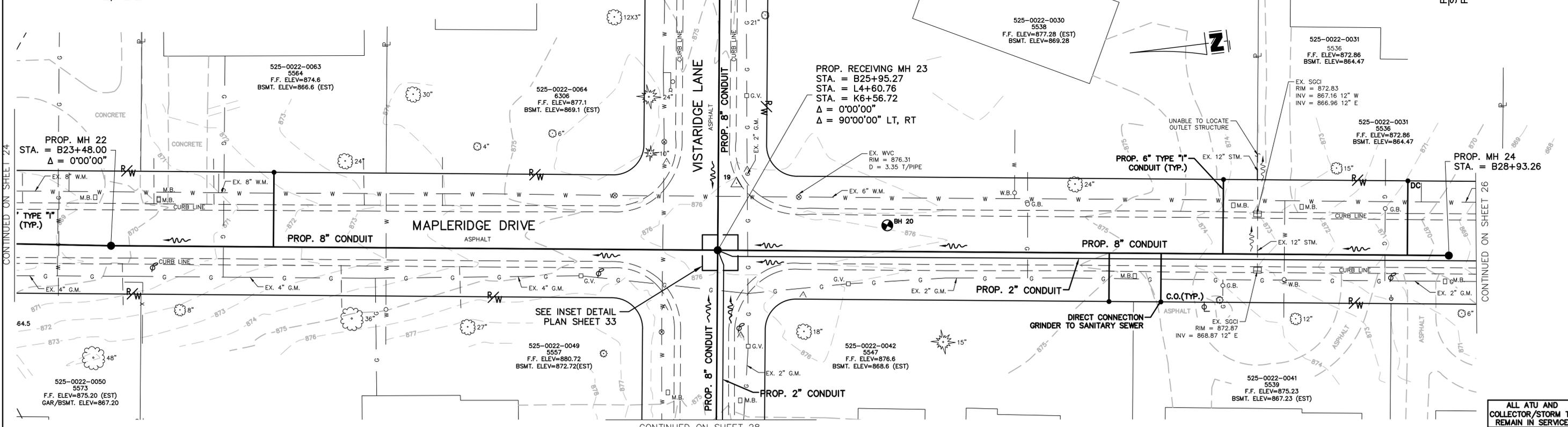
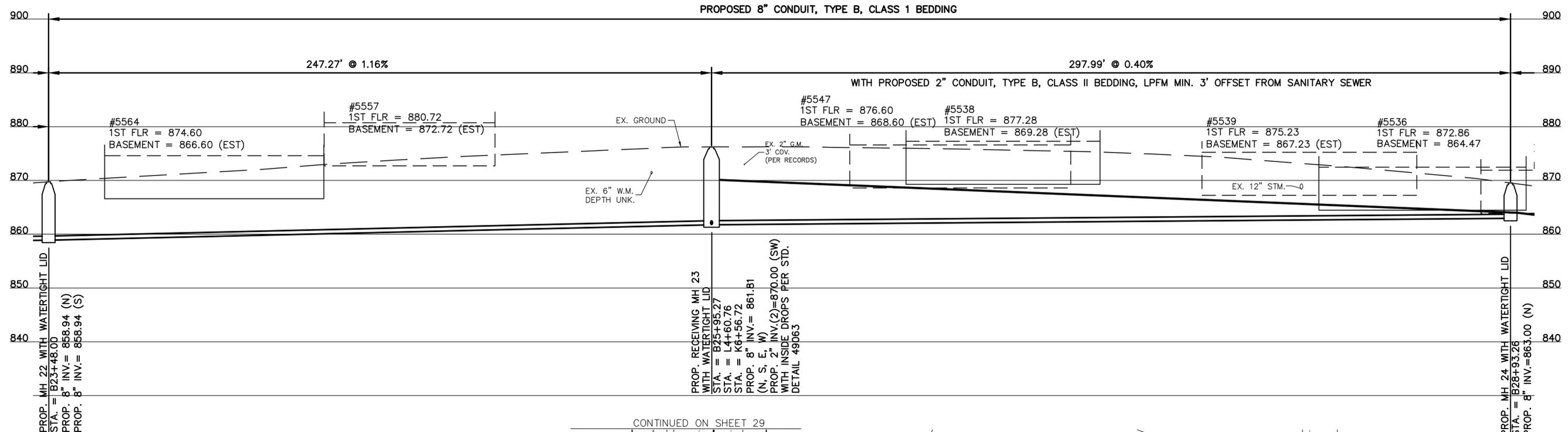


THE METROPOLITAN SEWER DISTRICT  
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 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**COACHLITE WAY**  
**PLAN AND PROFILE**





REVISIONS		
BY:	DATE:	DESCRIPTION:



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

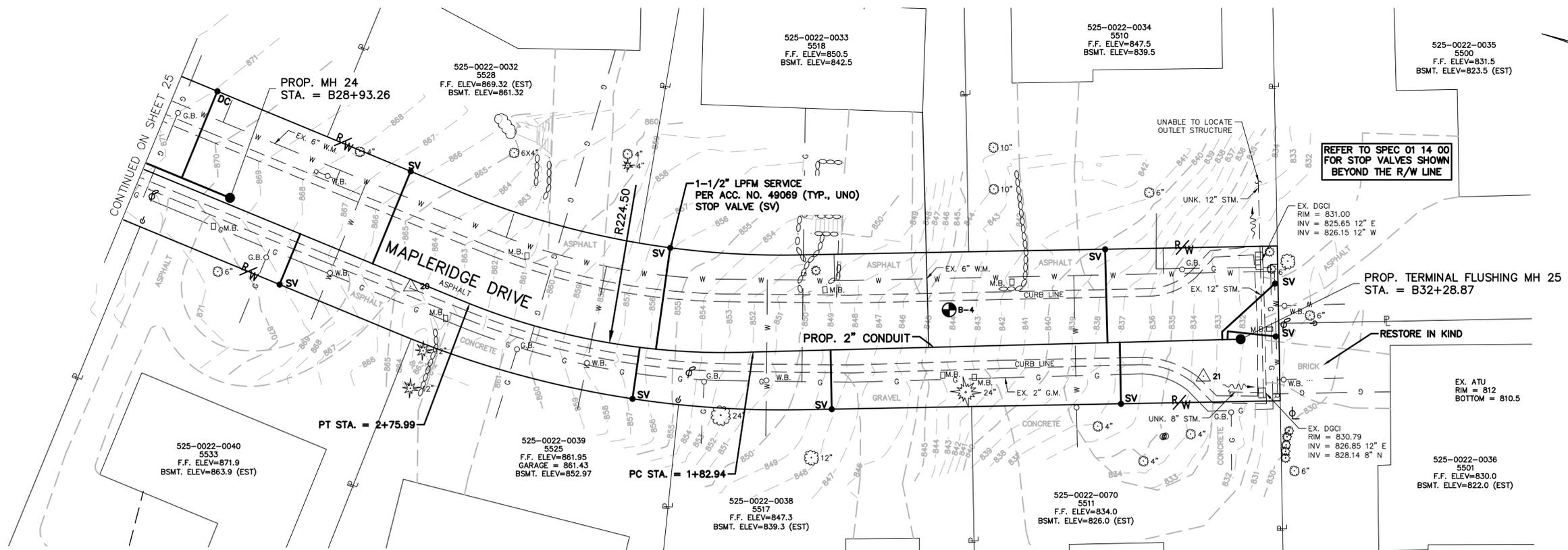
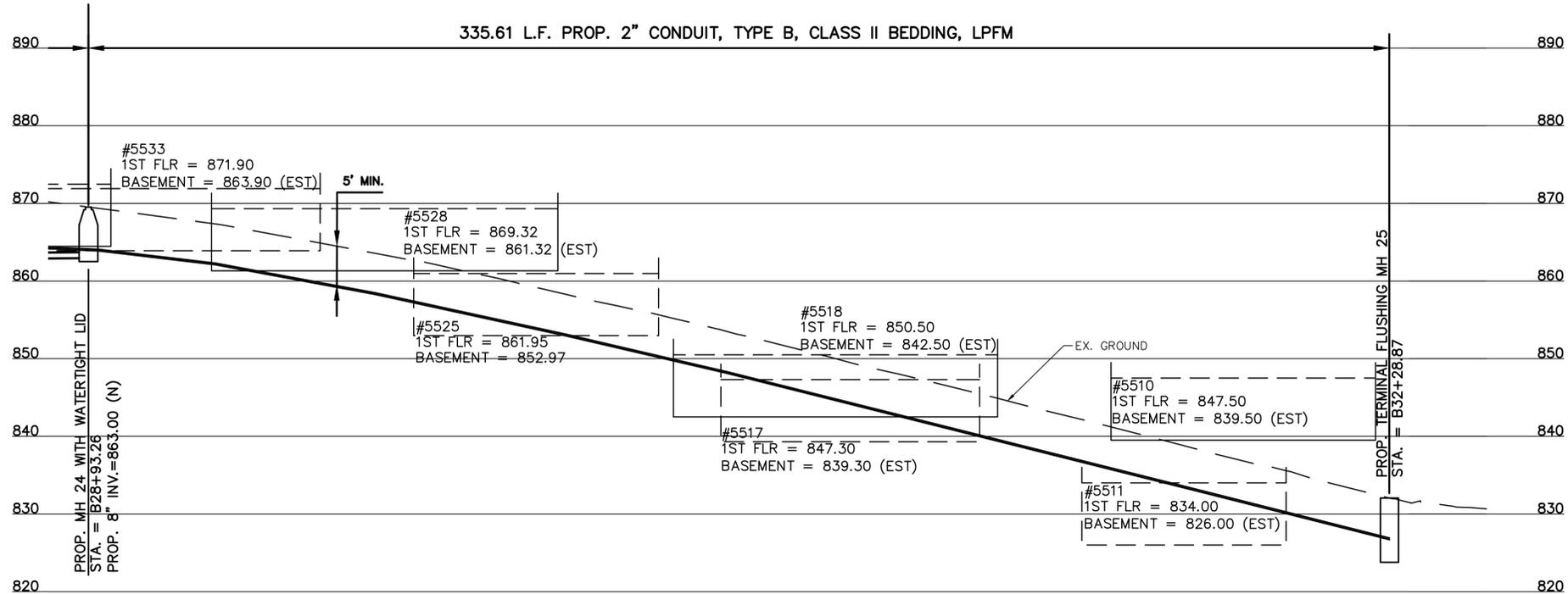


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COACHLITE  
SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

**PLAN AND PROFILE**  
ACC. NO. 78252 SHEET 25 OF 34 SS# 5933

PATH: N:\PROJECTS\2018\18026 - KENWOOD HILLS LOCAL SEWER\WATER\_WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 03:40 PM  
 PLOTTED BY: RUMMINS

ACAD DRAWING NAME: RA CONSULTANTS KENWOOD.DWG



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 DATE: Sep 11, 2024 03:41 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:	NO.	DESCRIPTION:
GAU			

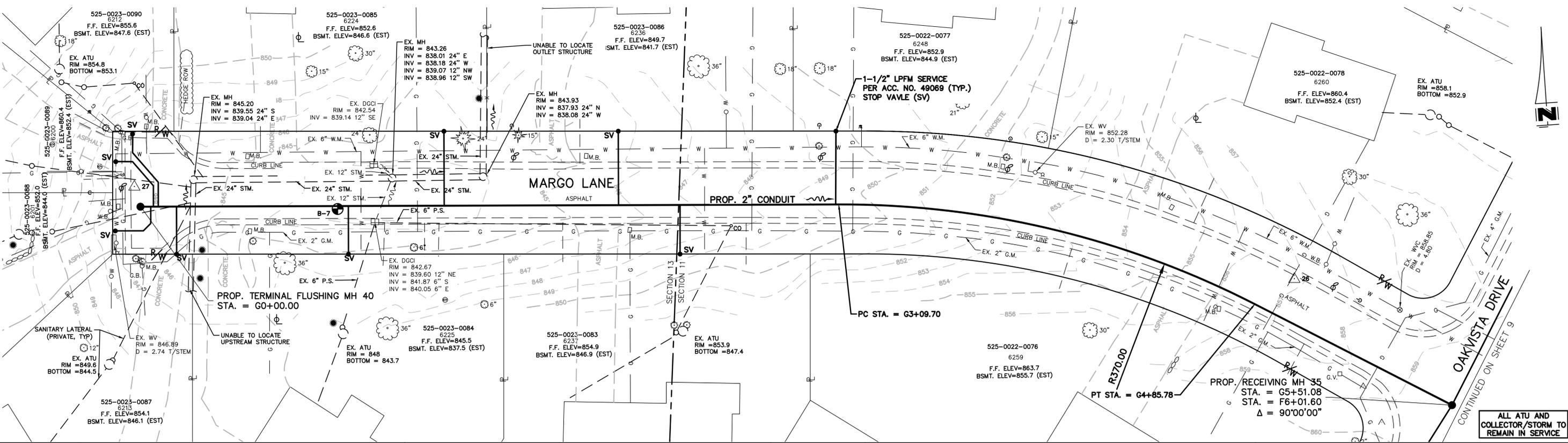
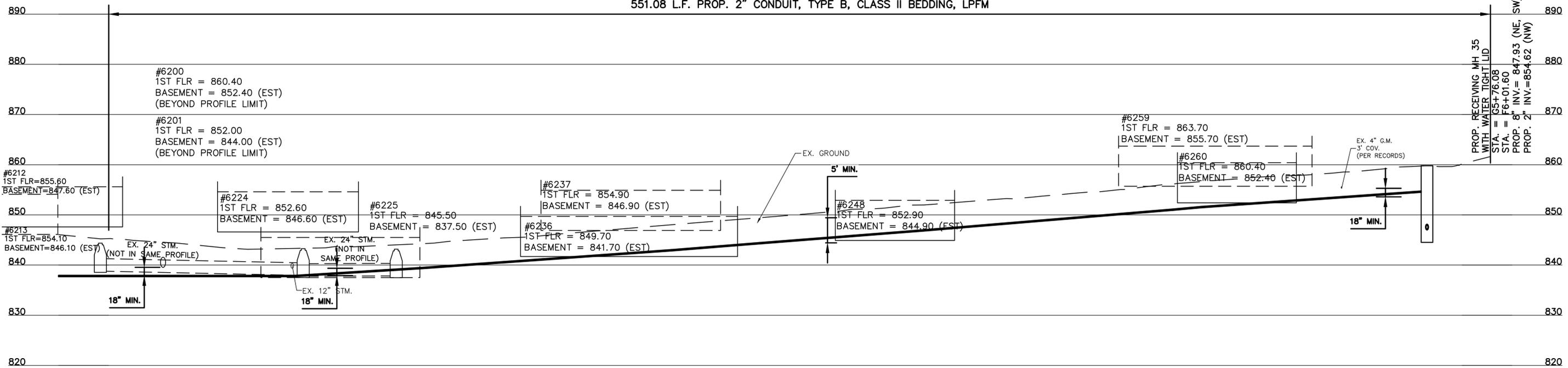


THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**PLAN AND PROFILE**  
 ACC. NO. 78253 SHEET 26 OF 34 SS# 5933

551.08 L.F. PROP. 2" CONDUIT, TYPE B, CLASS II BEDDING, LPFM



PATH: N:\085\2018\18026 - KENWOOD HILLS LOCAL SEWER\WATER\WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 - 03:41 PM  
 PLOTTED BY: RUMMINS

REVISIONS			
BY:	DATE:	DESCRIPTION:	



THE METROPOLITAN SEWER DISTRICT  
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 HAMILTON COUNTY, OHIO

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 COACHLITE

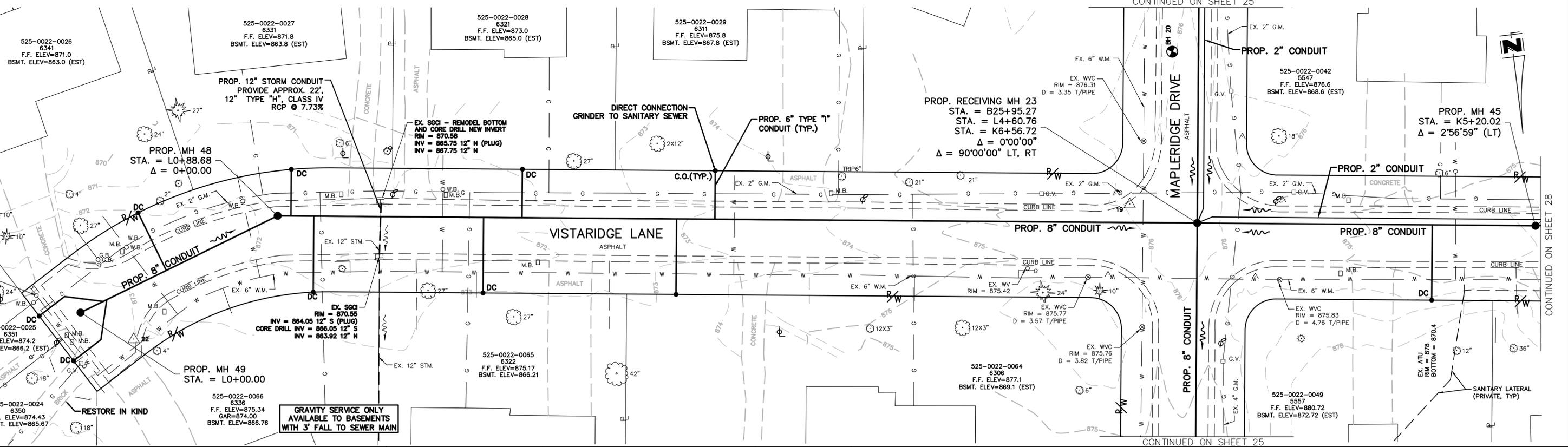
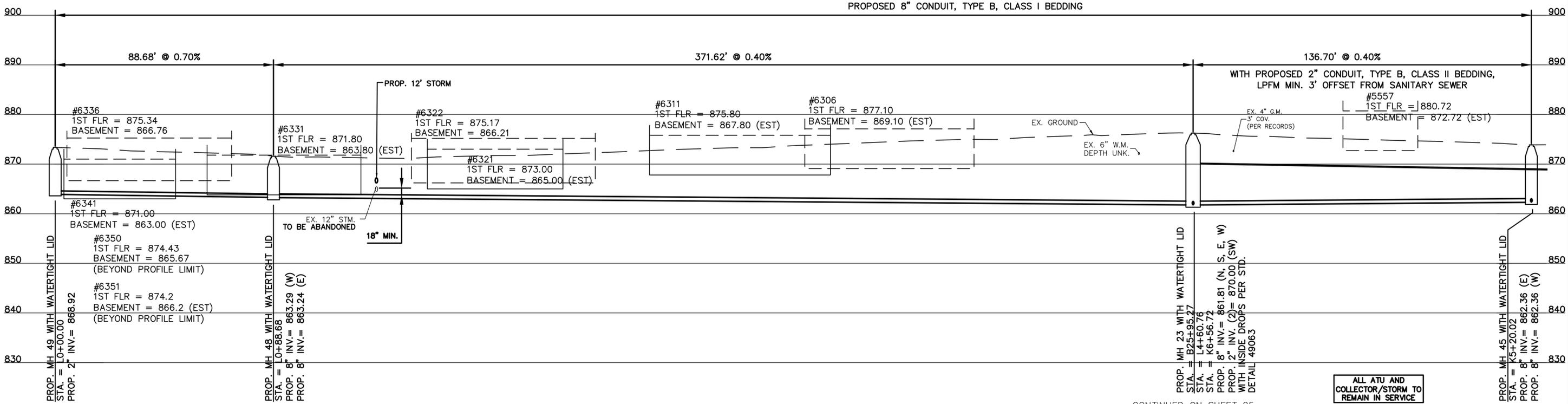
SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**PLAN AND PROFILE**

ACC. NO. 78254 SHEET 27 OF 34

ALL ATU AND COLLECTOR/STORM TO REMAIN IN SERVICE





ALL ATU AND COLLECTOR/STORM TO REMAIN IN SERVICE

GRAVITY SERVICE ONLY AVAILABLE TO BASEMENTS WITH 3' FALL TO SEWER MAIN

PATH: N:\PROJECTS\2018\10370025 - KENWOOD HILLS LOCAL SEWER\WATER\_WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
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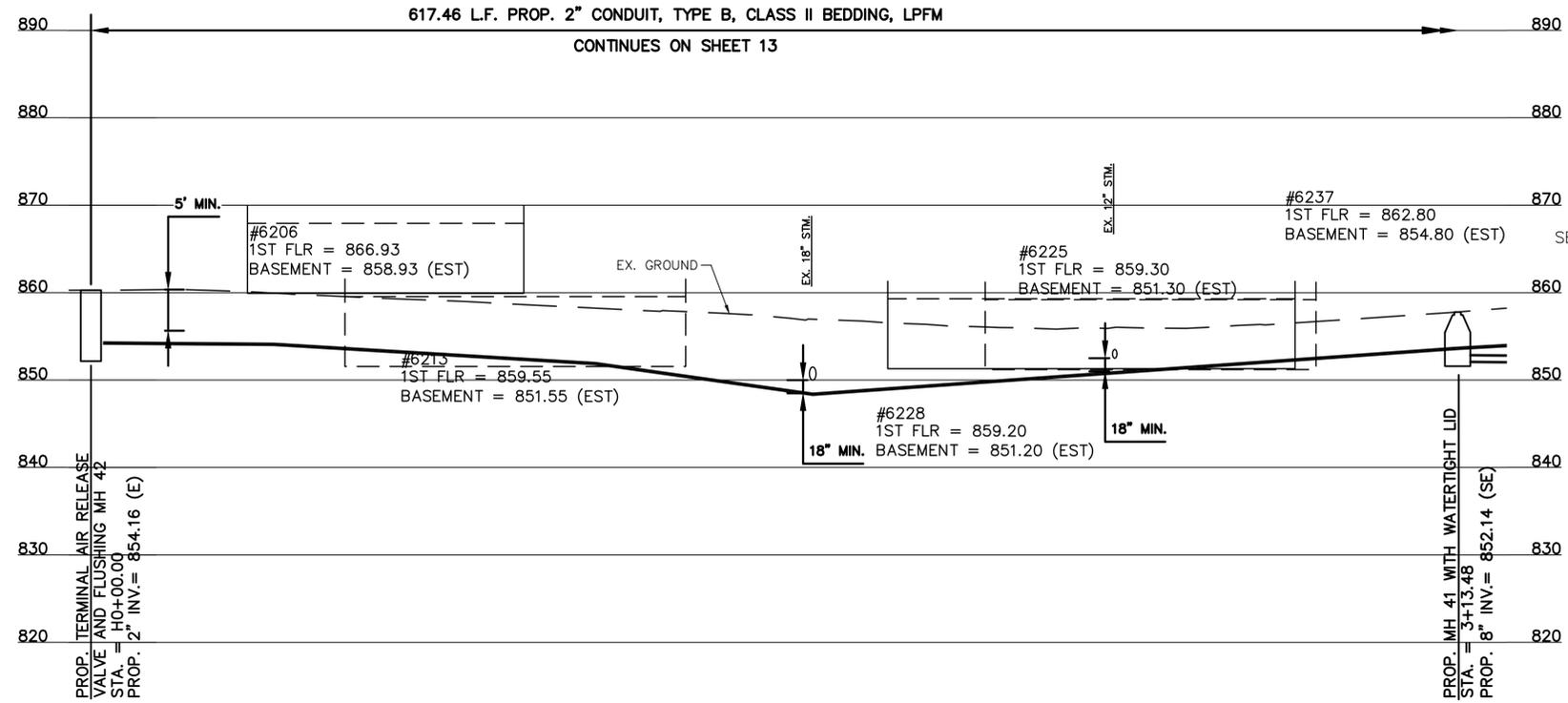
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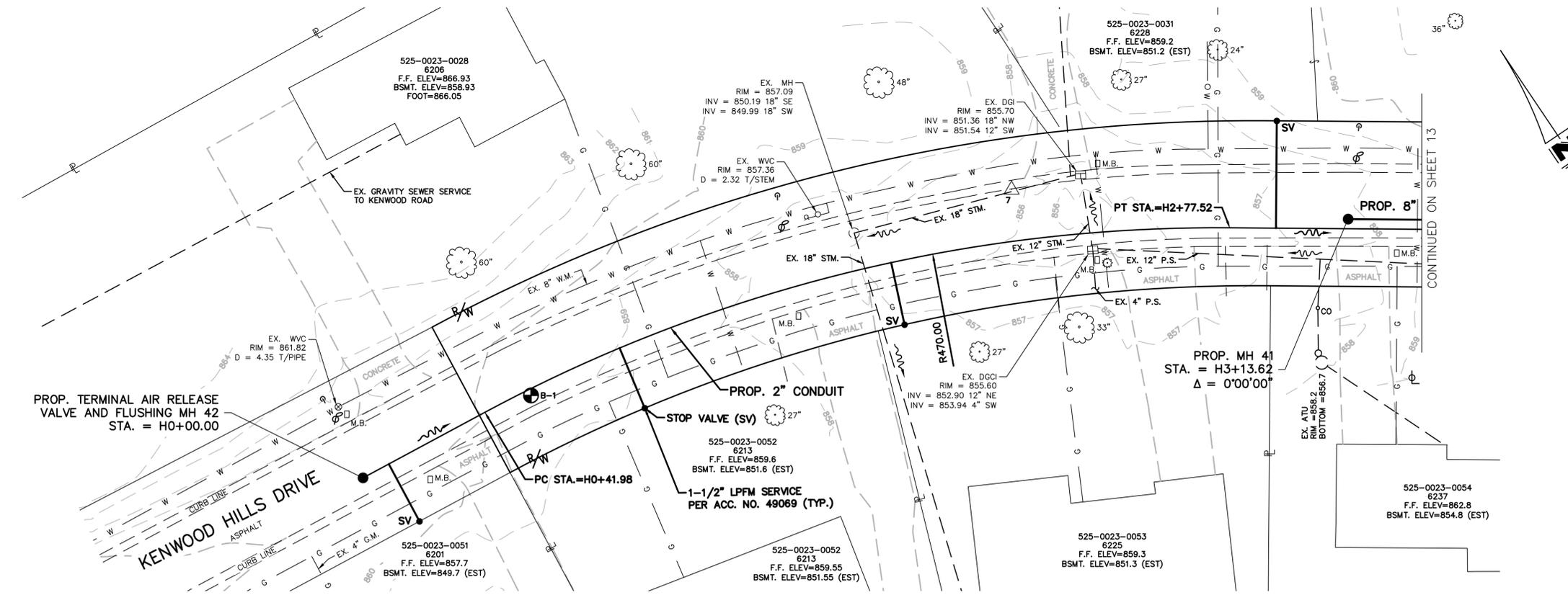
THE METROPOLITAN SEWER DISTRICT  
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HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**PLAN AND PROFILE**  
 ACC. NO. 78256 SHEET 29 OF 34 SS# 5933



SEE SHEET 13 FOR GRAVITY MAIN



PATH: N:\PROJECTS\2018\18026 - KENWOOD HILLS LOCAL SEWER\WATER\WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 03:43 PM  
 PLOTTED BY: RUMMINS

DESIGNED BY: GEW		REVISIONS	
BY:	DATE:		DESCRIPTION:
GAU			



THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO



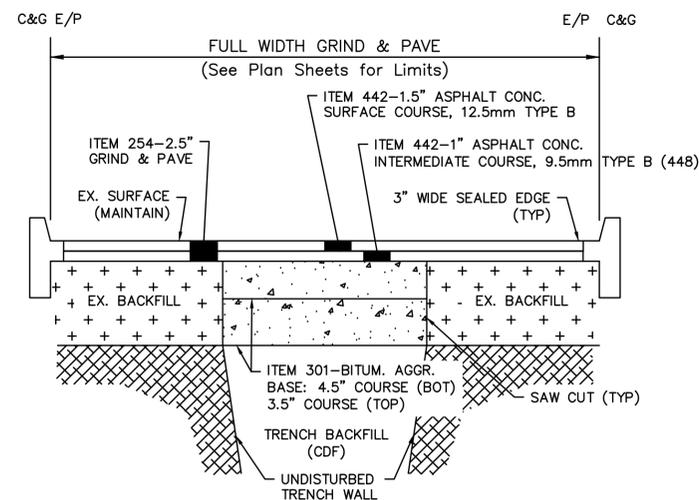
**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
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 COACHLITE  
 SCALE: HORIZ. 1"=20'  
 VERT. 1"=10'

**PLAN AND PROFILE**  
 ACC. NO. 78257 SHEET 30 OF 34 SS# 5933

ACAD DRAWING NAME: RA CONSULTANTS KENWOOD.DWG

KENWOOD HILLS DRIVE





**HCEO ROADWAY NOTES:**

1. SAW CUT FULL DEPTH PAVEMENT WITH WET DIAMOND BLADE SAW. VERMEER WILL NOT BE PERMITTED.
2. VERTICAL FACE OF EXISTING PAVEMENT SHALL BE CLEANED BY COMPRESSED AIR AND WETTED PRIOR TO PLACING CONCRETE.
3. PLACE AND COMPACT ASPHALT CONCRETE SURFACE COURSE IN ACCORDANCE WITH ODOT CMS ITEM 401.
4. ITEM 702.04-EDGES OF NEW ASPHALT SURFACE COURSE SHALL BE SEALED WITH A UNIFORM 3" WIDTH OF HOT APPLIED ASPHALT BINDER.
5. IF THE PROPOSED PAVEMENT WIDTH IS GREATER THAN 3'-0", THE CONTRACTOR HAS THE OPTION TO USE ODOT CMS ITEM 301-ASPHALT CONCRETE BASE.
- A. ASPHALT CONCRETE BASE MUST BE PLACED AND COMPACTED IN TWO EQUAL LIFTS, THE TOTAL THICKNESS OF ASPHALT BASE SHALL BE 8".
- B. PRIOR TO PLACING THE ASPHALT BASE, ALL VERTICAL SURFACE SHALL BE CLEANED AND COATED WITH BITUMINOUS MATERIAL IN ACCORDANCE WITH ODOT 407.02.
6. BUTT JOINTS ARE NECESSARY AT INTERSECTING STREETS.
7. ALL CASTING ADJUSTMENTS, REMOVAL OF PAVEMENT MARKERS, AND THE INSTALLATION OF NEW LINE STRIPING AND MARKERS SHALL BE INCLUDED.
8. ALL NECESSARY DRIVEWAY ADJUSTMENTS AND SEALING SHALL ALSO BE INCLUDED. THERE WILL BE NO ADDITIONAL COMPENSATION FOR PAVING WORK, ALL COST ASSOCIATED WITH PAVING AND DRIVEWAYS SHOULD BE INCLUDED IN THE BID PRICE UNDER INSTALLATION OF 8" SEWER CONDUIT.

**HCEO DRIVEWAY NOTES:**

- REGULATED HAMILTON COUNTY ENGINEERS OFFICE DETAILS (SEE HCEO "DRIVEWAY RULES AND REGULATIONS" MANUAL ([http://www.hamilton-co.org/engineer/permits\\_manuals.htm](http://www.hamilton-co.org/engineer/permits_manuals.htm)))
- PLATE 13 - TEMPORARY PAVEMENT RESTORATION
  - PLATE 15 - TYPICAL RESTORATION SECTIONS
  - PLATE 30 - TRENCH PLATES

**UTILITY CONTACT INFORMATION**

**ELECTRIC:** DUKE ENERGY  
139 EAST FOURTH STREET, ROOM 467A  
CINCINNATI, OHIO 45202  
MR. CONAN GIBSON  
(513) 287-4653  
conan.gibson@duke-energy.com

**GAS:** DUKE ENERGY  
139 EAST FOURTH STREET, ROOM 406A  
CINCINNATI, OHIO 45202  
MR. RICHARD HACKER  
(513) 287-4653  
richard.hacker@duke-energy.com

**TELEPHONE:** CINCINNATI BELL TELEPHONE  
221 EAST FOURTH STREET, BLDG. 121-900  
P.O. BOX 2301  
CINCINNATI, OHIO 45201-2301  
MR. BRECK COWEN  
(513) 565-7187  
breck.cowen@cinbell.com

**SANITARY:** METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
1600 GEST STREET  
CINCINNATI, OHIO 45204  
MR. ROB GOODPASTER  
(513) 431-5598  
robert.goodpaster@cincinnati-oh.gov

**WATER:** GREATER CINCINNATI WATER WORKS  
ASSISTANT TREATMENT SUPERINTENDENT  
4747 SPRING GROVE AVENUE  
CINCINNATI, OHIO 45232  
MR. RICK RIESS  
(513) 591-5058  
rick.riess@gcww.cincinnati-oh.gov

**CABLE:** SPECTRUM/TIME WARNER CABLE  
11252 CORNELL PARK DRIVE  
CINCINNATI, OHIO 45242  
MR. JIM O'REILLY  
(513) 386-5483  
Jim.OReilly@charter.com

**DUKE ENERGY NOTES TO CONTRACTOR:**

CONTRACTOR SHALL CONTACT THE COMPANY PRIOR TO EXCAVATION IN THE VICINITY OF ELECTRIC UNDERGROUND FACILITIES OR WHEN WORKING IN CLOSE PROXIMITY OF OVERHEAD ELECTRIC FACILITIES.

- A. FOR FIELD INSPECTOR TO LOCATE UNDERGROUND ELECTRIC LINES: IN OHIO, CALL "OHIO UTILITIES PROTECTION SERVICE", 1-800-362-2764; IN KENTUCKY, CALL "KENTUCKY DIG SAFELY", 1-800-752-6007. THESE CALLS SHOULD BE MADE AT LEAST 48 HOURS IN ADVANCE, EXCLUDING SATURDAYS, SUNDAYS, AND STATE LEGAL HOLIDAYS.
- B. FOR NOTIFICATION OF CONSTRUCTION ACTIVITY NEAR ENERGIZED ELECTRIC FACILITIES OR NEEDING A POLE SUPPORTED, CALL (513) 421-9500. WITHIN 2 DAYS A REPRESENTATIVE FROM OUR CONSTRUCTION DIVISION WILL CONTACT THE CUSTOMER AND VERIFY THE LOCATION AND CONDITIONS OF THE JOB SITE. AFTER THIS CONTACT HAS BEEN MADE, A LINE CREW WILL BE OUT TO COVER UP ELECTRIC LINES OR HOLD THE POLE WITHIN 2 TO 3 DAYS.
- C. FOR ADDITIONAL UNDERGROUND ELECTRIC RECORD INFORMATION CALL (513) 287-2454.
- D. FOR ELECTRIC ENGINEERING NOTIFICATION, AGREEMENTS AND CORRESPONDENCE, ADDRESS TO: MR. TOM BIRKENHAUER, DUKE ENERGY CORPORATION, DISTRIBUTION DESIGN ENGINEERING, ROOM 467A, 139 E. FOURTH STREET, P.O. BOX 960 CINCINNATI, OHIO 45202-0960

CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO ELECTRIC FACILITIES DURING CONSTRUCTION.

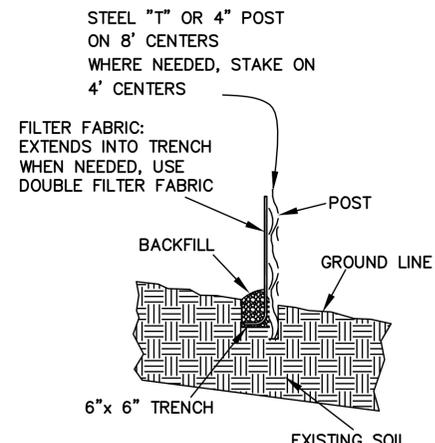
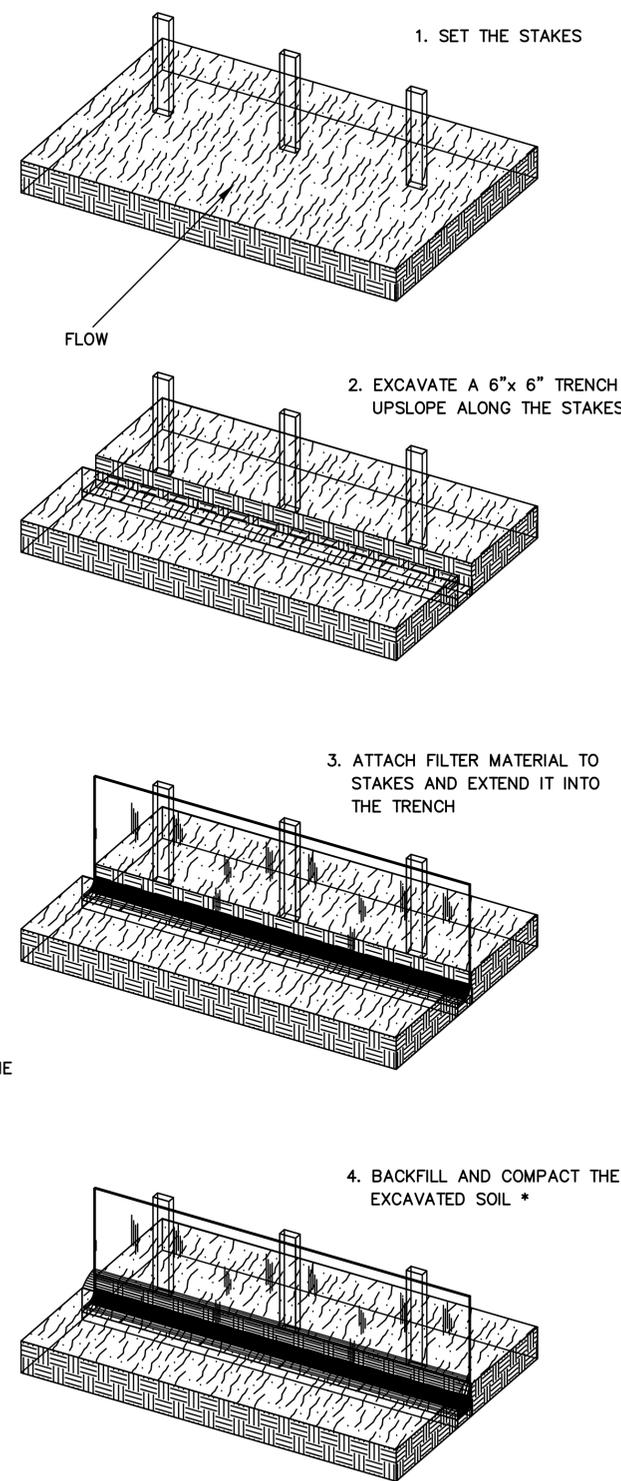
ELECTRIC FACILITIES TO BE KEPT IN SERVICE AT ALL TIMES.

CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORTING EXISTING ELECTRIC FACILITIES AFFECTED BY THE PROPOSED CONSTRUCTION

- A. WHERE HIGH PRESSURE OIL FILLED PIPE TYPE CABLE INSTALLATION ARE EXPOSED OR OTHERWISE INTERFERED WITH BY THE CONTRACTOR, PROTECTION BY THE CONTRACTOR WILL BE REQUIRED AGAINST DAMAGE TO THE COATING OR SURROUNDING THERMAL SAND ENVELOPE.
- B. WHERE CONCRETE ENCASED CONDUIT SYSTEMS OR DIRECT BURIED CABLE SYSTEMS ARE EXPOSED OR OTHERWISE INTERFERED WITH, THE CONTRACTOR SHALL PROTECT THE SYSTEM AS NECESSARY AGAINST DAMAGE. AS SOON AS FEASIBLE, THE CONTRACTOR SHALL TAKE ADDITIONAL APPROPRIATE STEPS TO PROVIDE PERMANENT MEASURES TO RESTORE SUPPORT. THE METHODS USED SHALL BE BASED ON CONDITIONS TO BE DETERMINED BY THE UTILITY.
- C. WHERE POLES OR ANCHORS THAT SUPPORT OVERHEAD ELECTRIC FACILITIES ARE EXPOSED OR OTHERWISE INTERFERED WITH, THE CONTRACTOR SHALL PROTECT THEM FROM DAMAGE AND PROVIDE TEMPORARY SUPPORT TO INSURE THE INTEGRITY OF THE SYSTEM. AS SOON AS FEASIBLE, THE CONTRACTOR SHALL TAKE ADDITIONAL APPROPRIATE STEPS TO PROVIDE PERMANENT MEASURES TO RESTORE SUPPORT. THE METHODS USED SHALL BE BASED ON CONDITIONS TO BE DETERMINED BY THE UTILITY.
- D. WHERE THE DEPTH OF EXCAVATION FOR THE PROPOSED WORK IS GREATER THAN FIVE (5) FEET, THE CONTRACTOR SHALL SHEET AND SHORE THE TRENCH TO CONTINUOUSLY MAINTAIN THE SUPPORT OF ELECTRIC FACILITIES AT LOCATIONS WHERE THE ELECTRIC FACILITIES ARE WITHIN THE ZONE OF INFLUENCE ADJACENT TO THE EXCAVATION AS DETERMINED BY THE NATURAL ANGLE OF RESPONSE OF THE SOIL.
- E. ALL DAMAGE TO ELECTRIC FACILITIES AND SERVICE REQUIRING ADJUSTMENTS, RELOCATION AND/OR REPAIRS WILL BE MADE AT THE CONTRACTOR'S COST.

CONTRACTOR SHALL NOT BACKFILL EXPOSED ELECTRIC FACILITIES UNTIL THE COMPANY HAS INSPECTED ITS FACILITY OR PERFORMED ANY ADJUSTMENTS AND/OR MAINTENANCE THAT MAY BE REQUIRED.

SHOULD CONTRACTOR DAMAGE ELECTRIC FACILITIES, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DUKE ENERGY CALL CENTER AT (513) 421-9500. CONTRACTOR SHALL KEEP EVERYONE CLEAR OF DAMAGED ELECTRIC FACILITIES UNTIL COMPANY PERSONNEL ARRIVE AT THE WORK SITE.



**REINFORCED SILT FENCE INSTALLATION DETAIL**  
NOT TO SCALE

PIPE ALTERNATES (SEE PROFILE VIEW CONDUIT LABELS)	
*	<ul style="list-style-type: none"> <li>• PVC SDR 35 (ASTM D3034) w/ FLEXIBLE ELASTOMERIC SEALS (ASTM D3212)</li> <li>• DUCTILE IRON PIPE (ASTM A746) w/ PUSH-ON JOINTS (AWWA C111)</li> </ul>
LPFM (INSTALLED PER ASTM D2321)	<ul style="list-style-type: none"> <li>• HDPE DR11 (ASTM D3035) IPS w/ BUTT FUSION JOINTS (ASTM F1055) AND MOLDED FITTINGS (ASTM 3261)</li> <li>• PVC SDR 21 PIPE AND FITTINGS (ASTM D2241) w/ FLEXIBLE ELASTOMERIC SEALS (ASTM D3139); ALL FITTINGS SHALL BE RESTRAINED AND CONFORM TO THE REQUIREMENTS OF SDR21</li> </ul>

DESIGNED BY: GEW	REVISIONS		
	BY:	DATE:	DESCRIPTION:
DRAWN BY: GAU			



THE METROPOLITAN SEWER DISTRICT  
OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**

FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG COACHLITE

SCALE: HORIZ. 1"=20'  
VERT. 1"=10'

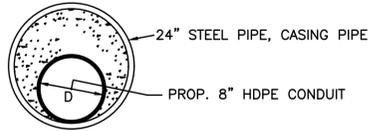
**NOTES & DETAILS**

**PLAN AND PROFILE**

PATH: N:\PROJECTS\2018\18026 - KENWOOD HILLS LOCAL SEWER\WATER\_WASTEWATER\600 CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 03:43 PM  
 PLOTTED BY: RCUUMINS

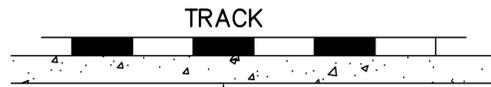
FILL WITH A LEAN (1 TO 8) MIXTURE OF CEMENT AND SAND OR CEMENT, SAND AND PEA GRAVEL RAMMED OR BLOWN INTO PLACE DRY. SOME POSITIVE MEANS TO ASSURE THAT THE SPACE IS COMPLETELY FILLED, FREE OF ANY VOIDS, SHALL BE USED.

PROP. CONDUIT SIZE "D"	MINIMUM STEEL CASING WALL THICKNESS
8"	0.375"



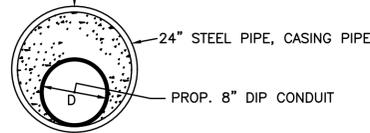
NO SCALE

**JACK AND BORE INSTALLATION OF HDPE PIPE DETAIL, BETWEEN COACHLITE WAY AND CABANA CLUB**  
NOT TO SCALE

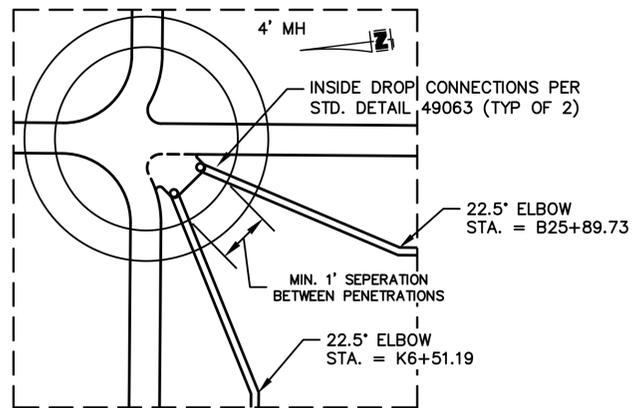


FILL WITH A LEAN (1 TO 8) MIXTURE OF CEMENT AND SAND OR CEMENT, SAND AND PEA GRAVEL RAMMED OR BLOWN INTO PLACE DRY. SOME POSITIVE MEANS TO ASSURE THAT THE SPACE IS COMPLETELY FILLED, FREE OF ANY VOIDS, SHALL BE USED.

PROP. CONDUIT SIZE "D"	MINIMUM STEEL CASING WALL THICKNESS
8"	0.375"



**PROPOSED JACK AND BORE INSTALLATION OF DIP PIPE DETAIL RAILROAD SECTION**  
NOT TO SCALE

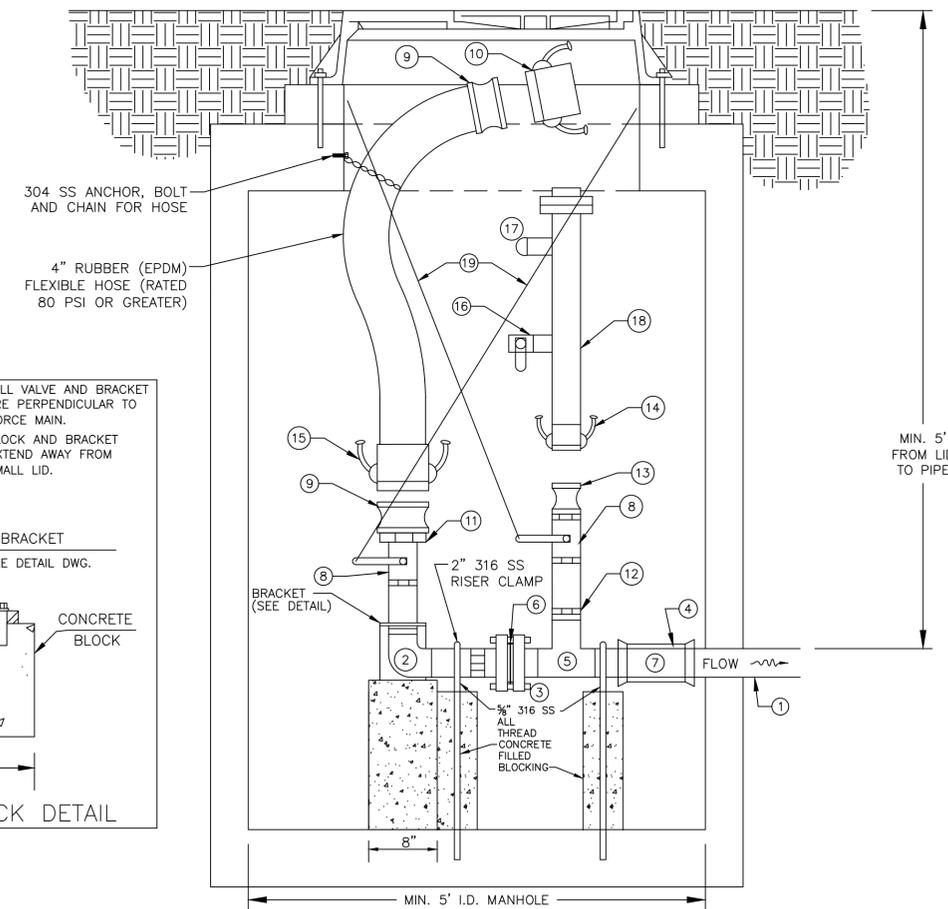
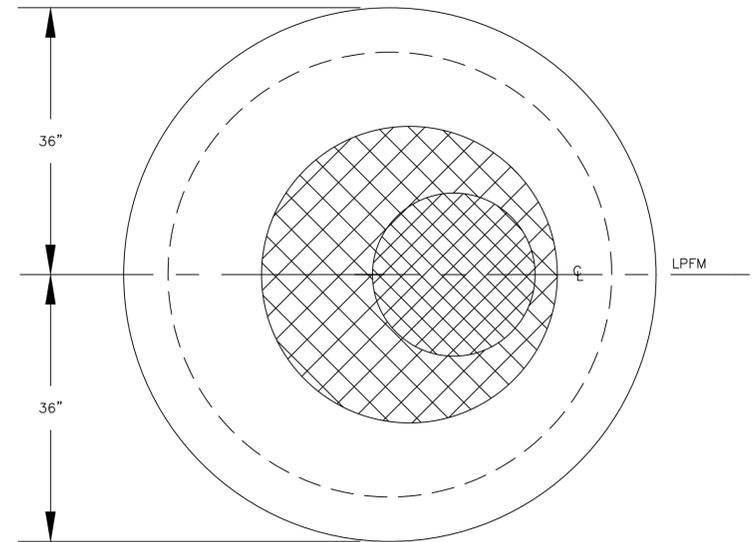


**PROP. MH 23 DETAIL PLAN**

SCALE: 1"=2'  
SEE SHEET 25

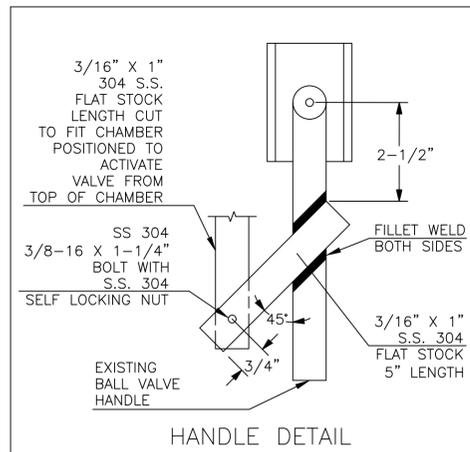
**MATERIAL LIST - ALL MATERIAL TO BE 316 STAINLESS STEEL**

- ① 2" SCHEDULE 40 PVC SOCKET FEMALE ADAPTER OR HDPE EQUIVALENT
- ② 2" 90° ELBOW
- ③ FLANGES WITH HEX HEAD CAP SCREW 5/8" x 3-1/2" 18-8 SS WITH 18-8 WASHER AND 18-8 5/8"-11 NYLOCK NUT
- ④ 2" THREADED PIPE CUT TO LENGTH
- ⑤ 2"x2"x2" TEE
- ⑥ 1/8" RUBBER GASKET
- ⑦ ROMAC MODEL #511 EPOXY COATED WITH SS HARDWARE
- ⑧ 2" FULL PORT BALL VALVE
- ⑨ 4" MALE CAMLOCK
- ⑩ 4" DUST CAP
- ⑪ 2"x4" REDUCER
- ⑫ 2" NIPPLE
- ⑬ 2" MALE CAMLOCK
- ⑭ 2" FEMALE CAMLOCK WITH HITCH PINS INSTALLED IN LOCK POSITION
- ⑮ 4" FEMALE CAMLOCK WITH HITCH PINS INSTALLED IN LOCK POSITION
- ⑯ 1" PIPE CAP
- ⑰ VENT-TECH OR VENT-O-MAT AIR RELEASE VALVE
- ⑱ VALVE ACTIVATION HANDLES (SEE DETAIL)

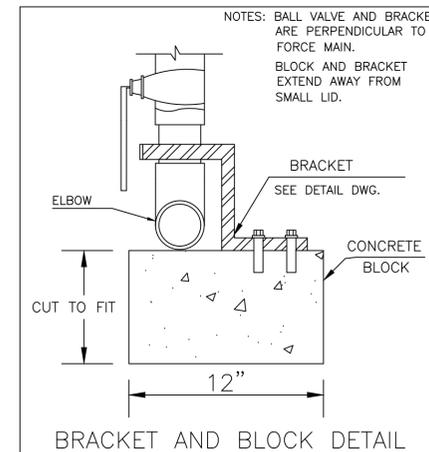


**2 INCH TERMINAL AIR RELEASE VALVE (ARV) AND FLUSHING MANHOLE**

NOT TO SCALE



**HANDLE DETAIL**



**BRACKET AND BLOCK DETAIL**

PATH: N:\JOBS\2018\18926 - KENWOOD HILLS LOCAL SEWER WATER CAD\BASE\RA CONSULTANTS KENWOOD.DWG  
 DATE: Sep 11, 2024 03:44 PM  
 PLOTTED BY: RCLUMINS

DESIGNED BY:	BY:	DATE:	REVISIONS	DESCRIPTION:
GEW				
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THE METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI  
HAMILTON COUNTY, OHIO

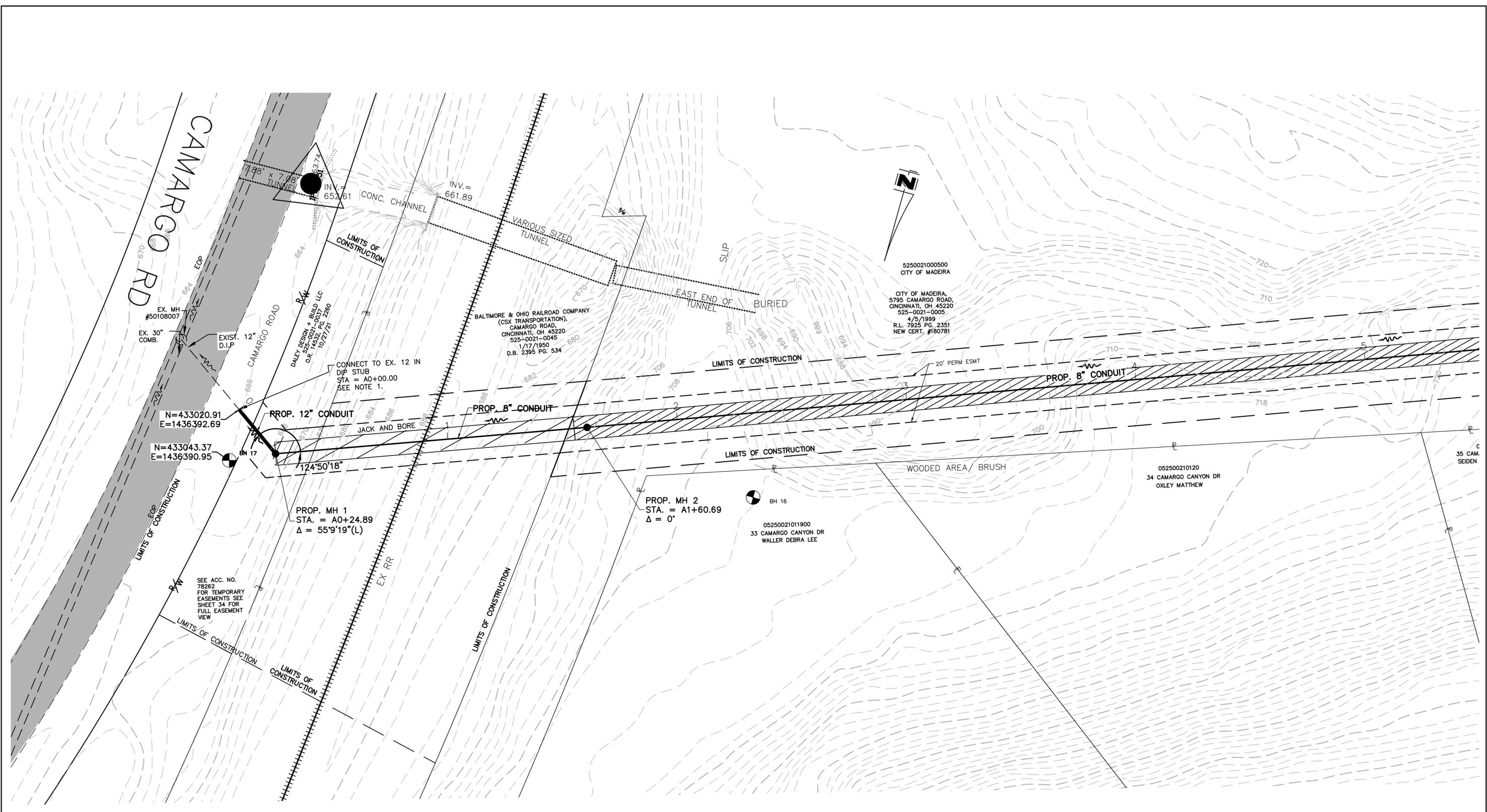
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SCALE: HORIZ. 1"=20'  
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**NOTES & DETAILS**

**PLAN AND PROFILE**

PATH: N:\JOBS\2018\18926 - KENWOOD HILLS LOCAL SEWER WATER\_WASTEWATER\600 CAD\SSA\BASE\KENWOOD HILLS BASEMAP.DWG  
 DATE: Sep 11, 2024 - 03:44 PM  
 PLOTTED BY: RUMMINS



REVISIONS			
BY:	DATE:	REVISIONS	DESCRIPTION:



THE METROPOLITAN SEWER DISTRICT  
 OF GREATER CINCINNATI  
 HAMILTON COUNTY, OHIO

**PROPOSED PROJECT NO. 10370025**  
 FROM THE INT. OF KENWOOD HILLS DR. AND KENWOOD HILLS TO THE CABANA CLUB DR. FROM  
 THE CUL-DE-SAC OF MAPLE RIDGE DR AND VISTA RIDGE DR TO THE CABANA CLUB DR ALONG  
 COACHLITE

SCALE HORIZ. 1"=200'

**RAILROAD ESMT**

**PLAN AND PROFILE**