STORMWATER MANAGEMENT PLAN

City of Brentwood
Brentwood, MO

Gonzalez Companies, LLC Project: 21-2019.08

July 1, 2022

Executive Summary

The City of Brentwood and many of the residents experience stormwater related issues. Over the years, the City has compiled a list of problem areas to track these issues. The City has also solicited information on additional areas of concerns by its residents through the use of surveys and public meetings. Gonzalez Companies was tasked with providing preliminary investigation and analysis of each of the sites on this list and developing a prioritized plan for the City to address these issues as resources become available. The results of this investigation are presented in this report.

The City also understands that changes to ordinances and policy could have a positive impact in reducing stormwater related issues for future development. Therefore, Gonzalez Companies was also tasked with providing a review of existing City of Brentwood ordinances and policy related to stormwater (Sections 400 and 500) and providing recommendations for potential updates to these documents. A proposed summary of ordinance updates is provided in Section 2, while the revised ordinance language suggestions are provided in Appendix A.

A description of the data collected for this project is detailed in Section 3. Aerial photography, topographic information, and public input were collected to facilitate the analysis. Extensive field investigations were also conducted to verify drainage patterns and the proposed recommendations.

The results of the preliminary analysis at each site are presented in Section 4. For each site, the stormwater issue is defined, the observations and preliminary calculations are summarized, and the recommended improvement is detailed. Property ownership information, opinion of cost, and priority ranking are also summarized. A site map detailing the existing conditions and the recommended improvement is provided for each location.

Preliminary analysis was conducted at a total of 42 sites. The most common observations included the lack of inlet capacity at low points in the roadway, undersized storm sewer pipes, and illicit discharges from sump and downspouts causing localized issues in neighborhoods with high density of development.

The opportunity to incorporate detention to reduce stormwater impacts was explored; however, most of the areas of concern were too developed, did not have available property, or were topographically located in an area that eliminated the potential for adding significant detention. Recommendations for improvement utilizing Best Management Practices to reduce runoff and improve water quality have been presented for both for specific areas, as well as more generically as this recommendation for improvement is a common recommendation for many of the issues presented.

Detailed hydraulic calculations, including hydraulic grade lines were not performed as part of this preliminary study. At each location, especially where stormwater is able to enter homes as a result of inadequate infrastructure, detailed design is required to finalize improvement recommendations.

Section 5 provides the option of probable cost for each of the recommended improvements. The total opinion of probable construction cost for the 42 sites is $6.1 million. The anticipated construction cost for the individual sites ranges from approximately $5,310 to $880,640.

The description of the prioritization methodology and a table for comparing the rankings at each site is provided in Section 6. The priority rankings are based on the severity of the stormwater issues, the amount of residents affected, and the cost of the proposed improvements.

As this report was being finalized it should be noted that additional concerns were brought to the attention of Gonzalez Companies. The City of Brentwood may want to consider including these additional areas of concern in a supplemental report.

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1. SECTION 1. Project Description

1.1 Summary

The City of Brentwood and many of its residents experience stormwater related issues. The City has compiled a list of problem areas to track these issues. The City has also solicited information on additional sites through surveys and a public meetings to determine resident concerns. Gonzalez Companies was tasked with providing preliminary investigation and analysis of each of the sites on this list and developing a prioritized plan for the City to address these issues. The investigation and analysis of each of these issues consisted of the following approach:

- Gather available data for the site
- Identify the cause of the problem
- Perform preliminary drainage analysis
- Provide preliminary recommendations for improvements
- Estimate preliminary costs for improvements
- Prioritize the list of stormwater concerns

The results of this investigation are presented in this report and serve to give the City a prioritized plan for addressing stormwater concerns as resources are available.

The City also understands that changes to ordinances and policy could have a positive impact in reducing stormwater related issues for future development. Therefore, Gonzalez Companies was also tasked with providing a review of existing City of Brentwood ordinances and policy related to stormwater, and providing recommendations for potential updates to these documents.

This work was performed by Gonzalez Companies, LLC for the City of Brentwood, pursuant to Resolution Number 1312 where the City of Brentwood adopted the extention of the on-call engineering services with Gonzalez Companies via Resolution Number 1242. These additional on-call services were adopted on and executed on September 7, 2021.

1.2 Study Locations

The City provided a list of a number of areas of concern and through the solicitation of the public input utilizing a stormwater questionnaire a total of 213 areas of concern where identified. Through preliminary investigations it was determined that these 213 areas of concern 42 sites would be selected to be studied in more detail. These 42 study locations were further investigated, hydraulically analyzed, construction cost estimated and prioritized herein.

The other sites not studied further were not disregarded by the plan but rather these additional sites were determined to be within one of the following subcategories:

- Found to be included in a nearby investigation
- Determined to be a code of ordinance violation where a sump pump or downspout discharged directly onto the roadway. It is recommended that these homeowners be provided additional information about how corrective measures could be implemented as noted in the City's Stormwater Best Management Practices (BMPs) guide. Additional information on available tools and these BMPs is provided herein.
- A hydraulic investigation would not be required as the issue was caused by a maintenance issue or could be corrected with minor grading adjustments.
- The issue was a private dispute between neighbors.
- The preliminary investigation did not result in any identifiable issues. Follow up letters were sent to residents requesting additional information for these specific cases.

Figure 1-1 is a comprehensive map exhibit, which shows all of the numbered detailed study locations discussed herein, as well as the complete list of preliminary investigation locations. In Appendix G there is a complete listing of the preliminary investigation locations and brief description on how they are being handled. Some of the preliminary investigation sites are recommended to be handled through letters detailing the benefits of stormwater best management implementation and importance of compliance with City Ordinances. Other preliminarily investigated sites involve disputes between neighbors or can be fixed through maintenance solutions. Letters have been drafted for these types concerns have been included in Appendix H. Appendix I is the list of addresses and an example of the registered letter that were sent to the homeowners in which no issues were discovered during the preliminary investigation.

1.3 American Rescue Plan Act (ARPA)

The American Rescue Plan Act (ARPA) is currently seeking grant applicants looking to make improvement to their stormwater system. Eligible Project Types:

- Projects for Municipal Separate Storm Sewer Systems (MS4s) and Combined Sewer Overflow Systems (CSOs) to manage, reduce, treat, or recapture stormwater or subsurface drainage water for publicly and privately owned, as well as permitted and unpermitted projects. Projects may include, but are not limited to roadside plantings, porous pavement, and rainwater harvesting;
- Projects that support stormwater system resiliency including bioretention basins that provide water storage and filtration benefits, and green streets, where vegetation, soil, and engineered systems are combined to direct and filter rainwater from impervious surfaces;
- Projects involving the reuse or recycling of stormwater;
- A broad range of stormwater infrastructure projects such as, gray infrastructure projects (traditional pipe, storage, and treatment systems); projects that manage, reduce, treat, or recapture stormwater or subsurface drainage water, including real-time control systems for combined sewer overflow management, and sediment control; culvert infrastructure projects if they implement a nonpoint source management plan, implement National Estuary Program Comprehensive Conservation and Management Plan, or implement a stormwater management plan with the goal of providing a water quality benefit;
- Other project types are: green roofs, green streets, and green walls; rainwater harvesting collection; storage, management, and distribution systems; real-time control systems for harvested rainwater; infiltration basins; constructed wetlands, including surface flow and subsurface flow (e.g., gravel) wetlands; bioretention/bioswales (e.g., bioretention basins, tree boxes); permeable pavement; wetland, riparian, or shoreline creation, protection, and restoration; establishment or restoration of urban tree canopy; and replacement of gray infrastructure with green infrastructure including purchase and demolition costs;
- Dam removal projects and associated stream and habitat restoration projects when the removal implements either a Nonpoint Source Management Program Plan or a National Estuary Program Comprehensive Conservation and Management Plan or when the removal will provide a water quality benefit;
- Repair, replacement, or removal of culverts or other road-stream crossing infrastructure to the extent the purpose of the project is to manage stormwater;
- Road repairs and upgrades that interact directly with an eligible stormwater infrastructure project;
- Projects to receive and distribute reclaimed water for irrigation systems or other agricultural use.

Ineligible Project Types:

- Rain barrels implemented on private property across a watershed to reduce the amount of runoff;
- Costs for planning and design only

Several of the proposed recommendations listed in Section 4 fall within one of these eligible project types. It is recommended that the City utilize this report to apply for this grant program as they see fit.

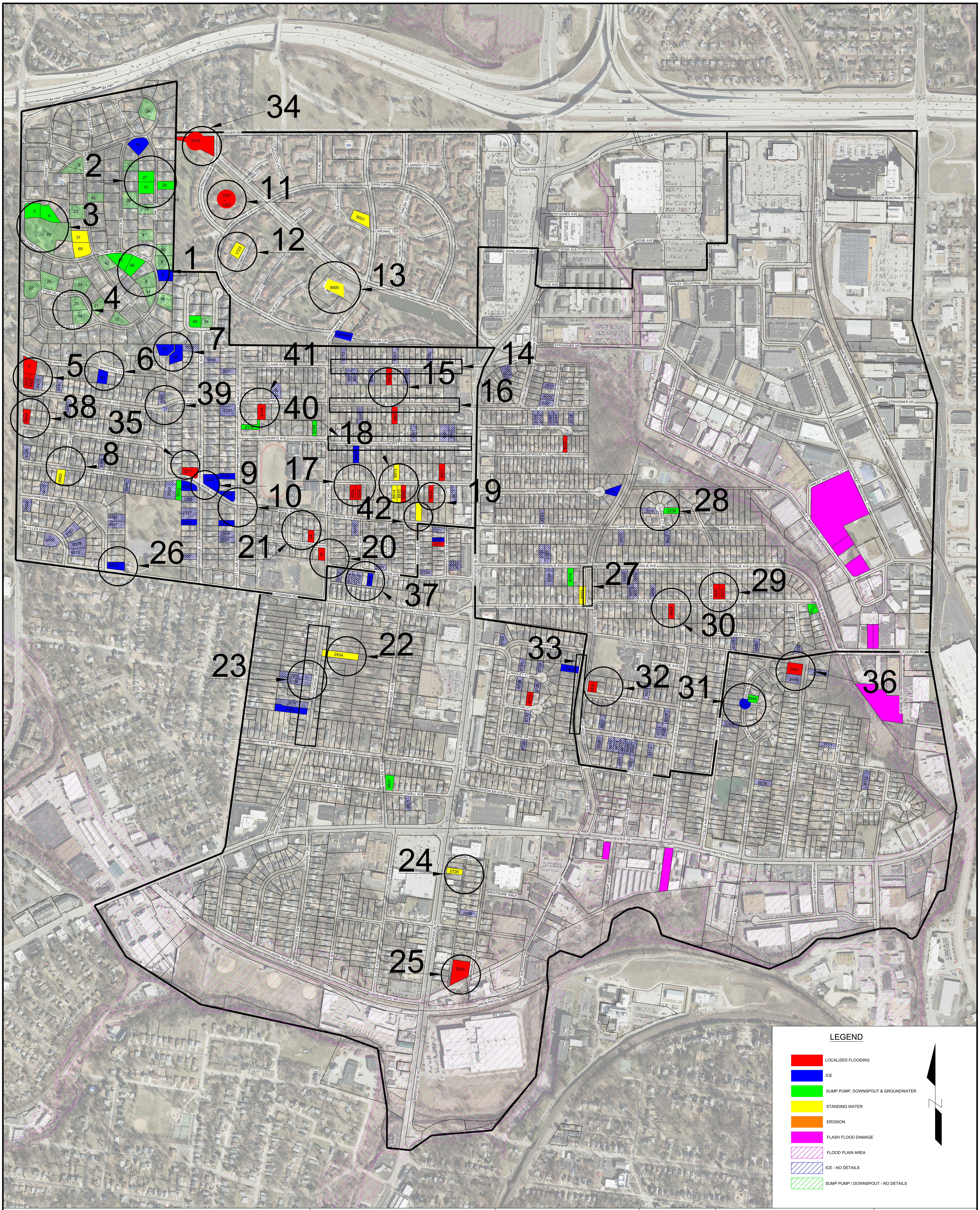

FIGURE 1-1:
COMPREHENSIVE MAP EXHIBIT

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF WARMTH

CITY OF BRENTWOOD
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

2. SECTION 2. Ordinance Review

Gonzalez Companies has provided a review of the existing City ordinances related to stormwater. This review includes recommendation for revised language and inclusions in future ordinance updates. A summary of recommended updates is provided in the following sections.

2.1 Section 400 – Division 7 - Stormwater Management, Grading and Erosion Control

General – Replace "Building Department" with "Planning and Development."

Section 400.2650 Permits.

Part A. – This section indicates that a permit is required from both State and City for disturbance of 43,560 sq. ft. (1 Acre). It is recommended that this section of the permit be updated to coincide with other section of the City's code of ordinances, which requires a grading permit for sites less than one acre. Developments that disturb more than one acre should also be reviewed by Metropolitan St. Louis Sewer District (MSD).

Section 400.2660 Storm Water Pollution Prevention Plan (SWPPP)

Part A. 4. – This section requires that the contour information be submitted based on "United State Geological Survey datum." It is recommended that this statement be revised to be specific and include the latest vertical datum "NAD83". It is also important to have the datum noted on the information submitted for future reference.

Section 400.2680 Storm Water Design Standards

General – The current ordinance does not provide any guidance on overland flow routes. Overland flow routes are a key feature in a stormwater conveyance system. They are especially important when the design capacity of the underground system is exceeded. This section requires storm sewer to be design for the 25-year frequency and 20-minut duration, when a rain event occurs that is greater than this the storm pipes will be at peak capacity and no additional runoff will be accepted by the underground system. At the point when the stormwater does not have any remaining capacity runoff will seek an overland flow route. If an appropriate overland flow is not design and maintained stormwater has the potential to backup onto properties or into structures with the potential to cause damage or present safety hazards. It is recommended that an overland flow route be designed in conjunction with the storm sewer system to convey the 100-year storm event.

Section 400.2690 Construction and Maintenance of Storm Water and Erosion Control Facilities

Part C./D. – While these sections include good language concerning the important maintenance responsibilities of stormwater detention facilities, this section does not include any requirements for maintenance agreements. It is recommended additional language similar Section 500.1790 be included to provide the City a mechanism of enforcement for post construction stormwater runoff mitigation. Without proper maintenance of stormwater detention facilities, overtime they can fill with silt and debris causing them to lose capacity, plug or otherwise become ineffective and additional stormwater runoff can cause issues downstream.

2.2 Section 500 – Article XVII – Infill Development Stormwater Management

Section 500.1710. Definitions

REGULATED INFILL DEVELOPMENT – The definition of the regulated infill development includes the following statement, "…net additional impervious area of two hundred (200) square feet or greater and the change or improvement requires review by the Architectural Review Board …". It is recommended that the reference of the Architectural Review Board (ARB) be eliminated from this definition. Gonzalez Companies believes the purpose of the ordinance is control all net impervious additions greater than 200 square feet not just those, which are reviewed by the ARB.

Section 500.1720. Stormwater Infill Development Permit Required – Procedure

Part A. – The description of the procedure for submittal of the Stormwater Infill Development (SWID) permits suggests that the applicant should provide hard copies of the documentation required. This requirement goes against the current procedure in which the SWID permits are being filed. Currently, all SWID permit documents are being uploaded to the City's MyGOV system. This system allows for a streamlined process of submittals, reviews, re-reviews and approvals, as well as overall documentation of the timeline for submittals and evidence of personnel involved with the reviews. It is recommended that the ordinance be updated to include the current procedure for submittals of SWID documentation.

Appendix A contains the current SWID permit process within a flow chart that can be provided to those who are new to the process or have questions regarding the next steps.

Part A. 1. – This section requires that an existing and proposed contour map consisting of two (2) foot intervals be submitted with the permit. It is recommended that the ordinance be revised to require one (1) foot contours. At some locations two-foot contours may not provide enough information for reviewers to adequately assess the site conditions.

Additionally, in Part A. 1. this section requires that the contour information be submitted based on "United State Geological Survey datum." It is recommended that this statement be revised to be specific and have the inclusion of the latest vertical datum "NAD83".

Part A. 6. – This section requires that soils conditions "as necessary" be submitted with permit documentation. Soils conditions are an integral part of designing and evaluating suitability of a Storm Water Best Management Practice. It is recommended that the "as necessary" be eliminated from this section as each submittal should be evaluating soils conditions and the evidence of this evaluations should be provided to the reviewers along with the rest of the documentation.

Section 500.1740. Review and Inspection Fees.

The City's current ordinance calls out base fees depending on resulting net impervious area added by the development. However, it does not call out any requirement for additional fees when numerous reviews, more than two, are required by the City's stormwater engineering consultant. It is the current procedure that when the consultant requires more than two reviews the City is charged the actual time and expenses incurred by the additional reviews. They City should have a regulatory mechanism in place to pass these costs along to the applicants.

Section 500.1750. Deposit

Part A – This section states, "To ensure compliance with the provisions hereof, each applicant for a Stormwater Infill Development Permit shall deposit with the City a sum equal to the construction cost for BMP installations to control stormwater runoff…" However, the current procedure for deposits per the MyGOV site is that the fee is based upon the impervious area on the site (i.e., total square footage of impervious x 110% = Deposit Fee in dollars). It is recommended that the ordinance be revised to reflect

the current procedure or provide a range of fees depending upon an assumed cost of construction of the Stormwater BMP, which could be based upon the size of net impervious to be detained.

Section 500.1770. Sump Pump and Downspouts.

Part A. 1. – This section states, "Stormwater discharges from downspouts or sump pumps shall be located at least ten (10) feet from the property line whenever possible and shall in every case be located no less than four (4) feet from the property line and shall discharging to a pervious surface or stormwater BMP…" It is recommended that the ambiguity of this ordinance on the allowable distance be removed. The current building setbacks allow for construction a home five (5) feet from the property line, which is likely why four (4) feet was originally chosen as an allowable discharge point for downspouts. However, providing discharges with only four (4) feet of pervious area to absorb into the ground is unrealistic and results in discharges that affect the neighboring property. It is recommended that additional consideration be given to both distance and direction of the discharges. Downspouts should not be directed toward the property line without a minimum 20' vegetated filter strip.

Furthermore, this section does not address popup emitters or overflow pipes from stormwater BMPs. It is recommended that additional sections be included to address the requirement for discharge of these stormwater pipes.

Lastly, this section does not address the direct connection of stormwater discharges to the storm sewer system. It is recommended that an additional statement be included to prevent this or require appropriate approvals to be obtained from MSD.

Section 500.1790. BMP Maintenance and Inspection

Part A. – This section requires that a maintenance agreement be executed prior to issuance of a SWID permit. Maintenance of a stormwater BMP is a critical step in being able to provide lasting benefits of storage and water quality. It is recommended to include additional requirements that an applicant should provide a schedule of maintenance and inspection per the design requirements for the specific BMP selected for the site. The lack of maintenance allows the stormwater BMP's to become filled with silt, debris, become clogged or otherwise become ineffective allowing additional stormwater runoff to discharge through overflow pipes affecting properties downstream.

Section 500.1800. Correction of Violations

Part A. – This section indicates that a "fee shall not exceed one hundred dollars" for the administration of City staff to coordinate corrective measures to violators. It is recommended that additional fees be considered to cover the cost of said administration of correction actions.

2.3 Future Considerations

Gonzalez Companies recommends that the City do more to promote and implement Green Infrastructure techniques into the redevelopment and improvements within the City.

Green Infrastructure techniques can include things such as:

- Narrower right-of-way or roadway widths
- Grassy swales and shoulders without curb and gutter
- Pedestrian walkways that do not constitute the sidewalks
- Permeable pavements (e.g., pavers, permeable concrete, permeable asphalt pavement)
- Bioretention swales
- Planter boxes
- Curb extensions
- Downspout Disconnection
- Rainwater Harvesting
- Rain Gardens
- Bioswales

- Green Streets and Alleys
- Green Parking
- Green Roofs
- Urban Tree Canopy
- Land Conservation

Green Infrastructure techniques should utilize the landscape or nature's ability to reduce, slow, filter, and/or absorb stormwater runoff from streets, parking lots, and buildings in a method that equals or exceeds the existing infrastructure requirements of the City. These techniques should be consistent with best management practices and follow recommendations provided by USEPA. Future ordinance sections can be developed to require these important practices for sustainable development. Visit USEPA's website for more information, What is Green Infrastructure? | US EPA.

3. SECTION 3. Data Collection

3.1 Desktop Survey

A desktop survey was conducted for the purpose of obtaining characteristic basin data for use in the modeling effort. The following data was obtained for use in the analysis:

- USGS Topographic Maps
- GIS Data on MSD Storm and Sanitary Sewer System
- St. Louis County GIS and LiDAR Contours
- Flood Maps
- Property Parcel Data
- Orthophotos
- Land use information for Curve Numbers, Rational Method C-coefficient and Manning's n-value development

3.2 Public Input

The City and project team conducted a survey to gather public input. Comment forms were made available to the public during the initial phases of this project. The forms provided residents with an opportunity to ensure that the City and the project team were aware of their stormwater concerns as well as add detail to help the project team in the investigation. Results of the survey were tabulated by the project team and organized by location.

A detailed report of the public input phase was provided to the City on January 29, 2022, and has been included herein as Appendix E.

3.3 Field Investigations

Multiple site investigations were conducted by the project team over the course of the project duration. The purpose of these site investigations was to investigate locations identified in the lists provided by the City, investigate the concerns provided by residents during the public comment period, confirm the drainage patterns throughout the area, identify the characteristics of connections between basins, and identify areas for potential improvements. Field investigations were conducted during periods of wet weather events, freezing temperatures, snowfall and during dry periods. These field investigations were conducted on all 217 properties that were identified as potential areas of concern and the findings of the preliminary investigation provided to the City on March 4, 2022, at which time the 42 locations were chosen for hydraulic analysis, detailed cost estimation and prioritization ranking.

3.4 Topographic Information

LiDAR topographic information was acquired for the City for the project area. From the LiDAR data, contours were created which allowed the project team to efficiently determine the boundaries of the contributing watershed to each area of study.

To supplement the LiDAR data, additional topographic survey was gathered by the project team through the use of survey equipment. Key information at each site including size and elevation of information for storm sewers, culverts, drainage structures, berms, and roadway were obtained. This information was used during the analysis phase as required to determine areas of deficiencies and development of the preliminary recommendations for improvement.

4. SECTION 4. Preliminary Drainage Analysis

A preliminary drainage analysis was conducted for each area of concern. The analysis determined the drainage characteristics at each location to use for developing preliminary recommendations at each site. The project team used land use, impervious percentages, and topographic information along with data obtained from site investigation and public input to conduct the analyses. In general, the following approach was used at each site:

1. Delineate the contributing watershed (drainage basin) to the area of concern.

2. Determine the peak discharge (flow rate) for each area of concern using the rational method for a 25-year, twenty (20) minute design storm.

3. Use flow rates to size preliminary improvement recommendations including:
   a. Adding inlets
   b. Increasing size of storm sewer pipe
   c. Grading improvements to improve conveyance capacity

The most common observations included the lack of inlet capacity at low points in the roadway and/ or undersized storm sewers. The preliminary analysis and recommendations for each site are described in more detail throughout the remainder of this section.

The opportunity to incorporate detention to reduce stormwater impacts was explored; however, most of the areas of concern were too developed, did not have available property, or were topographically located in an area that eliminated the potential for adding significant detention. Recommendations for improvement utilizing Best Management Practices to reduce runoff and improve water quality have been presented for both for specific areas, as well as more generically as this recommendation for improvement is a common recommendation for many of the issues presented.

Section 4 also provides a summary of the Opinion of Probable Cost and the Priority Ranking for each of the sites. A detailed description of the approaches for the Opinion of Probable Cost as well as the Priority Ranking can be found in Sections 5 and 6, respectively.

The recommendations provided in this report are preliminary in nature for the purpose of defining the stormwater issue and identifying a possible improvement. The recommendations are appropriate for preliminary cost estimating and prioritization. For each site, a detailed design and analysis are required prior to construction of the recommended improvement.

4.1 Site 1: 8 Southcote Rd.

4.1.1 Concerns:

Several properties in the vicinity of 8 Southcote Road in the York Village subdivision have been noted to have sump pumps or downspouts that discharge directly onto the roadway. The addresses listed below have all been reported in area of the stormwater issue, which is believed to stem from a lack of Stormwater Best Management Practices (BMPs) and a minimal amount of stormwater inlets and underground drainage system. This lack of underground conveyances in the area to remove the surface water from the roadway creates the potential for the roadways to become inundated during heavy rains and icy during the winter months.

- 39, 47, 50, 56, & 62 York Drive
- 6, 8, 9, 11, & 18 Southcote Road

4.1.2 Observations:

During field investigations it was noted that water ponded at several locations within the roadway and driveways surrounding the noted addresses. Residents also provided photographs of wet sidewalks and driveways. There were also reports of wet or standing water in some of the yards within Site 1.

In addition to the areas of ponding, it was also noted that in areas that appeared to have good longitudinal slope stormwater would run down the middle of the road rather than along the curb since there was not appropriate transverse slope on the roadways.

As was mentioned in the original concern it was observed that numerous homes in the area were not in compliance with the City Ordinance to have downspouts and sump pumps discharging less than 10’ from the property line or discharging onto an impervious surface (City Code of Ordinances - Section 500.1770).

4.1.3 Drainage Characteristics:

A basin map is presented in Appendix B as Figure B-1. Stormwater generally drains from three directions west and south on York Drive toward the intersection with Southcote Road, as well as toward the north on Southcote Road, toward the same intersection where a depression exists just north of the intersection. The contributing basin area to the depression at the intersection of Southcote Road and York Drive is approximately 20.18 acres. The design storm peak flow to the depression is calculated at 37.22 cfs.

4.1.4 Preliminary Improvement Recommendation:

Based on discussion with the residents and a hydraulic evaluation of the storm sewer system within the area inlet capacity was found to be insufficient for the design storm. It is recommended that the inlet at the southwest corner inlet on Southcote Rd. be replace with a double inlet, and that an additional single inlet be added on the northwest side of Southcote Rd. to add additional capacity.

In addition to adding capacity to the underground system in order to eliminate continual low flow events from sump pumps and downspouts residents should be encouraged to disconnect these discharges from impervious areas and implement a stormwater BMP. An example of the sizing requirements for a dry-well has been included within the recommendations for improvement for this site.

A detailed illustration of the recommendations and installation details for the stormwater BMP follow in Figure 4-1.

4.1.5 Property Characteristics:

This site is located within York Village, and all the streets and properties of this subdivision are owned by the residents and homeowners association (HOA). Therefore, the proposed improvements would be located on private property. It is unknown if stormwater easements are currently present at this property, however, the improvements proposed would not be within any easements and would be the responsibility of said homeowners and HOA.

4.1.6 Opinion of Probable Cost:

The opinion of probable construction cost is $34,450 for incorporating the recommendations at this site. Please note that this cost does not include engineering services and potential permit acquisition as may be required.

4.1.7 Priority Ranking:

The efficiency ranking factor for this site is 10.07. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.1.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 40'

0' 40' 80'

FIGURE #
4-1A

8 SOUTHCOTE RD
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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OF AUTHORITY #2005038353

CONTRIBUTING AREA: 2375 S.F.
WQv = 2375 * 1.14 * 0.95 / 12 = 214.34 CF
ASSUMING 40% POROSITY = 214.34 / 0.40 = 535.85 CF OF ROCK REQUIRED
USING A 4 FOOT ROCK DEPTH = 535.85 / 4 = 133.96 SF
7.0 X 19.25 = 134.75 SF

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 20'

0' 20' 40'

FIGURE #
4-1B

8 SOUTHCOTE RD
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

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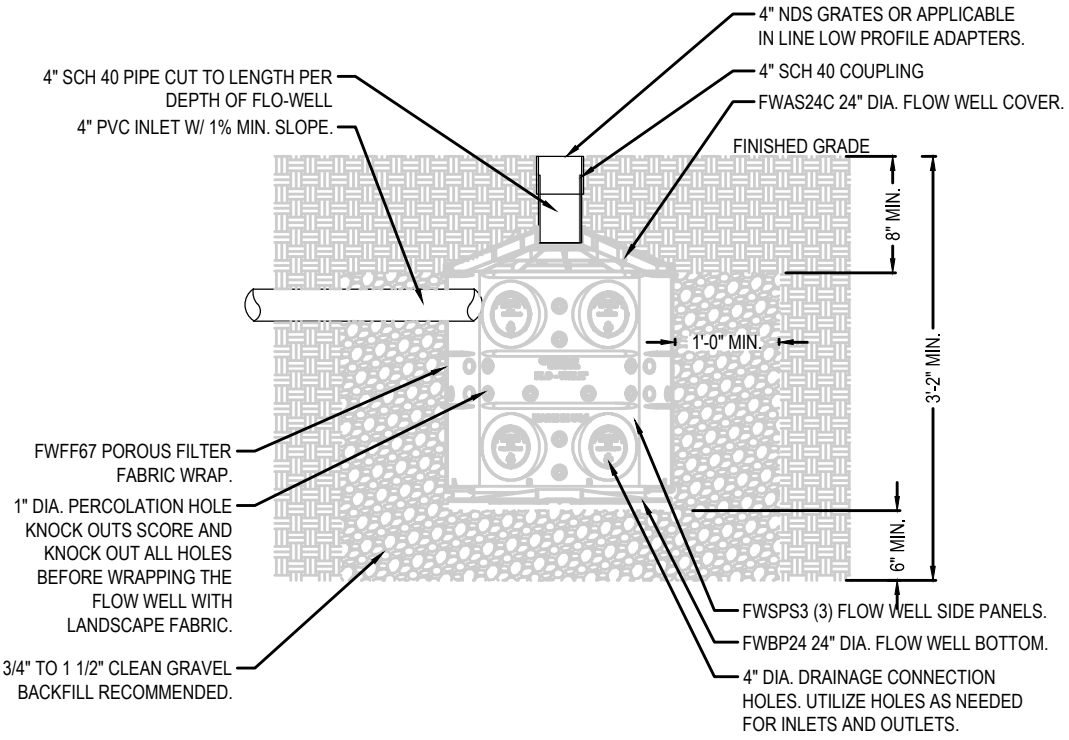


NOTES:
1. MUST BE INSTALLED 10' AWAY FROM STRUCTUREOR FOUNDATION.
2. FWAS24 KIT DOES NOT COME WITH FWPB24 BTM.
3. REFERENCE FLO-WELL CALCULATOR ON NDSPRO.COM
4. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
5. DO NOT SCALE DRAWING.
6. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY.
7. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

FLO-WELL DRY WELL SYSTEM

FLO-WELL INSTALLATION DETAIL - LOAD CLASS "A" & "B" - GRAVEL INSTALLATION DETAIL

REVISION DATE 3-5-2015

4.2 Site 2: 28 York Drive

4.2.1 Concerns:

The addresses listed below have all been reported for stormwater issues near the vicinity of 28 York Drive. Many of these issues include the lack of Stormwater Best Management Practices and City Code of Ordinances - Section 500.1770 violations. The neighborhood has a small amount of drainage structures in place and the excess surface water from contributing impervious areas has provided a concern for residents in this area. Many side yards near this site are sloped so that water flows from one neighbor to the next, leaving standing water in poorly graded areas and surface runoff that lasts well after rain events have ended.

- 18, 27, 28, 31, & 39 York Drive
- 34 Northcote Road
- 12 & 26 Sussex Drive

4.2.2 Observations:

Discussions with residents proved that surface runoff from neighboring properties was the major concern. Specifically, the unlawful discharge of downspouts on impervious surfaces and/or too near the property line was the primary concern for this site.

During field investigations, it was noted that the roadway generally had good longitudinal slope away from the primary area of concern, but roadways slopes diminish as they approached 18 York Drive. While the roadway had good longitudinal slope, the slopes in the yards between the houses was less pronounced. The general lay of the land is sloping from south to north and the homes surrounding this site face east and west creating conflicting drainage patterns and provide for flat areas where stormwater pools.

Transverse slope on the roadways appeared to be insufficient as stormwater runoff generally flowed down the middle of the roadway and/or side to side.

As was mentioned in the original concern, it was observed that numerous homes were in fact out of compliance with City Code of Ordinances - Section 500.1770.

4.2.3 Drainage Characteristics:

A basin map is presented in Appendix B as Figure B-2. Drainage patterns are forced to flow east to west in between the homes along the west side of York Drive and west to east along the east side of York Drive, while generally drainage flows from south to north within the project corridor. The conflicting drainage patterns create flat spots in some yards, but roadway drainage is positive. At the intersection of York Drive and Northcote Road, the longitudinal slope flattens out and there are some localized depressions and storm sewer inlets that collect water at this intersection. The contributing drainage basin area to the localized depression at the intersection near the project site is approximately 0.7 acres. The design storm peak flow within this area is calculated at 1.9 cfs.

4.2.4 Preliminary Improvement Recommendation:

A hydraulic evaluation of the storm sewer system and allowable gutter spread within the area indicated that both inlet and storm sewer pipe capacity is sufficient for the design storm.

The lack of transverse slope within the roadway allows gutter spread beyond what is typical, which leads to the potential for wet, slippery, or icy conditions. The downspout discharges also contribute additional surface flows, which do not have the opportunity to absorb into the pervious surface before flowing onto neighboring properties.

Proposed recommendations for improvements to this site include transverse slope corrections through an asphalt resurfacing, which should build up the pavement and shed the water toward the curb and gutter and result in appropriate gutter spread. However, these costs have not been included within the Opinion of Probable Costs.

In order to correct the additional surface flows from the downspouts and sump pumps, a Stormwater Best Management Practice is recommended. While many Stormwater Best Management Practices are available for this site, we have focused on the implementation of a "rain garden," which is a commonly used BMP that can help reduce surface runoff, improve water quality, and can be an aesthetic improvement. The rain gardens can also help prevent ponding or wet areas with yards.

A detailed site investigation is required for the selection and use of any BMP. More information on the selected BMP and many others can be found in Appendix F, Stormwater Best Management Practices Guide. A detailed illustration and installation details for the recommended improvement follow in Figure 4-2.

4.2.5 Property Characteristics:

This site is located within York Village, all of the streets and properties of this subdivision are owned by the residents and homeowners association (HOA). Therefore, the proposed improvements would be located on private property. It is unknown if stormwater easements are currently present at this property, however, the improvements proposed would not be within any easements and would be the responsibility of said homeowners and HOA.

4.2.6 Opinion of Probable Cost:

The opinion of probable construction cost is $30,340 for incorporating the recommendations at this site. Please note that this cost does not include engineering services and permit acquisition, as may be required.

4.2.7 Priority Ranking:

The efficiency ranking factor for this site is 19.57. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.2.8 Site Photos:

Representative photos are provided below.

SIZING CALCULATIONS EXAMPLE FOR DRAINAGE AREA 1

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of rain garden(s) for stormwater management:

- ✓ Square footage of contributing drainage area: 1770 (ft^2)
- ✓ Sizing calculations.

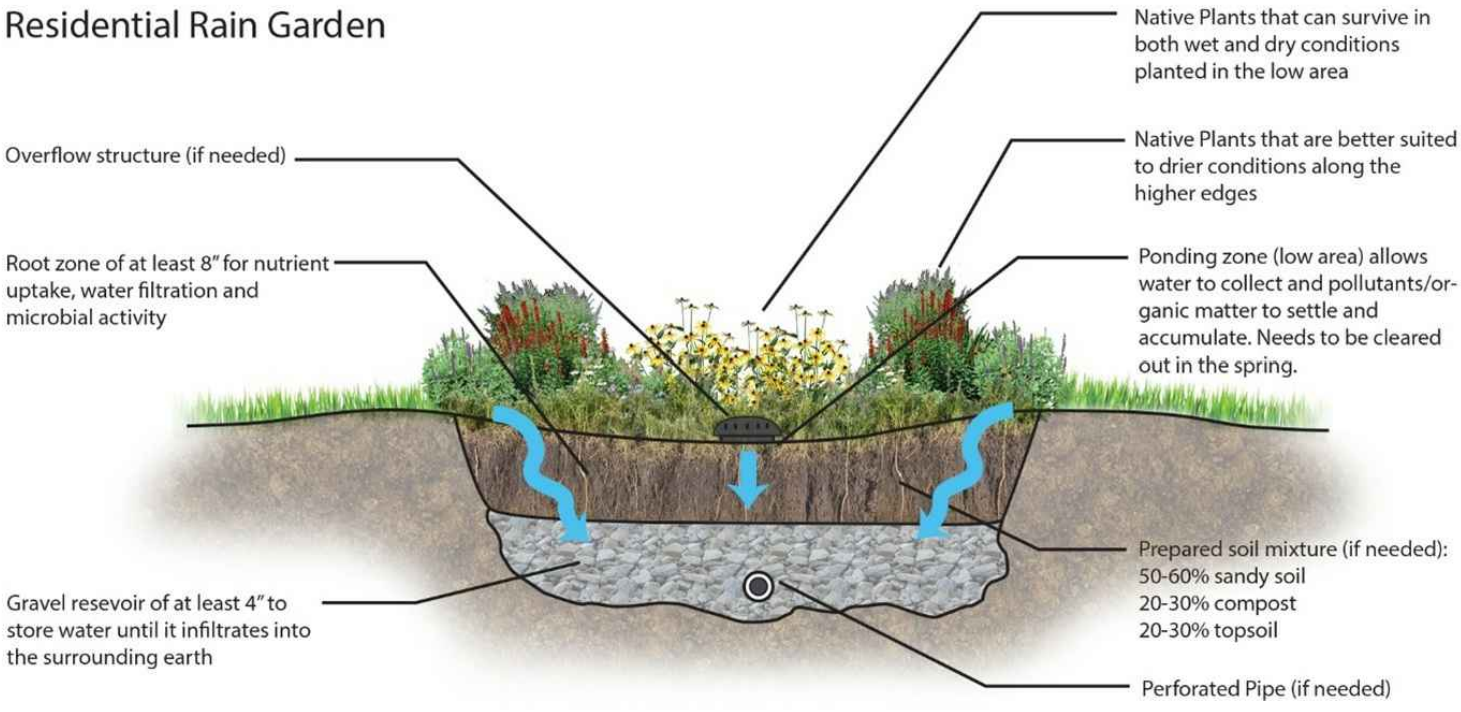
  Contributing Drainage Area (ft^2) x0.2 = 354 (ft^2)
- ✓ Site infiltration rate: 0.25 inches/hour
  - Is underdrain required? YES (NO)
  - Can BMP size be reduced? YES (NO)
    - If yes, revised required surface area: _____ (ft^2)
- ✓ Design overflow structure to allow for maximum ponding depth of 6-inches.
- ✓ A Landscape Plan must be submitted to the City for review and approval in conjunction with the Stormwater Infill Development Permit application

Drainage Area 1 rain garden size: 6 ft x 59 ft = 354 sqft

THIS FORM CAN BE FOUND ON PAGE 21 OF *BRENTWOOD STORMWATER CONTROL BEST MANAGEMENT PRACTICES*

FIGURE #						
4-2A	28 YORK DR SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

Residential Rain Garden



CONSTRUCTION

STEP 1 – CALL ONE CALL - CALL ONE CALL UTILITY LOCATING BEFORE ANY EXCAVATION AND ALSO CHECK FOR PRIVATE CABLE, PROPANE, ELECTRIC, AND OTHER LINES. MAKE SURE TO HAVE A PLAN AND PHONE NUMBERS OF WHO TO CALL IN CASE THERE IS ANY DAMAGE TO UTILITIES.

STEP 2 - OUTLINE THE GARDEN: MARK THE BOUNDARIES OF THE RAIN GARDEN EXCAVATION AREA. CONFIRM THE FLOW OF WATER INTO THE RAIN GARDEN, CHECKING THE AREAS THAT ARE TO CONTRIBUTE RUNOFF TO THE PRACTICE. THIS MAY REQUIRE USING A SURVEY LEVEL OR HAND LEVEL AND A SURVEY ROD TO CHECK SPOT ELEVATIONS AND CONFIRM FLOW PATHS.

STEP 3 – EROSION CONTROL: IT IS BEST TO DIG THE RAIN GARDEN WHEN THE WEATHER IS EXPECTED TO BE DRY FOR SEVERAL DAYS. INSTALL A ROW OF SILT FENCE BELOW THE CONSTRUCTION SITE IN CASE OF RAIN. COVER STOCKPILES OF SOIL TEMPORARILY WITH A TARP TO PREVENT THE MATERIAL WASHING AWAY.

STEP 4 - DIG BASIN – ELEVATIONS ARE KEY: EXCAVATE THE RAIN GARDEN AREA AND SIDE SLOPES. THE RAIN GARDEN SURFACE AREA SHOULD BE AS FLAT AS POSSIBLE WHILE SIDE SLOPES CAN BE NO STEEPER THAN 3:1. IN ORDER TO NOT COMPACT THE SOIL, ENSURE THAT HEAVY EQUIPMENT WORKS FROM THE SIDES TO EXCAVATE THE RAIN GARDEN TO THE DEPTH AND DIMENSIONS SPECIFIED IN THE DESIGN.

THE OUTLET OR OVERFLOW SHOULD BE SET AT THE MAXIMUM PONDING ELEVATION AND SLOPE DOWNWARD AWAY FROM THE BASIN, WITH THE FLOW PATH UNOBSTRUCTED. IF A BERM IS UTILIZED TO CREATE THE REQUIRED PONDING DEPTH, THE BERM SHOULD BE THOROUGHLY COMPACTED SO IT DOES NOT FAIL WHEN IT GETS SATURATED. IF THE SITE SOILS ARE VERY LOOSE OR SANDY, THIS MAY REQUIRE SOME CLAY TO BE ADDED. THE BOTTOM OF THE EXCAVATION SHOULD BE AS DEEP AS NECESSARY TO ACCOUNT FOR THE COMPONENT LAYERS INCLUDED IN THE DESIGN. WORKING DOWNWARD FROM THE TOP, THESE INCLUDE PONDING DEPTH, MULCH, AND SOIL FILTER BED AS NECESSARY. FOR EXAMPLE:

- 6 INCHES PONDING +
- 2 INCHES MULCH +
- 18 INCHES SOIL =
- 26 INCHES DEEP, BELOW THE SURFACE ELEVATION.

IF THE EXISTING SOIL HAS GOOD INFILTRATION FOR THE RAIN GARDEN, THE EXCAVATION NEED NOT BE AS DEEP. IN THESE CASES, THE INSTALLER SHOULD EXCAVATE TO 2" BELOW THE BOTTOM OF THE MULCH LAYER (10" IN THE EXAMPLE ABOVE), TO PREPARE FOR THE ADDITION OF 2" OF COMPOST.

STEP 5 – ADD COMPOST AMENDMENT (IF APPLICABLE): IF FILTER BED SOIL MIX IS NOT REQUIRED, ADD 2" OF COMPOST TO AMEND THE EXISTING SOILS.

STEP 6 - TILL BOTTOM OF BASIN: TILL THE BOTTOM SOILS TO A DEPTH OF 6" TO PROMOTE GREATER INFILTRATION AND INCORPORATE THE COMPOST AMENDMENT, IF APPLICABLE. ENSURE THAT THE BOTTOM IS AS LEVEL AS POSSIBLE.

STEP 7 – SPREAD FILTER BED SOIL MIX: PLACE THE SOIL MIX DIRECTLY INTO THE BOTTOM OF THE EXCAVATION. PLACE THE SOIL MIX UNTIL THE DESIRED TOP ELEVATION OF THE RAIN GARDEN IS ACHIEVED (ACCOUNTING FOR 2" – 3" OF MULCH). WATER THE SOIL MIX WELL WITH A HOSE TO ALLOW IT TO SETTLE. WAIT A FEW DAYS TO CHECK FOR MORE SETTLING, AND ADD ADDITIONAL SOIL AS NEEDED.

STEP 8 – INSTALL PLANTS AND MULCH: PREPARE HOLES FOR TREES AND SHRUBS ON RAIN GARDEN BASIN SURFACE, INSTALL VEGETATION, AND WATER ACCORDINGLY. PLANT TREES AND SHRUBS AFTER THEY GO DORMANT IN THE LATE FALL, IF POSSIBLE.

AVOID TREES AND SHRUBS ON THE BERM, IF IT IS PRESENT. INSTALL ANY TEMPORARY IRRIGATION. PLACE THE MULCH AROUND THE PLANTS, AS PER THE DESIGN. WATER PLANTS DURING WEEKS OF NO RAIN FOR AT LEAST THE FIRST TWO TO THREE MONTHS.

STEP 9 – INSTALL INLET: INSTALL ANY PRE-TREATMENT FEATURES ASSOCIATED WITH THE PLAN, SUCH AS A STONE PAD AT THE MOUTH OF DOWNSPOUTS.

STEP 10 – RESTORE DISTURBED AREA: SEED AND STRAW OR SOD ALL SIDE SLOPES, BERMS, AND DISTURBED AREAS OUTSIDE THE RAIN GARDEN AREA. ASIDE FROM THE BERM, THESE AREAS MAY ALSO BE PLANTED WITH NATIVE PLANTS.

STEP 11 – INSPECT: INSPECT THE RAIN GARDEN AFTER SEVERAL RAIN EVENTS TO LOOK FOR ANY NEEDED ADJUSTMENTS: ENSURE THAT RUNOFF IS ENTERING THE RAIN GARDEN PROPERLY, THE GARDEN IS DRAINING PROPERLY, THERE IS NO EROSION AT INLETS AND OUTLETS, AND PLANTS ARE SURVIVING. REMOVE SILT FENCE ONCE THE SITE IS SUFFICIENTLY VEGETATED AND STABLE.

MAINTENANCE

THE FOLLOWING MAINTENANCE SHOULD BE PERFORMED TO KEEP PERVIOUS PAVEMENT FUNCTIONING PROPERLY:

- DURING THE FIRST FEW MONTHS, WATER NEW PLANTS TO ENSURE ESTABLISHMENT.
- IN THE SPRING OR FALL, REPLACE DEAD PLANTS OR DIVIDE PLANTS THAT HAVE EXCEEDED THEIR ALLOTTED SPACE.
- ONCE A YEAR, ADD MULCH TO NOURISH THE PLANTS AND MINIMIZE THE GROWTH OF WEEDS.
- DO NOT ADD CHEMICAL FERTILIZERS, HERBICIDES, OR PESTICIDES.
- REMOVE ANY WEEDS BY HAND PULLING.
- CHECK FOR SIGNS OF EROSION NEAR THE INFLOW AND OUTFLOW AND ADDRESS AS NEEDED BY ADDING COBBLE OR GRAVEL.
- REMOVE ACCUMULATED SEDIMENT AND DEBRIS AS NEEDED.

4.3 Site 3: 5 & 6 Cricket Lane

4.3.1 Concerns:

After periods of heavy rainfall and typically in the spring, the residents located at 5 & 6 Cricket Lane experience heavy groundwater and surface flows coming from the south. The property south of this area is a fairly large approximately 2-acre lot that sits on a hill. Much of this lot has been developed with a large home, garage, driveway, and patio area. The residents at 5 & 6 Cricket Lane claim that the area has been re-developed over the last 30 years and the increased impervious area is exacerbating the natural ground water present at this location. In addition, 6 Cricket Lane a has concern that newly installed landscaping berms from the neighbors contributes additional surface flows, which are redirected toward their home.

It has also been noted that a French Drain has been installed near the property line between the property to the south and the lower lying properties of 5 & 6 Cricket Lane. The concern is that this French Drain also contributes to the discharges onto these properties.

Lastly, it was noted that each of the subject properties within this site has discharge pipes, which drain directly onto the roadway. These discharge pipes contribute to a steady flow of water on the roadway, which is undesirable by the other neighbors in the project area.

4.3.2 Observations:

Site visits were conducted during wet weather events, as well as periods without rain for more than 72-hours, during the spring of 2022. During both wet and dry site visits, the steady discharge onto the roadway was apparent. The natural occurrence of the ground water was likely intensified through the development of all three lots within this area. The existing French Drains installed on these properties to help reduce ground water seepage into pools and basements have been left to discharge directly onto the roadways or the neighboring property.

While the installation of the French Drain system was completed on multiple properties with good intentions, it is likely that there have been several instances of negligence. A French Drain system can be an appropriate stormwater best management tool, but it can only operate as well as it was installed and maintained. This is true for all stormwater BMPs. Maintenance and inspections are critical for the long-term performance of these structures.

The nearest underground stormwater conveyance system or channelization structure is about 600’ from the high point of the properties. Surface flows are generally limited to around 300’ and with the addition of the ground water flows an additional underground system could be beneficial.

4.3.3 Drainage Characteristics:

A basin map is presented in Appendix B as Figure B-3. Drainage patterns flow from south to north across the subject properties. The effluent water from the properties flow onto Cricket Lane and continue north to the first set of drainage structures halfway between the 90-degree bend near 6 Cricket Lane and York Drive.

It is likely due to the steep grades on Cricket Lane that there is some by-pass of the initial inlets and stormwater ultimately collects in the low area at the intersection of York Drive and Cricket Lane. However, since no concerns were raised north of the 90-degree bend near 6 Cricket Lane the drainage analysis was limited to these upper reaches. The contributing basin for Site 3 is approximately 1.01 acres. The design storm peak flow to the depression is calculated at 2.84 cfs.

4.3.4 Preliminary Improvement Recommendation:

It is recommended that previously installed French Drainage systems be upgraded to provide for proper installation of the discharge pipe and regular maintenance schedule is established for this BMP.

In order to limit the flow length in which surface water must travel, additional underground storm sewers can be installed to provide proper conveyance and provide for additional relief of the naturally occurring groundwater. Each of the homes have discharge pipes, which should be discharging into a stormwater BMP rather than onto the roadway. In order to correct the flows from the downspouts, a Stormwater Best Management Practice is recommended. While many Best Management Practices are available for this site, we have focused on the proper implementation and maintenance of a French Drain for this site.

A detailed site investigation is required for the selection and use of any BMP. More information on the selected BMP and many others can be found in Appendix F, Stormwater Best Management Practices Guide. A detailed illustration and installation details of the recommended improvement follow in Figure 4-3.

4.3.5 Property Characteristics:

This site is located within York Village and all of the streets and properties of this subdivision are owned by the residents and homeowners association (HOA). Therefore, the proposed improvements would be located on private property. It is unknown if stormwater easements are currently present at this property, however, the improvements proposed would not be within any easements and would be the responsibility of said homeowners and HOA.

4.3.6 Opinion of Probable Cost:

The opinion of probable construction cost is $39.390 for incorporating the recommendations at this site. Please note that this cost does not include engineering services and permit acquisition as may be required.

4.3.7 Priority Ranking:

The efficiency ranking factor for this site is 20.52. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.3.8 Site Photos:

Representative photos are provided below.

FIGURE #

4-3A

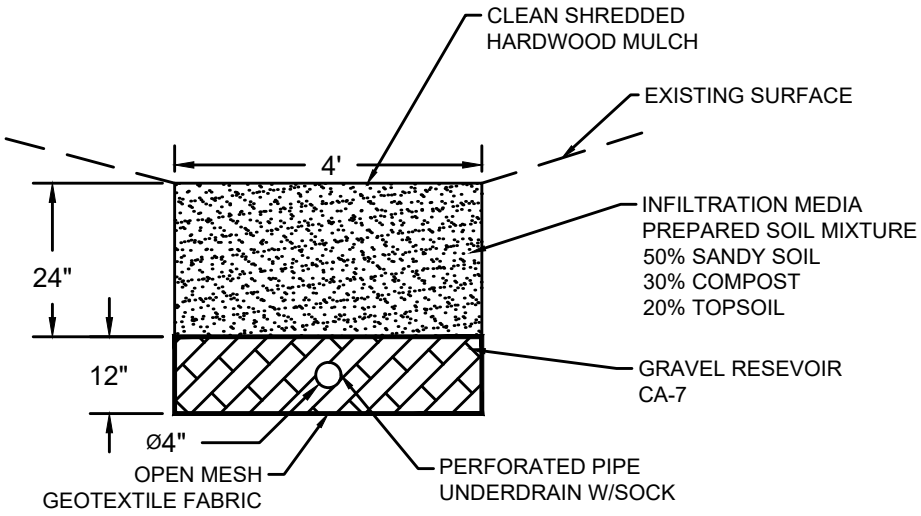
5 & 6 CRICKET LN
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

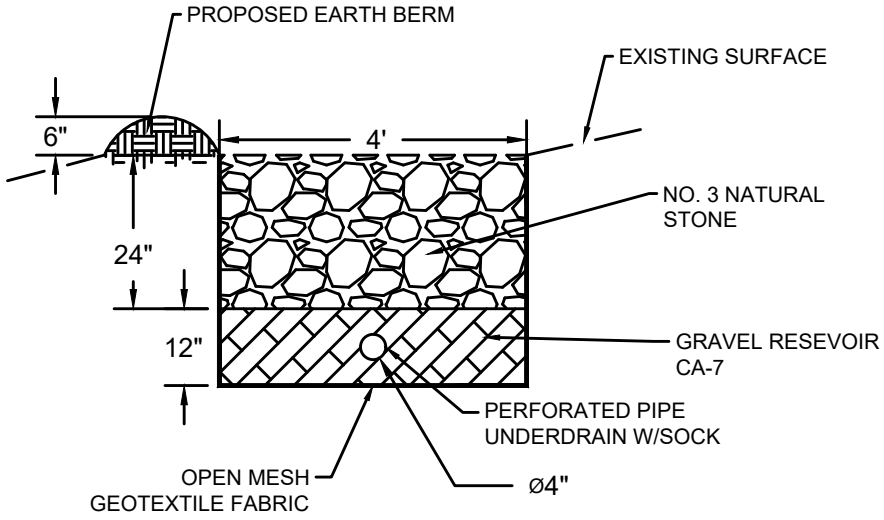
CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



FRENCH DRAIN DETAIL, TYPE I

NOT TO SCALE



FRENCH DRAIN DETAIL, TYPE II

NOT TO SCALE

INSTALLATION:

1. DRAIN SHOULD SLOPE BETWEEN 0.5% AND 6% TOWARDS OVERFLOW OUTLET
2. DO NOT PLACE BENEATH IMPERVIOUS PAVEMENT, LESS THAN TWO FT ABOVE BEDROCK, OVER UTILITY LINES, OR ABOVE SEPTIC FIELD
3. AN INFILTRATION TEST SHOULD BE PERFORMED TO ENSURE A RATE OF 0.25 IN/HR OR GREATER IN SURROUNDING SOILS
4. DISCHARGE OVERFLOW STORM WATER AT LEAST 10 FT FROM BUILDINGS AND PROPERTY LINE THROUGH PERVIOUS PAVEMENT
5. FULLY INSERT PROPER COUPLINGS AT ALL SYSTEM CONNECTIONS
6. IF THE SURFACE RUNOFF VELOCITY IS HIGH A SOIL BERM MAY BE REQUIRED TO SLOW DOWN EFFLUENT STORM WATER

MAINTENANCE:

1. ANNUAL MAINTENANCE IS REQUIRED TO OPTIMIZE DRAINAGE THROUGHOUT THE BMP
2. USE AN ELECTRIC SNAKE TO BREAK UP SOFT CLOGS AND REMOVE OBSTRUCTIONS
3. REMOVE DEBRIS AND TRASH FROM TOP OF DRAIN REGULARLY
4. CHECK FOR EXCESSIVE POOLING, SLOWED DRAINAGE, AND SEDIMENT ACCUMULATION AFTER HEAVY RAIN EVENTS

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
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PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.4 Site 4: York Village

4.4.1 Concerns:

During the preliminary investigation phase, a large number of the addresses were provided by City staff and Alderman with concerns relating to sump pumps and downspouts discharging directly onto sidewalks, driveways, and pavement. These discharges were claimed in areas that were prone to icy conditions during the winter.

In total, there were 167 addresses all around the City, which were included in the preliminary investigation where sump pumps or downspouts discharging onto impervious surfaces were noted as the primary concern. This was 77% of total properties investigated during the initial phases of the stormwater management plan. York Village had the highest concentration of these types of concerns. The following addresses were included in reports of illicit discharges (not previously included):

- 12, 14, 20, 21, 24, 26, & 27 York Hills Drive
- 9, 23, 26, 31, & 42 Middlesex Drive

Section 500.1770 of the City's code requires, "Stormwater discharges from downspouts or sump pumps shall be located at least 10 feet from the property line whenever possible and shall in every case be located no less than 4 feet from the property line and shall discharge to a pervious surface or stormwater BMP."

4.4.2 Observations:

There are couple of purposes for the enforcement of this ordinance. First, the ordinance was implemented to help keep one homeowner from discharging stormwater off their property and onto a neighboring property. Secondly, having the discharge occur a minimum of four feet and more desirably ten feet from the property line would allow these discharges to be reabsorbed into pervious areas rather than discharging onto the roadway, lessening the effects of urbanized stormwater runoff.

If homeowners are not required by ordinance to disconnect these discharge pipes, the corrective measure would either fall upon the homeowner or City to construct a stormwater BMP. The stormwater BMP would be used to control the discharge rates, as required by MSD, and the new underground conveyance system would be used to carry the stormwater away from the sites.

4.4.3 Drainage Characteristics:

Drainage characteristics for the specific sites can vary widely. Representative calculations and sites were provided in Sites 1-3. The contributing area is calculated by determining the combination of impervious and pervious areas that drain to the stormwater BMP. This contributing area and soils conditions are used to calculate the size of the selected BMP.

4.4.4 Preliminary Improvement Recommendation:

While Sites 1-3 also had solutions that surrounded Stormwater Best Management Practices, this section will focus more on a more general solution that can be used as a tool to aid the City's residents who need to come into compliance with the ordinance, which will improve water quality and reduce stormwater runoff.

Implementation of stormwater BMPs, which improve water quality and reduce runoff, can be eligible for a number of grants. MSD regularly announces Rainscaping Cost-Share and Small Grant programs for eligible watersheds. Information on their current program is available on their website at: https://msdprojectclear.org/what-we-do/rainscaping/small-grants/ .

Eligible projects include things such as:

- Lawn Alternatives
- Green Roofs
- Permeable Pavers
- Rainwater Harvesting
- Soil Amendments and Mulching
- Yard Management
- Woodland Restoration
- Creek Corridor Vegetative Buffers
- Rain Gardens
- Bioswales
- Rock Weirs and Filters Socks

Figure 4-4 contains the available information from the 2022 Round for the Rainscaping Cost-Share Program, the latest available information from the MSD Clear Rainscaping Small Grant Program, and additional details concerning many of these stormwater BMPs.

4.4.5 Property Characteristics:

The proposed improvements would be located on private property.

4.4.6 Opinion of Probable Cost:

The opinion of probable construction cost varies depending on size and type of impervious but an average cost of $6,500 is an average amount and has been used to priority rank the representative site. Please note that this cost does not include engineering services and permit acquisition as may be required.

4.4.7 Priority Ranking:

The efficiency ranking factor for this site is 24.07. The ranking of this site in comparison with each of the other sites is provided in Section 6.

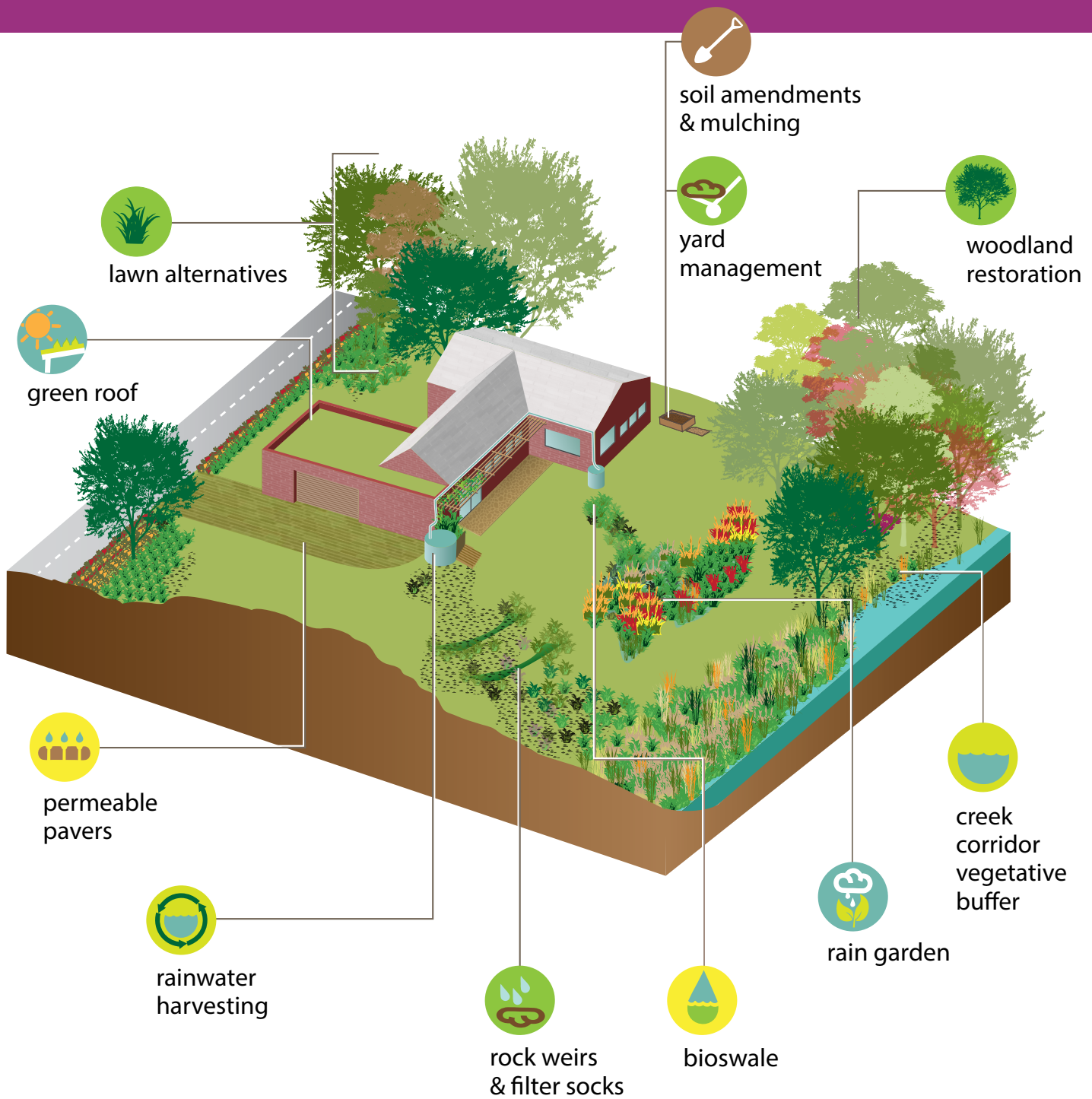
4.4.8 Site Photos:

Representative photos are provided below.

Round 2022

Rainscaping Cost-Share Program

A joint program of the Missouri Botanical Garden, Metropolitan St. Louis Sewer District, Missouri Department of Natural Resources, and project partners



Deer Creek Watershed Alliance

a project of Missouri Botanical Garden

deercreekalliance.org

MSD

Missouri Department of Natural Resources

EPA United States Environmental Protection Agency

FIGURE 4-4A

Rainscaping Cost-Share Program

Background

This **Rainscaping Cost-Share Program** is a program of the Missouri Botanical Garden's Deer Creek Watershed Alliance (DCWA). The purpose of this program is to improve water quality and benefit aquatic life in Deer Creek and its tributaries by installing landscaping that helps manage stormwater by capturing rain where it falls, instead of allowing water to run off-site.

Rainscaping is any combination of plantings, water features, catch basins, permeable pavement, and other activities that manage stormwater as close as possible to where it falls, rather than moving it someplace else.

Rainscaping can also be employed to solve a drainage problem, increase aesthetic appeal, improve property values, and/or attract birds and butterflies, in addition to other benefits. Rainscaping practices can include features such as rain gardens, bioswales, trees and shrubs, green roofs, etc. to slow down, soak up and reuse rainwater before it carries pollutants to a local stream.

Program Guidelines

PROGRAM REQUIREMENTS

- Site must be located within one of the Program Focus Areas (see maps at *deercreekalliance.org/cost-share*). Landowners including residential, institutional and commercial are eligible to participate.
- Only projects to be installed after the award notification date will be considered.
- Application must include a plant-based solution that removes and replaces a minimum of 100 square feet of established lawn, invasive species, impervious surface, or bare ground. No re-landscaping of previously landscaped areas will be accepted. For more details, download the *Eligible Improvements List* at *deercreekalliance.org/cost-share.*
- A 1–3″ mulch layer is expected where appropriate to inhibit weed growth, prevent soil loss and retain moisture.
- Include a plant list. The use of a significant percentage of Missouri native plants and/or their cultivars is expected. The planting of invasive species is prohibited. See *deercreekalliance.org/cost-share* for plant suggestions and for a list of prohibited invasive species. Use plant palette recommendations or defend alternatives.
- Landowner agrees to maintain the design feature for a minimum of five years, including watering plants during the establishment phase, weeding, pruning, annual mulching, and plant replacement as needed.
- Application must be submitted and signed by the **actual landowner**.

FUNDING SELECTION CRITERIA

Only completed applications will be considered. Only appropriately designed eligible improvements will be reviewed.

In addition, priority will be given to projects that meet one or more of the following criteria: large amount of stormwater managed, high percentage of native plants, cost effective project, appropriate design, and appropriate and detailed maintenance plan.

REIMBURSEMENT GUIDELINES

Each landowner with property located in one of the Program Focus Areas is eligible to receive a rebate of 75% of approved and documented costs up to a maximum of $4,500 or 60% of approved and documented costs up to a maximum of $6,000 for project design, implementation, and/or maintenance costs incurred for Rainscaping Cost-Share funded feature(s).

All reimbursable labor costs must be completed by a qualified professional and/or contractor formed and operating as a duly registered business in the State of Missouri.

Save all itemized receipts and/or invoices to submit to Deer Creek Watershed Alliance. Site visits will be scheduled to verify that projects have been appropriately installed prior to reimbursement.

See *mobot.org/rainscaping* for rainscaping solutions and details.

FIGURE 4-4A

Rainscaping Cost-Share Program Application

Name_____ Phone Number _____

Address _____

Municipality _____Zip _____

Email address _____

1. Is your property located in one of the Rainscaping Cost-Share Program Focus Areas? ☐ Yes ☐ No
   (Go to *deercreekalliance.org/cost-share* to view detailed Focus Area maps.)

2. Would you like to receive the Deer Creek Watershed Alliance quarterly newsletter? ☐ Yes ☐ No

3. Did you attend a required landowner orientation? ☐ Yes ☐ No Date of orientation:_____

4. Project is (check one): ☐ Residential
   ☐ Institutional/Commercial (includes businesses, schools, governments, churches, etc.)

5. Are any of your neighbors also submitting applications? ☐ Yes ☐ No
   If yes, what are their names and addresses? _____

6. Type(s) of rainscaping to be installed; check all that apply and indicate size of each. (Go to *mobot.org/rainscaping* for step-by-step rainscape planning guidance.) NOTE: choose only one box for each rainscaping feature you are implementing; multiple checked boxes mean multiple features are being proposed.

   Plant-based solutions

   - ☐ Native soil rain garden: _____ sq. ft. × _____ inches ponding depth
   - ☐ Engineered bioretention (MSD permit required*): _____ sq. ft. × _____ inches deep
   - ☐ Bioswale(s): _____ sq. ft. × _____ inches deep
   - ☐ Lawn alternatives (replace turf grass or invasives with trees and groundcover, shrubs, perennials and/or prairie plants): _____ sq. ft.
   - ☐ Upland woodland restoration: _____ sq. ft.
   - ☐ Lowland woodland restoration (creek corridor vegetative buffer): _____ sq. ft.
   - ☐ Green roof: _____ sq. ft.

   *The following improvements **must** be paired with a plant-based solution:*

   - ☐ Permeable pavers: _____ sq. ft. × _____ inches gravel layer depth
   - ☐ Soil amendments
   - ☐ Filter socks
   - ☐ Rock weirs
   - ☐ Rainwater harvesting: cistern(s) or rain barrel(s): _____ gallons
   - ☐ Other:_____

   * To obtain an over the counter MSD permit, contact Engineer of the Day at (314) 768-2705.

7. Is your rainscaping feature(s) replacing one or more of the following? **(Note: previously landscaped areas are NOT eligible.)**

   Lawn grass: ☐ Yes ☐ No Bare ground: ☐ Yes ☐ No
   Invasive species: ☐ Yes ☐ No Pavement: ☐ Yes ☐ No

   Other; please explain: _____

   For a list of invasive species, see *deercreekalliance.org/cost-share*.

8. Are you installing a rain garden or permeable pavers? ☐ Yes ☐ No

   If yes, what was the percolation test result for each rain garden and/or permeable paver feature (in inches per hour drained)? _____

   Indicate test location(s) and result(s) on your landscape drawing. (Percolation test instructions *mobot.org/perc*.)

FIGURE 4-4A

9. Describe your mulching and/or soil amendment strategy. What kind and how much will be applied? Please also indicate type of compost or soil to be added or aeration method to be used if applicable.

_____

_____

10. Describe/attach your maintenance plan—this is a critical component for all approved proposals. See maintenance resources and recommendations at *deercreekalliance.org/cost-share.*

_____

_____

11. List plants to be installed, including genus and species, common name, quantity, spacing, container size. Indicate which plants are native (including native cultivars). **Attach additional paper as needed.**

Plant Genus & Species (List each plant species separately)	Common Name	Quantity	Spacing	Container Size	Cost	Native?

12. Summarize your total costs and enter in the table below. Your application **must also include** an itemized budget showing design, installation, and maintenance (material and labor) costs which should add up to the costs you enter in the table.

	Materials Cost	Labor Cost	**TOTAL COSTS**	Rebate Requested
Design				
Installation				
Maintainance				
TOTALS				

Please note that design and labor costs can only be reimbursed for a qualified registered professional and/or contractor. If do-it-yourself (DIY) design, installation, and/or maintenance is employed, labor costs cannot be reimbursed. Equipment rental for DIY projects and an itemized material list including cost per item per feature must be attached.

Which rebate are you requesting? (check one): ☐ **75% up to maximum of $4,500** ☐ **60% up to maximum of $6,000**

12a. Who designed the landscaping? (check one): ☐ Do-it-yourself ☐ Contractor

12b. Who will install the landscaping? (check one): ☐ Do-it-yourself ☐ Contractor

12c. Who will maintain the landscaping? (check one): ☐ Do-it-yourself ☐ Contractor

12d. If seeking reimbursement for labor by a qualified registered professional and/or contractor, please provide name and contact information for each.

_____

_____

12e. When will your project be installed? (check one): ☐ Fall 2022 ☐ Spring 2023

FIGURE 4-4A

13. Include a landscape design drawing with planting plan. (Download graph paper and review a sample design drawing at *deercreekalliance.org/cost-share*). Drawings **must include**:

    13a. Indicate scale. Landscape design drawing should be scaled to 1″ = 8′ or a similar scale. (For example, a ¼″ graph paper square can equal 2′. **Do not resize drawings as this will affect the true scale.**)

    13b. Show existing utility lines (call 1-800-DIG-RITE) and buildings.

    13c. Indicate positions of existing trees and vegetation.

    13d. Show location, shape, and dimensions of the rainscaping feature(s) you intend to install.

    13e. Write the square footage of each feature adjacent to each of these areas on your drawing.

    13f. Show location(s) of rainwater harvesting feature(s), i.e. cisterns or rain barrels, and the size of each if included.

    13g. Show slope by drawing arrows that point downhill or note when there is no slope.

    13h. Show where plants are to be installed and how many of each plant species is to be planted with names specified.

    13i. Show and label yard-bordering streets.

    13j. If installing rain garden(s), please include/show the following:
    - percolation test location(s) and results
    - planned ponding depth
    - location(s) of rain garden inflow and overflow

    If installing permeable pavers, please include/show the following:
    - percolation test location(s) and results
    - planned gravel layer depth

    13k. Optional: attach additional plan(s) showing cross sections with elevations.

    13l. If there are multiple features that cannot be included in one drawing, an overall site map is required.

14. Take photographs of your current site. Loose photos must be attached to an 8½″ × 11″ piece of paper. You must:

    14a. Show exact future location(s) of your rainscaping feature(s). We must be able to see what currently is in the location where you intend to add a rainscaping feature.

    14b. Show proximity of the feature(s) to the street.

    14c. Include descriptive labels on all photos.

    14d. Clearly label all pages with your name and address.

15. SIGNATURE/AGREEMENT

- I have read and agree with all Rainscaping Cost-Share Program requirements.
- I agree to maintain the rainscaping feature(s) for a minimum of five years, including watering plants, weeding, pruning, annual mulching, and plant replacement as needed.
- I understand that this program is partially funded with public money, therefore names, addresses, and project data may be shared with partners as requested.
- I understand that the Rainscaping Cost-Share Program parameters and the Rainscaping Guide are provided as guidelines only. Landowners are solely responsible for ensuring the success of their own rainscaping feature designs and implementations. Grant application review and acceptance for funding does not imply program, funder, or partner endorsement or responsibility for proper design, installation, or maintenance.
- I will allow Deer Creek Watershed Alliance representatives to come onto my property to assess and photo-document installed features. I will also allow them to use pictures of this project for outreach efforts or publications. I understand that photographs will not reveal street location or property ownership details without my express permission.

_____

Landowner Signature (signature required)

FIGURE 4-4A

Rainscaping Cost-Share Program

Deer Creek Watershed Alliance | a project of Missouri Botanical Garden

MSD

Missouri Department of Natural Resources

EPA United States Environmental Protection Agency

Timeline

	ROUND I	ROUND 2022
Cost-Share Applications Due	7.30.21	6.3.22
Project Notifications Out	8.30.21	7.15.22
Planting Time	Fall 2021 or Spring 2022	Fall 2022 or Spring 2023
Project Receipts and Completion Forms Due	10.20.21 for Fall 2021 installs 6.22.22 for Spring 2022 installs	10.14.22 for Fall 2022 installs 6.16.23 for Spring 2023 installs
Quality Control/Ground Truthing/ Completion Forms Processed	Within 6 weeks of receipt of Project Completion Forms	
Cost-Share Funds Dispersed to Landowners	Within 12 weeks of receipt of Project Completion Forms	
Maintenance Reimbursement Forms and Receipts Due	5.20.22 for Fall 2021 installs 9.1.22 for Spring 2022 installs	5.19.23 for Fall 2022 installs 11.17.23 for Spring 2023 installs

Application Checklist

Incomplete applications will not be reviewed.

To be eligible, please include the following:

- ☐ **Two copies of your fully completed application**
  - ☐ Have you answered all application questions?
  - ☐ Did you remember to sign the form?
- ☐ Maintenance plan
- ☐ Budget detail—itemized materials list including cost per item
- ☐ Detailed plant list
- ☐ Landscape drawing(s) with all required components included (do not resize original design)
- ☐ Photo(s) as previously specified
- ☐ Bonus points—additional project details and description of installation process

Submission

Applications must be postmarked by 5 p.m. on the due date. Electronic submittals will not be accepted. Please make a copy of your **FULL** application for your records. We cannot take responsibility for applications lost in the mail. If you submit your application by mail, keep your receipt as proof of mailing.

Submit applications to:

Deer Creek Watershed Alliance
c/o Missouri Botanical Garden – Sustainability Division
CBEC – West
4651 Shaw Blvd.
St. Louis, MO 63110

Questions? Contact (314) 577-0202 or *rainscaping@mobot.org*.

The Rainscaping Cost-Share Program is funded by Metropolitan St. Louis Sewer District, Mabel Dorn Reeder Foundation, and US EPA Region 7 through the Missouri Department of Natural Resources (subgrant number G19-NPS-11), under Section 319 of the Clean Water Act.

FIGURE 4-4A

MSD PROJECT CLEAR RAINSCAPING SMALL GRANTS APPLICATION

CONTACT INFORMATION & SCOPE OF PROJECT

Name _____ Phone Number _____

Project Address _____

Mailing/Billing Address _____

City _____ State _____ Zip _____

Email address _____

1. Project is (check one): ☐ Residential ☐ Institutional
(includes businesses, schools, governments, churches, etc.)

2. Type(s) and size(s) of rainscaping to be installed; check all that apply. (Go to www.mobot.org/rainscaping for step-by-step rainscape planning guidance. **NOTE:** choose a box for each separate rainscaping feature you are implementing; multiple checked boxes mean multiple features are being proposed.)

☐ **Native soil rain garden:** _____ sq. ft.; _____ ponding depth; _____ perc. test results (inches/hour drained)
(ensure perc test is completed, and basin and overflow are noted on design. profile design recommended on top of landscape design.)

☐ **Engineered bioretention:** _____ sq. ft.; _____ ponding depth; _____ perc. test results (inches/hour drained)
(MSD Permit Required*)

☐ **Lawn alternatives:** _____ sq. ft.
(replace turf grass or invasives with trees and groundcover, shrubs, perennials and/or prairie plants)

☐ **Permeable pavers:** _____ sq. ft.; _____ # of base layers;
(profile design recommended to show size and number of base layers) _____ total inches of base layers _____ perc. test results (inches/hour drained)

☐ **Rain barrel(s) or cistern:** _____ gallons

☐ **Bioswale(s):** _____ sq. ft.

☐ **Woodland restoration:** _____ sq. ft.
(invasive species removal and replacement)

☐ **Green roof:** _____ sq. ft.

☐ **Other:** _____

**To obtain an over-the-counter MSD permit, contact Engineer of the Day at (314) 768-2705.*

3. Is your rainscaping feature replacing one or more of the following?
(***NOTE:*** *existing landscaped areas are NOT eligible)*

Lawn grass: ☐ Yes ☐ No **Bare ground:** ☐ Yes ☐ No

Invasive species*: ☐ Yes ☐ No **Pavement:** ☐ Yes ☐ No

Other; please explain: _____

**For a list of invasive species, see www.mobot.org/rainscaping.*

FIGURE 4-4B

BUDGET

Materials/Items (plants, soil, gravel, etc...) **All plant species must be noted separately**	**Source** (attach source if not on official bid)	**Plant Genus and Species**	**Common Name**

FIGURE 4-4B

Quantity	Price per item/ plant	Total price Per Item	Running Total	Spacing	Container Size	Native (Yes or No)	Additional Information
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	$	$	$				
	Materials Total	$	$				
	Design* Total	$	$				
	Labor* Total	$	$				
	Project Total	$	$				
	Amount Requested for Award	$	$				

FIGURE 4-4B

OUTREACH

4. Will you allow MSD Project Clear to use pictures and/or information from your project in public outreach efforts or publications?

   ☐ Yes ☐ No

5. Please note that design and labor costs can only be included if a contractor is employed. If do-it-yourself (DIY) design and/or installation is employed, labor costs cannot be reimbursed. Therefore, equipment rental for DIY projects should be listed under materials. In addition, an itemized materials list including the cost per item per feature must be attached.

   5A. Who designed the landscaping? (check one): ☐ Do-it-yourself ☐ Contractor

   5B. Who will install the landscaping? (check one): ☐ Do-it-yourself ☐ Contractor

   5C. If using a contractor, name those that you plan to or have solicited bids from & indicate which plan you would like to move forward with: _____

   _____

   5D. Who will maintain your feature?_____

ATTACHMENTS — *(IMPORTANT: Clearly label each attachment with your name and address.)*

☐ If requesting contractor-installed project, please include bid on contractor letterhead.

☐ If installing a DIY project, please print off copies of any online pricing you have sourced.

☐ Landscape design drawing(s)/planting plan(s). *(See Landscape Drawing Requirements.)*

☐ Photograph(s) of your site. **Please including the following:** (1) Show exact future location(s) of your rainscaping feature(s) *(we must be able to see what is currently in the location where you intend to add a rainscaping feature)*; (2) Show proximity of the feature(s) to the street; (3) Include descriptive labels on all photos; (4) Include aerial photograph or aerial satellite image from Google Maps; (5) Loose photos must be attached to an 8½" × 11" piece of paper.

☐ Maintenance plan *(specify who will take care of the plan)*

☐ Soil amendment strategy *(if applicable)* including—mulch: what kind, how thick, where from; if compost applied: quantity *(in inches)*, what kind, where from; if aeration method is used: type of aerator and depth of aeration in inches.

☐ BONUS: Include project narrative/description.

SIGNATURE/AGREEMENT

- I have read and agree with all MSD Project Clear Rainscaping Small Grants Program requirements and watched required Instructional Videos.
- I agree to maintain the rainscaping feature(s) for a minimum of five years, including watering plants during the establishment phase, weeding, pruning, annual mulching, and plant replacement as needed.
- I do not intend to sell my house at this time.
- I understand that this program is partially funded with public money, therefore names, addresses, and project data may be shared with partners as requested.
- I understand that the Rainscaping Small Grants Program parameters and RainScaping Guide are provided as guidelines only. Landowners are solely responsible for ensuring the success of their own rainscaping feature designs and implementations. Grant application review and acceptance for funding does not imply program, funder, or partner endorsement or responsibility for proper design, installation, or maintenance.
- I agree to locate any underground utility lines by calling 1-800-344-7383 (DIG-RITE) and provide proof of the appointment with photos, or the DIG RITE report. Missouri law requires that a location request be placed before beginning any excavation.

_____

Landowner signature

_____

Print name

FIGURE 4-4B

4.5 Site 5: 9433 Pine Avenue (McKnight Rd.)

4.5.1 Concerns:

Several issues were reported by residents at 9429 & 9433 Pine Avenue and 2 Whitehall Court. Each of these addresses are affected by stormwater that comes off of McKnight Road and flows into the driveways and backyards of adjacent homes, as well as the intersections of these streets.

One resident at 9433 Pine Avenue was concerned that the surface flow coming down from McKnight Road was too great for storm inlets and provided statements that “most of the water coming down McKnight Road enters the driveway instead of flowing into the storm basin”.

It was also noted that additional houses on Pine Avenue (9429 and 9425) have water that drains to the west after coming off McKnight Road, overwhelming the drainage system on Pine Avenue. Similar concerns were made from the owner at 2 Whitehall Court.

4.5.2 Observations:

During site visits to McKnight Road, it was noted that there are several stormwater inlets along the west side of the roadway, but each of the inlets seemed to have been restricted by several factors. Some inlet throat heights and lengths were limited due to roadway resurfacing, concrete sidewalk construction, or generally blocked by debris.

The restrictive throat heights and lengths contribute to the ability to accept the excessive surface flows seen by the residents. Additionally, it was noted that each of the concerned residents was located near the low point in the roadway where longitudinal slopes flatten, and gutter spread becomes the widest with the slower moving water.

4.5.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-5. Drainage patterns along McKnight Road is generally southward from York Drive to the low point between Whitehall Road and Pine Avenue. Stormwater also flows north toward this same low point on McKnight Road from just north of Sonora Avenue. The contributing basin area to the low point on McKnight Road is approximately 9.4 acres. The combined peak flow for the design storm at the problem area is calculated at 21.1 cfs.

4.5.4 Preliminary Improvement Recommendation:

Based upon the hydraulic capacity of the existing inlets, storm sewer pipes, and the concerns raised by the residents, it is recommended to increase inlet capacity by adjusting existing inlets to MSD standard throat dimensions that will have a higher capacity, as well as upsizing storm sewers from 18” to 24” to create the required capacity for the design storm. It is also recommended the 12” storm sewer south of the proposed inlets be capped in order to not overload the storm sewer system on Pine Avenue.

A layout of the preliminary recommendations is provided in Figure 4-5.

4.5.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits.

4.5.6 Opinion of Probable Cost:

The opinion of probable construction cost is $187,020 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.5.7 Priority Ranking:

The efficiency ranking factor for this site is 41.56. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.5.8 Site Photos:

Representative photos are provided below.

FIGURE #						
4-5	9433 PINE AVE. (MCKNIGHT RD.) SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.6 Site 6: 50 Whitehall Court

4.6.1 Concerns:

Stormwater sits in a low point formed at the corner of the cul-de-sac near 50 Whitehall Court. During the summer months, the stagnant water is a mosquito breeding ground and in the winter months, becomes icy with the freeze thaw of snow events.

4.6.2 Observations:

The grade of the road prevents stormwater from reaching the inlets along Whitehall Court. The water collects in the gutter and along the road. Several inlets are placed within cul-de-sac but is not able to reach them.

4.6.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-6. Drainage comes from both the east and west along Whitehall Court to the low point where the problem exists. Coming from the west high point is approximately 420' away, and from the east stormwater flows from the end of the cul-de-sac to this low point. The contributing basin area to the depression on the Whitehall Court property is approximately 10.9 acres. The design storm peak flow to the depression is calculated at 30.7 cfs.

4.6.4 Preliminary Improvement Recommendation:

Based on the hydraulic investigation, the existing inlet and storm sewer does not have appropriate capacity for the design storm. In order to improve this site, it is proposed that double inlets replace the current single inlets in front of 49 Whitehall Court, along with adding two other double inlets, one in front of 33 Whitehall Court and one in front of 85 Whitehall Court. Improvements to the storm sewer capacity are also necessary with a proposed 18" storm sewer to be added, and the existing roadway should be regraded for positive drainage.

A layout of the preliminary recommendations is provided in Figure 4-6.

4.6.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits.

4.6.6 Opinion of Probable Cost:

The opinion of probable construction cost is $580,660 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.6.7 Priority Ranking:

The efficiency ranking factor for this site is 175.96. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.6.8 Site Photos:

Representative photos are provided below.

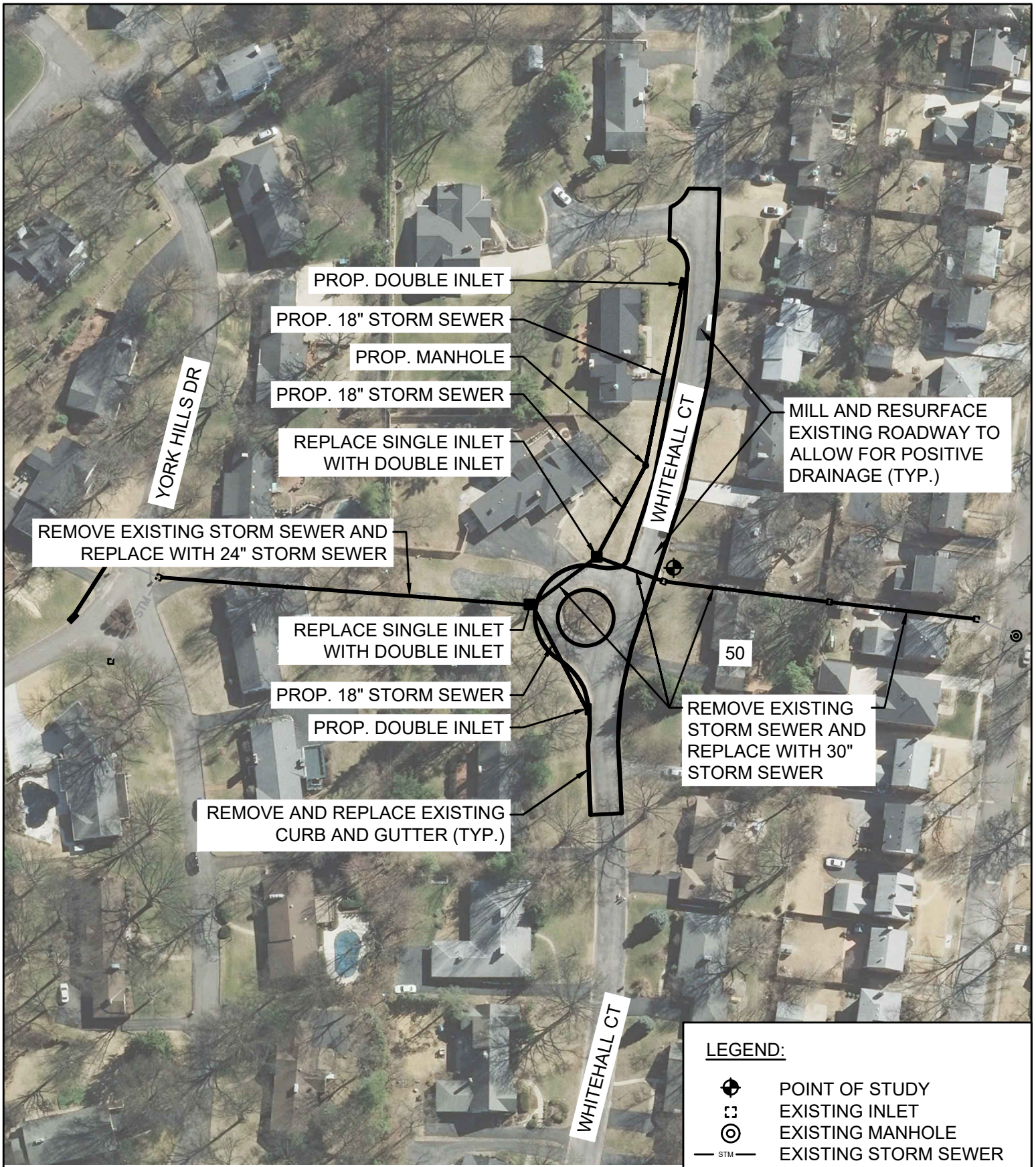


FIGURE #						
4-6	50 WHITEHALL CT SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF TRUMAN	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.7 Site 7: 98 & 99 Whitehall Court

4.7.1 Concerns:

A public walkway from Whitehall Court to Yorkshire Lane tends to hold water. The water continually spreads debris along the path during the warmer months, and icy conditions makes it untraversable in the winter months. Several downspouts from adjacent houses discharge toward this walkway. The longitudinal slope is not sufficient enough to carry the stormwater to receiving basins. Currently there is a curb in place along the south edge of sidewalk, which catches the stormwater, but does not direct it away from the site. Any water that is able to move along the path ends up pooling at the west end of the trail.

4.7.2 Observations:

Several downspouts from adjacent houses discharge toward this walkway. The longitudinal slope is not sufficient enough to carry stormwater to other areas. Currently there is a curb in place along the south edge of sidewalk, which does not have longitudinal slope to carry stormwater off of the sidewalk.

4.7.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-7. Drainage within the problem area comes from the homes on the north side of the path. The stormwater ultimately wants to go westwardly, but the lack of longitudinal slope is prohibitive. The contributing basin area to the pathway is approximately 0.5 acres. The design storm peak flow to the depression is calculated at 1.6 cfs.

4.7.4 Preliminary Improvement Recommendation:

Due to the proximity of the private properties and the inability to change longitudinal slope, it is recommended that the solution would be to be provide appropriate transverse slope on the sidewalk to the south and reconstruct utilizing permeable pavers. Reconstruction with permeable pavers would allow for underground storage and infiltration of the stormwater.

As a factor of safety, a pipe underdrain should be constructed to provide for a relief of this underground storage. Appropriate longitudinal slope could be included on the pipe underdrain as it would not be affected by the adjacent properties. The underdrain could flow west until it could outlet on a pervious surface.

A layout of the preliminary recommendations is provided in Figure 4-7.

4.7.5 Property Characteristics:

The proposed improvements are located on an access easement and involve infrastructure located within the City limits. It is unclear whether or not additional easements would be required. At a minimum, coordination with the property owner is recommended.

4.7.6 Opinion of Probable Cost:

The opinion of probable construction cost is $136,700 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.7.7 Priority Ranking:

The efficiency ranking factor for this site is 227.83. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.7.8 Site Photos:

Representative photos are provided below.

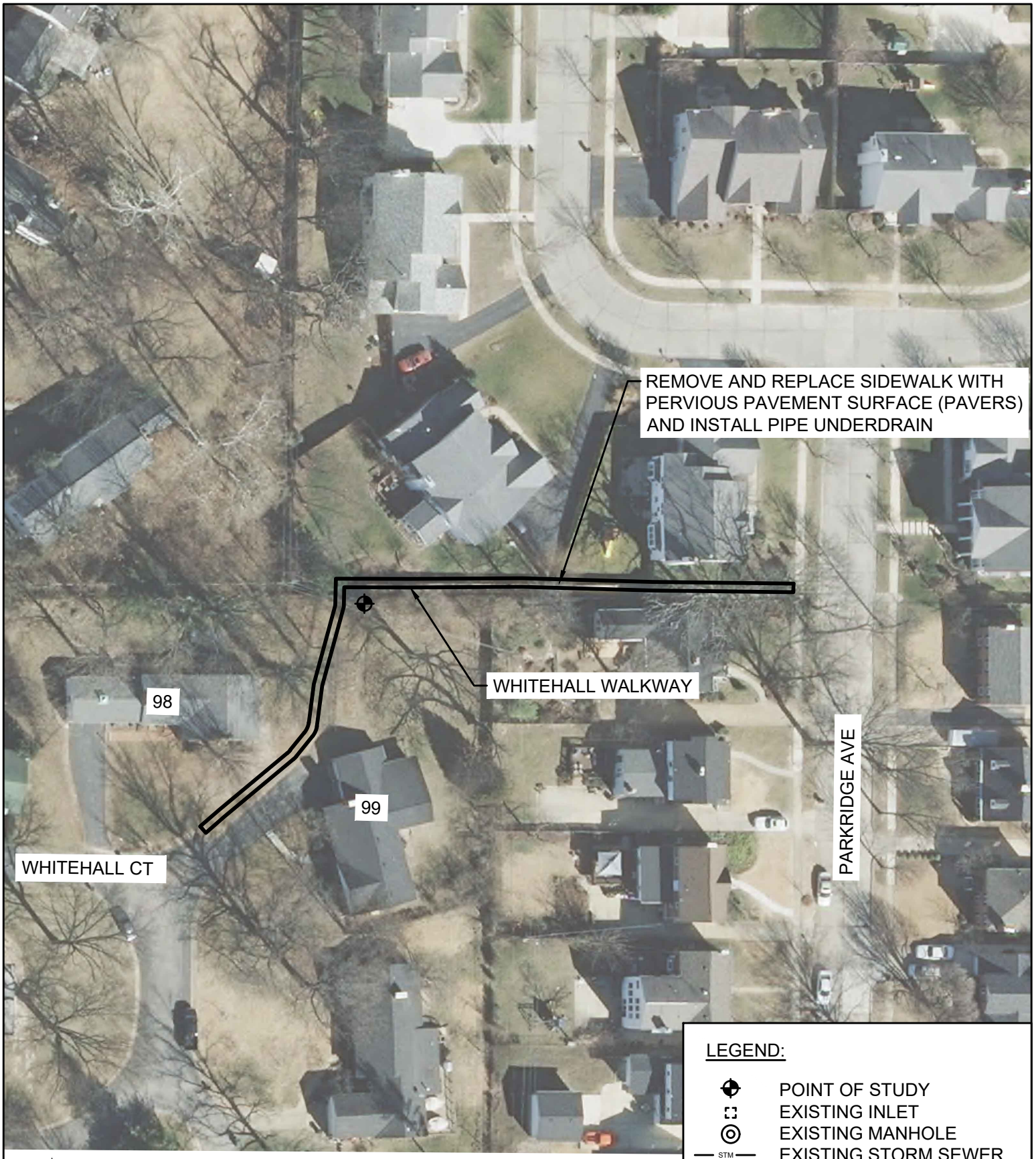


FIGURE #						
4-7	98 & 99 WHITEHALL CT. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.8 Site 8: 9402 White Avenue.

4.8.1 Concerns:

The resident at 9402 White Avenue was concerned about the ability of the inlets to handle the stormwater that accumulates at the intersection of White Avenue and Kempton Lane. The resident reported that stormwater at this intersection was more than a foot in depth during a recent rain event. The resident also pointed out that she believed that recent work in the intersection of Sonora Avenue and Kempton Lane, one block north, may have contributed to the additional flows by-passing the inlets at this intersection coming down the hill to area of concern.

4.8.2 Observations:

During the field investigation, each of the inlets within the intersection of White Avenue and Kempton Lane were inspected and it was found that all of these stormwater inlets had been plugged.

After further investigation and coordination with MSD, it was determined that this intersection historically drained into a combined a sewer. However, after repeated backups and combined sewer overflows, it was decided that capping the inlets would be beneficial until a Combined Sewer Over (CSO) project could be constructed. The CSO project known as CSO – Mary Avenue South of Manchester. CSO Interceptor (I-132)/Outfall (L-106) Elimination has been in the design process with MSD for many years and consists of a number of phases and includes capital projects throughout the City of Brentwood. The construction of this project would involve a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.8.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-8. Drainage patterns for the problem are from both the northwest and northeast. Stormwater is funneled down Kempton Lane and flows to the low point on White Avenue. directly in front of the home at 9402 White Avenue. The contributing basin area to the low point on White Avenue. is approximately 6.7 acres. The design storm peak flow to the intersection is calculated at 20.2 cfs.

4.8.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that a double inlet replace the north-west single inlet on White Avenue at the intersection of White Avenue and Kempton Lane. These inlets and storm sewers will discharge into the CSO project being planned for this area. The layout and sizes of these improvements has been included in Figure 4-8.

4.8.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.8.6 Opinion of Probable Cost:

The opinion of probable construction cost is $140,290 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.8.7 Priority Ranking:

The efficiency ranking factor for this site is 62.35. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.8.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-8

9402 WHITE AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

4.9 Site 9: Parkridge Avenue & White Avenue

4.9.1 Concerns:

Several residents at the intersection of Parkridge Avenue and White Avenue presented concerns about stormwater backups and icy conditions in the area. They claim the intersection drains poorly and creates a hazard during winter months.

4.9.2 Observations:

During the field investigation, each of the inlets within the intersection of Parkridge Avenue and White Avenue were inspected, and it was found that all of these stormwater inlets had been plugged.

After further investigation and coordination with MSD, it was determined that this intersection historically drained into a combined a sewer. However, after repeated backups and combined sewer overflows, it was decided that capping the inlets would be beneficial until a CSO – Mary could be constructed. The construction of this project would involve a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.9.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-9. Drainage for the area of concern comes from all directions as this intersection is the low point for a distance in all four quadrants. The contributing basin area for the intersection of Parkridge Avenue and White Avenue is approximately 9.2 acres. The design storm peak flow to the intersection is calculated at 27.7 cfs.

4.9.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that a double inlet replace the single inlet at the southeast corner of the intersection of Parkridge Ave. and White Ave. These inlets and storm sewers will discharge into the CSO project being planned for this area. The layout and sizes of these improvements has been included in Figure 4-9.

4.9.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.9.6 Opinion of Probable Cost:

The opinion of probable construction cost is $125,230 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.9.7 Priority Ranking:

The efficiency ranking factor for this site is 37.95. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.9.8 Site Photos:

Representative photos are provided below.

FIGURE #						
4-9	PARKRIDGE AVE & WHITE AVE SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.10 Site 10: St. Clair Avenue & White Avenue

4.10.1 Concerns:

Several residents at the intersection of St. Clair Avenue and White Avenue presented concerns about stormwater backups and icy conditions in the area. They claim the intersection drains poorly and creates a hazard during winter months.

4.10.2 Observations:

During the field investigation, each of the inlets within the intersection of St. Clair Avenue and White Avenue were inspected and it was found that all of these stormwater inlets had been plugged.

After further investigation and coordination with MSD, it was determined that this intersection historically drained into a combined a sewer. However, after repeated backups and combined sewer overflows, it was decided that capping the inlets would be beneficial until a CSO – Mary could be constructed. The construction of this project would involve a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.10.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-10. Drainage for the area of concern comes from all directions as this intersection is the low point for a distance in all four quadrants. The contributing basin area for the intersection of St. Clair Avenue and White Avenue is approximately 11.1 acres. The design storm peak flow to the intersection is calculated at 33.6 cfs.

4.10.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that new double inlets replace the single inlets at the intersection of St. Clair Ave. and White Ave., as well as the existing 12” storm sewer being replaced with an 18”. These inlets and storm sewers will discharge into the CSO project being planned for this area. The layout and sizes of these improvements has been included in Figure 4-10.

4.10.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.10.6 Opinion of Probable Cost:

The opinion of probable construction cost is $149,970 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.10.7 Priority Ranking:

The efficiency ranking factor for this site is 66.65. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.10.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-10

ST CLAIR AVE & WHITE AVE SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.11 Site 11: 1501-1507 Swallow Drive

4.11.1 Concerns:

Several downspouts and surface water within the Brentwood Forest apartment complex near 1501 and 1507 Swallow Drive flow onto lower lying patios and yards. Yard debris and mud are carried onto the paved surface creating for a nuisance and potential for property damage.

4.11.2 Observations:

Poor grading and the lack of an overland flow routes do not allow for positive drainage at several locations within the apartment complex. The apartment buildings sit relatively close together making grades tight.

4.11.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-11. Drainage patterns for the project area are generally from east to west and meander around the apartment buildings. There are several storm sewers within the area, as well as a significant open channel that carries water over to the lake off of Wrenwood Lane. The contributing basin area to the area of concern is approximately 1.0 acre. The design storm peak flow to the depression is calculated at 3.7 cfs.

4.11.4 Preliminary Improvement Recommendation:

Improvements for the problem area generally consist of regrading the ground surface to provide for positive drainage between buildings, and channels for stormwater between buildings that would carry water from low lying areas to the pre-existing stormwater channel to the north. It would be recommended that the downspouts be directed away from neighboring apartments and creating an underground conveyance system to carry stormwater away from the lower lying buildings.

To improve water quality and reduce runoff, a number of Stormwater Best Management Practices could be implemented at this site, which were discussed in more detail in other sections of this report, as well as can be found in Appendix F, Stormwater Best Management Practices Guide.

A layout of the preliminary recommendations for the regrading and conveyance system is provided in Figure 4-11.

4.11.5 Property Characteristics:

The proposed improvements would be located on private property owned by the apartment complex owners. It is unknown if stormwater easements are currently present at this property.

4.11.6 Opinion of Probable Cost:

The opinion of probable construction cost is $37,180 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.11.7 Priority Ranking:

The efficiency ranking factor for this site is 16.75. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.11.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-11

1501-1507 SWALLOW DR
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.12 Site 12: 1723 Redbird Cove.

4.12.1 Concerns:

Several downspouts and surface water within the Brentwood Forest apartment complex near 1723 Redbird Cove flow into lower lying areas and become trapped. Standing water is a breeding ground for mosquitos and generally a nuisance. These areas of standing water have the potential to seep into basements through cracks in the foundation.

4.12.2 Observations:

Poor grading and the lack of an overland flow routes do not allow for positive drainage at several locations within the apartment complex. The apartment buildings sit relatively close together making grades tight. There are several storm sewer structures a short distance from the problem area, but the surface runoff does not keep it away from the problem areas.

4.12.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-12. Drainage patterns for the area of concern are generally to the northwest, but landscaping berms and general low spots trap water at select locations. The contributing basin area to the depression at this site is approximately 0.3 acres. The design storm peak flow to the depression is calculated at 1.1 cfs.

4.12.4 Preliminary Improvement Recommendation:

Improvements for the problem area generally consist of regrading the ground surface to provide for positive drainage away from buildings. It would be recommended that the downspouts be directed away from neighboring apartments and lower lying areas. Also, there is a proposed channel in the low-lying area between 1723 and 1743 Redbird Cove connecting to the previously existing channel.

A number of Stormwater Best Management Practices could also be implemented at this site to improve water quality and reduce runoff. Examples of these as can be found in Appendix F, Stormwater Best Management Practices Guide.

A layout of the preliminary recommendations to regrade the area toward the available storm sewers is provided in Figure 4-12.

4.12.5 Property Characteristics:

The proposed improvements would be located on private property owned by the apartment complex owners. It is unknown if stormwater easements are currently present at this property.

4.12.6 Opinion of Probable Cost:

The opinion of probable construction cost is $18,590 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.12.7 Priority Ranking:

The efficiency ranking factor for this site is 16.03. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.12.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-12

1723 REDBIRD CV
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

CITY OF BRENTWOOD
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OF AUTHORITY #2005038353

4.13 Site 13: 9000 Wrenwood Lane

4.13.1 Concerns:

A report from the condominium management brought an issue to the City's attention near the complex's pool at 9000 Wrenwood Lane. The issue consisted of erosion, ground water seepage, and standing water during periods without rain for more than 72 hours.

4.13.2 Observations:

A field investigation of the site provided evidence of the statements made above. Near the area in which the issues were happening, there was an existing stormwater inlet and small berm constructed to keep water from draining directly down the steep hill onto the pool deck. Surrounding this area, the erosion and standing water was apparent. Since the discharges occur during dry weather events, it was determined that the cause of the problem was likely groundwater and storm event related.

4.13.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-13. Drainage patterns are toward the northeast from Swan Court. There is a large hill that leads to the inlet and berm constructed near the location of the standing water. The contributing basin area to the area of concern is approximately 2.9 acres. The design storm peak flow to the depression is calculated at 8.7 cfs.

4.13.4 Preliminary Improvement Recommendation:

Based on a hydraulic analysis, it was determined that inlet and storm sewer capacity were sufficient for the design storm.

Since these are not storm related issues, it was determined that groundwater is likely causing the issues. In order to remedy the erosion and standing water, it is recommended that a groundwater relief pit and riprap be installed. This improvement will provide a release for the groundwater, which can be controlled to drain into the existing system. A layout of the preliminary recommendations is provided in Figure 4-14.

4.13.5 Property Characteristics:

The proposed improvements would be located on private property owned by the apartment complex owners. It is unknown if stormwater easements are currently present at this property.

4.13.6 Opinion of Probable Cost:

The opinion of probable construction cost is $25,190 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.13.7 Priority Ranking:

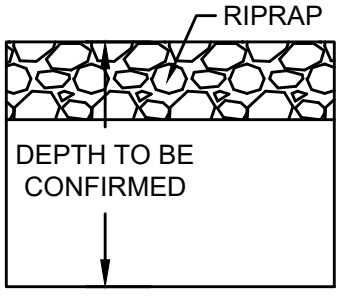
The efficiency ranking factor for this site is 93.30. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.13.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE



GROUND WATER RELIEF PIT AND RIP RAP DETAIL

SCALE: 1" = 50'

0' 50' 100'

N

FIGURE # 4-13

9000 WRENWOOD LN. SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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4.14 Site 14: Lawn Avenue (Brentwood Blvd. to High School Dr.)

4.14.1 Concerns:

Multiple properties along Lawn Avenue between Brentwood Boulevard and High School Drive have had complaints about icy conditions and areas that pond water for extended periods after rain events. The following properties have been noted as being impacted by these issues: 9015, 9010, 9006, 8934, 8922, 8917, 8908, and 8835 Lawn Avenue.

The property owner at 8933 Lawn Avenue also reported issues. The homeowner reported $5,000 estimated in damage due to saturated walls and carpet in basement, which required removal and replacement. It was reported that the stormwater came up through basement drain. MSD inspected the home after the issue and indicated that they will have a contractor install a flap valve to help prevent future occurrences of stormwater backing up into the home. Homes on Lawn Avenue still are on a combined sanitary and stormwater system.

4.14.2 Observations:

During the field investigation, it appeared that poor longitudinal slopes and minimal stormwater inlets was a contributing factor to the stormwater that would pond along the curb and gutter at several places within the area of concern.

4.14.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-14. Drainage patterns are from the east and west to a low point near the center of the block on Lawn Avenue. The contributing basin area to the low point on Lawn Avenue between Brentwood Boulevard and High School Drive is approximately 4.9 acres. The combined design storm peak flow in the area of Lawn Avenue between Brentwood Boulevard and High School Drive is calculated at 14.7 cfs.

4.14.4 Preliminary Improvement Recommendation:

Based on the hydraulic analysis conducted, the lack of stormwater inlets was a major contributing factor in the ability to remove water from the roadway. It is recommended that to appropriately drain this area, a new storm sewer system should be constructed, which would place double inlets at the low points, as well as additional flanking inlets to help remove surface flows along the roadway. This new storm sewer system would utilize a 12” storm sewer and tie in the existing system at Brentwood Boulevard. A layout of the preliminary recommendations is provided in Figure 4-14.

4.14.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.14.6 Opinion of Probable Cost:

The opinion of probable construction cost is $376,290 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.14.7 Priority Ranking:

The efficiency ranking factor for this site is 32.16. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.14.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

HOUSE ADDRESSES
9015, 9010, 9006, & 8934
LOCATED SOUTH

SCALE: 1" = 100'

0' 100' 200'

N

FIGURE # 4-14

LAWN AVE. (BNTWD BLVD. - HS DR.) SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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4.15 Site 15: 8922 Lawn Avenue

4.15.1 Concerns:

The property of 8922 Lawn Avenue sits at the low point on Lawn Avenue, and stormwater from surrounding properties flow between homes and along property lines until pooling in this backyard. The resident attempted to alleviate the problem by digging drainage swales to move the water from the property, but this attempt proved to be insufficient to move the water from the property.

4.15.2 Observations:

From available contour maps, it appears that drainage should continue south from this property. However, overtime there has been a buildup of earth and yard debris along the property line inhibiting drainage and creating a low point in the southeast corner of the property. The poor slopes that exist create a wet area that lasts long after rain events have ended.

4.15.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-15. Drainage for the area of concern comes from the east, west, and north. While contours show that the flow patterns should continue to the south, the field investigation provided that a buildup along the property lines will not allow this. The contributing basin area to the depression at 8922 Lawn Avenue is approximately 0.3 acres. The design storm peak flow to the depression is calculated at 0.9 cfs.

4.15.4 Preliminary Improvement Recommendation:

Due the development in the area, it would be difficult to re-establish natural drainage patterns without pushing the current problem onto other neighboring properties. Therefore, there are two optional recommendations for improvement on this property.

First, a rain garden could be installed. A rain garden provides a natural storage area in which native plants could be introduced to make the nuisance wet spot more aesthetically pleasing. More information about rain gardens can be found in the exhibits for Site 2 and Site 4.

The other recommendation for improvement would be the construction of new storm inlet in the southeast corner of the property. This area inlet could be connected with an underground storm sewer into the existing system along Pine Avenue at the front of the property via a 12” storm sewer. A layout of this preliminary recommendations is provided in Figure 4-15.

4.15.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners.

4.15.6 Opinion of Probable Cost:

The opinion of probable construction cost is $75,960 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.15.7 Priority Ranking:

The efficiency ranking factor for this site is 165.13. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.15.8 Site Photos:

Representative photos are provided below.

SCALE: 1" = 50'

0' 50' 100'

N

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- EXISTING STORM SEWER (STM)
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

FIGURE #						
4-15	8922 LAWN AVE. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.16 Site 16: Pine Avenue (Brentwood Blvd. to High School Dr.)

4.16.1 Concerns:

The property owner of 8914 Pine Avenue reported that stormwater enters the backyard after flowing down the driveway off of the roadway. Stormwater enters the garage and backyard. The homeowner is concerned about the potential damage and nuisance caused by the stormwater that drains onto their property from the City street.

4.16.2 Observations:

During field investigations, elevation shots along the road and driveway within the area of concern determined that once stormwater would rise approximately 4” in height it would begin to flow down the driveway. The garage at the end of the driveway is about two feet lower than the roadway.

There are two stormwater inlets near the driveway at 8914 Pine Avenue and another located in the backyard of home. The two inlets in the roadway are open throat inlets with the openings located about an inch below the elevation at the edge of the driveway. The inlet in the backyard did not have a defined grading to direct stormwater to it.

4.16.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-16. Drainage comes from both the east and west down Pine Avenue to the low at the area of concern. Drainage also comes from north to south from properties along the north side of Pine Avenue. The contributing basin area to the depression near 8914 Pine Avenue is approximately 8.3 acres. The design storm peak flow to the depression is calculated at 24.9 cfs.

4.16.4 Preliminary Improvement Recommendation:

Based on the hydraulic analysis of the storm inlets, it was determined that due to the restricted throat heights and narrow widths there was not sufficient capacity to remove the water from the roadway. It is recommended that these inlets be upgraded to double inlets in order to provide for additional capacity. A 15” storm sewer pipe is recommended as capacity is also required to be improved.

Additionally, in order to accommodate flows that exceed the design storm, it is recommended that the overland flow routes and additional grading be completed in the rear of the home to ensure positive grading to the inlet at this location. A layout of the preliminary recommendations is provided in Figure 4-16.

4.16.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. The grading improvements would be located on private property. This site should be considered a combination site.

4.16.6 Opinion of Probable Cost:

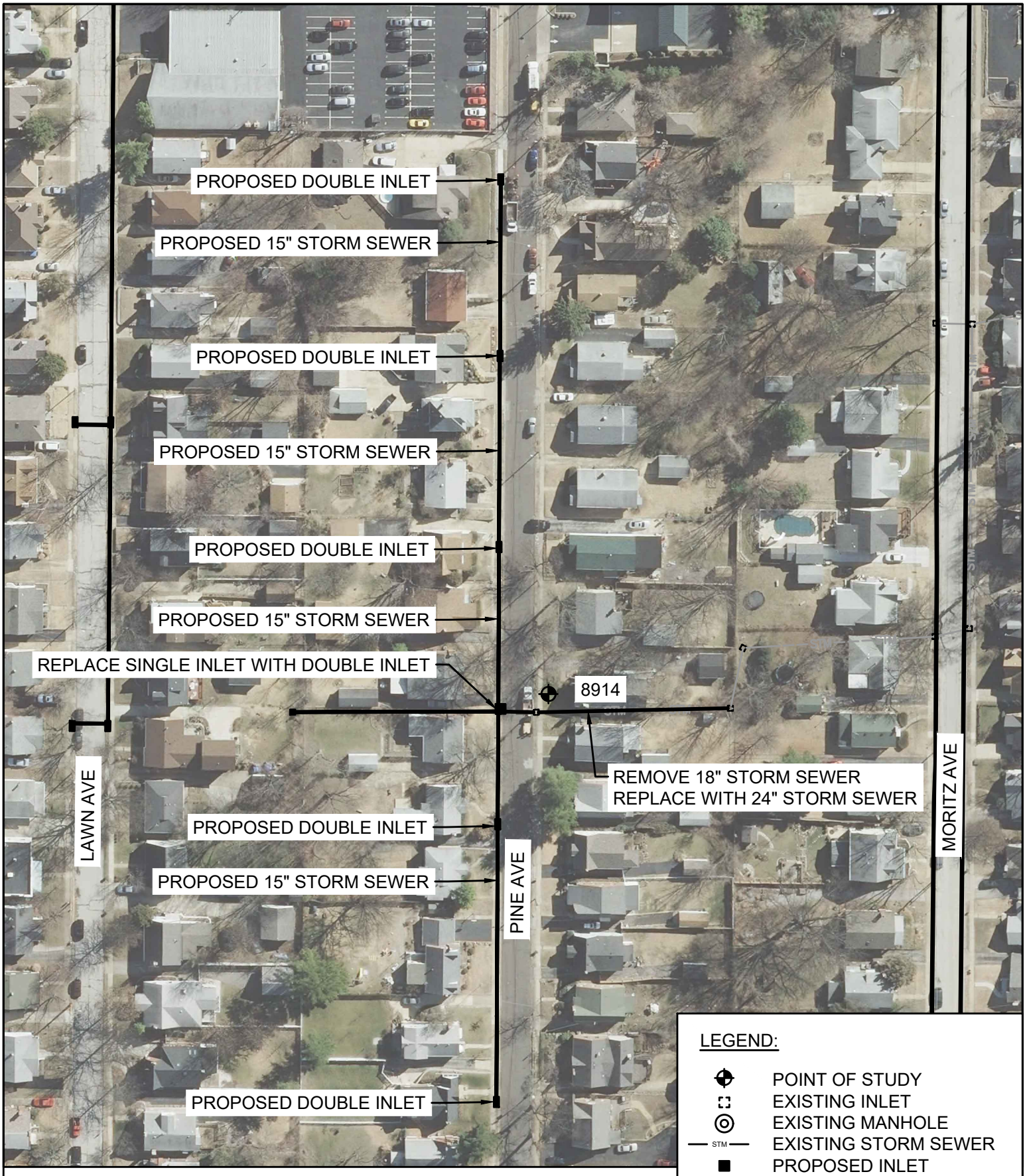
The opinion of probable construction cost is $479,380 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.16.7 Priority Ranking:

The efficiency ranking factor for this site is 14.54. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.16.8 Site Photos:

Representative photos are provided below.



SCALE: 1" = 100'

0' 100' 200'

N

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

FIGURE #						
4-16	PINE AVE. (BNTWD BLVD. - HS DR.) SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.17 Site 17: 9000 & 9004 Bridgeport Avenue

4.17.1 Concerns:

Several residents along Bridgeport Avenue reported issues regarding localized flooding during rain events. The resident at 9000 Bridgeport Avenue reported that they believe construction debris from work at the high school had entered the storm sewer system and may be compromising the capacity of the system.

During a recent rain event, flooding was deep enough to enter the basement of 9004 Bridgeport Avenue, damaging property.

4.17.2 Observations:

Along the south side of Bridgeport Avenue, near the project area, there is a double grated inlet with an open back. Along the north side there is a single grated inlet with an open back, but this inlet is not at the low point of the roadway. In order for stormwater on the north side of the road to drain, it must cross the centerline of roadway, which is inefficient. There are other manholes within the project limits, some of which are capped or have been converted into junction chambers, which do not contribute to the ability to drain the area.

4.17.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-17. Drainage patterns are east towards the depression from High School Drive and north to south from Moritz Avenue to the low point Bridgeport Avenue. The contributing basin area to the low point near 9000 Bridgeport Avenue is approximately 2.5 acres. The design storm peak flow to the depression is calculated at 7.5 cfs.

4.17.4 Preliminary Improvement Recommendation:

The preliminary hydraulic analysis of the storm system surrounding this property indicated that storm sewer sizes were sufficient. However, based upon the field investigations, it was apparent that the location of the inlets on the north side of the road and the amount of by-pass, the inlet capacity at the low point was not appropriate.

It is recommended that an additional inlet be installed at the low point along the north side of the roadway. This additional inlet will provide additional capacity near the low point and will tie into the existing system with an 18” storm sewer. These improvements will provide for appropriate pavement drainage for the design storm.

The existing system should be examined further to ensure that any potential blockages have been removed.

A layout of the preliminary recommendations is provided in Figure 4-17.

4.17.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether or not easement would be required to compete the improvements.

4.17.6 Opinion of Probable Cost:

The opinion of probable construction cost is $18,800 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.17.7 Priority Ranking:

The efficiency ranking factor for this site is 11.44. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.17.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 20'

0' 20' 40'

FIGURE # 4-17

9000 & 9004 BRIDGEPORT AVE. SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.18 Site 18: 8908-8914 Bridgeport Avenue

4.18.1 Concerns:

Several residents along Bridgeport Avenue reported issues regarding localized flooding and standing water during rain events. The resident at 8908 Bridgeport Avenue reported that flooding happens frequently and the worst such event led to about two feet of water in the basement, damaging property.

4.18.2 Observations:

During the field investigation, it was noted that the subject properties sit in a low point on the roadway and there were two storm inlets at this location. The inlet along the north side of the road is an open throated inlet and the inlet along the south side of the road is a grated inlet.

It appeared that the open throated inlets had a reduced capacity due to asphalt buildup within the throat. The grated inlet also had comprised capacity due to poor placement. The grated inlet was located within the driveway of the 8908 Bridgeport Avenue and was not flush with the pavement, which did not allow for all the water to drain from the roadway.

4.18.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-18. Drainage patterns are east towards the depression from High School Drive, and there is a significant area that drains north to south from Moritz Avenue to Bridgeport Avenue. The contributing basin area to the low point near 8908 Bridgeport Avenue is approximately 2.8 acres. The design storm peak flow to the depression is calculated at 8.5 cfs.

4.18.4 Preliminary Improvement Recommendation:

Based upon the hydraulic analysis of the system it was determined that the existing inlet and storm sewer capacity was insufficient to handle the design storm. Additionally, it was determined that overland flow routes were unavailable for instances when a design storm would be exceeded.

Due the large amount of runoff along the north side of the roadway, it is recommended to replace the single inlet on the north side of Bridgeport Avenue to a double inlet, and to adjust the existing southern inlet which will provide adequate capacity. Additionally, improvements for this site include installation of upsized storm sewer pipes from the current 12” to various 18” and 24” storm sewers in order to handle an increased capacity. A layout of the preliminary recommendations is provided in Figure 4-18.

4.18.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.18.6 Opinion of Probable Cost:

The opinion of probable construction cost is $129,850 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.18.7 Priority Ranking:

The efficiency ranking factor for this site is 44.74. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.18.8 Site Photos:

Representative photos are provided below.

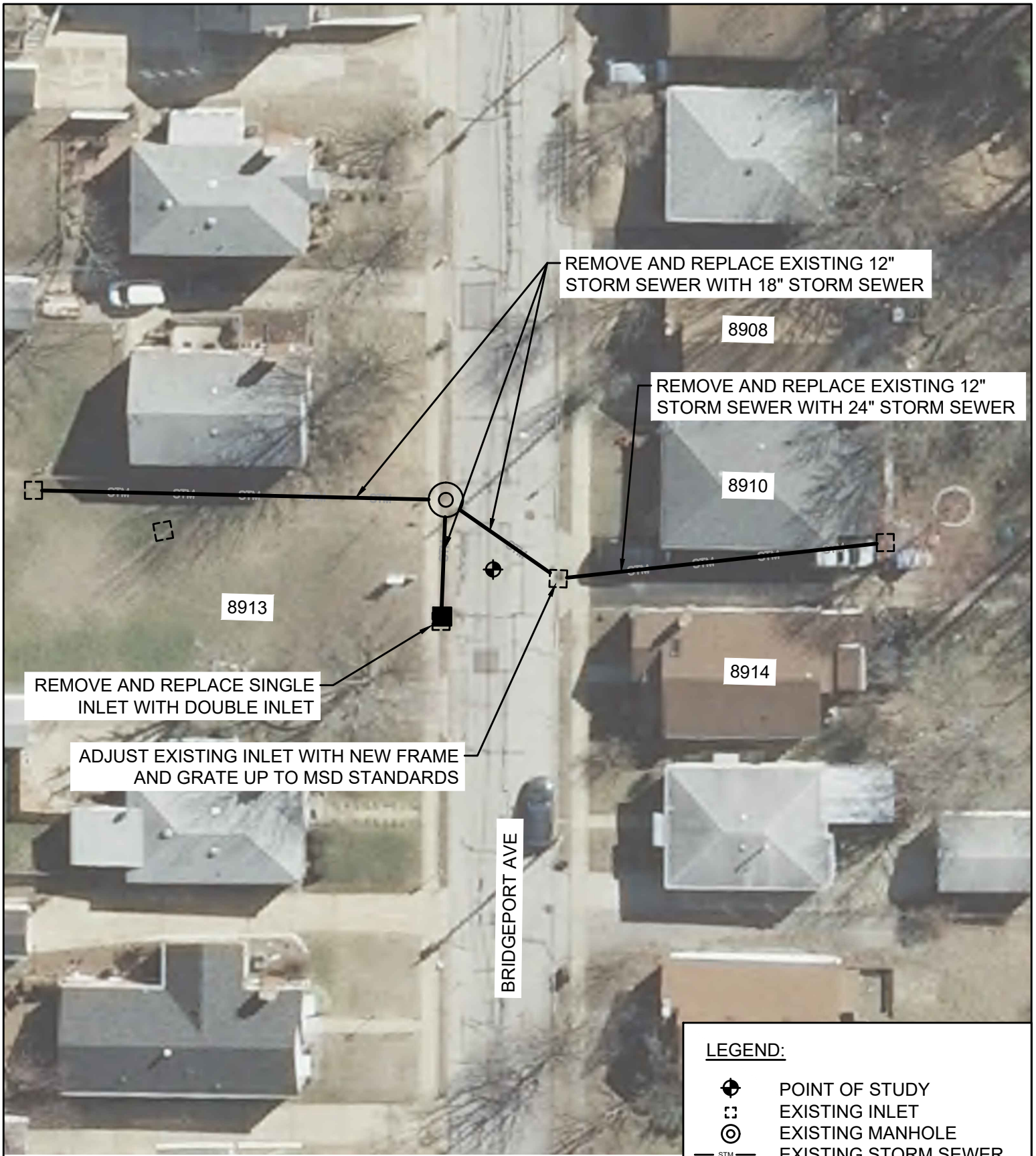


FIGURE #						
4-18	8908-8914 BRIDGEPORT AVE. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.19 Site 19: 8830 Bridgeport Avenue

4.19.1 Concerns:

After periods of heavy rainfall, the homeowner of 8830 Bridgeport Avenue reports that stormwater flows down their driveway and into the garage. The stormwater originates from the stormwater that backs up on Bridgeport Avenue.

4.19.2 Observations:

During field investigations, it was determined that the garage sits approximately 6” higher than the roadway. The low point of the roadway and receiving inlets are directly adjacent to this driveway.

The storm inlets within the roadway were determined to be a part of a much larger system flowing from Moritz Avenue to the north, south across the subject property, and into the combined system on White Avenue. It was noted that storm inlets in the rear of the property had considerable debris stacked around them and appeared to be damaged allowing debris to enter the system.

4.19.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-19. Drainage patterns are from north to south and then generally east and west towards the low point centered at 8830 Bridgeport Avenue. The contributing basin area to the low point on Bridgeport Avenue is approximately 3.2 acres. The design storm peak flow to the depression is calculated at 9.8 cfs.

4.19.4 Preliminary Improvement Recommendation:

Based on the hydraulic analysis conducted within the site, inlet capacity was insufficient for the design storm on Bridgeport Avenue. For this reason, it is recommended the two single inlets north of 8824 Bridgeport Avenue be replaced with double inlets. Additionally, overland flow routes were not available for rain events exceeding the design storm.

In addition to the new infrastructure maintenance and cleaning is recommended on the existing damaged infrastructure downstream of the home on 8830 Bridgeport Avenue. A layout of the preliminary recommendations is provided in Figure 4-19.

4.19.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. The maintenance improvements would be located on private, but it is assumed that stormwater easements are currently present at this property.

4.19.6 Opinion of Probable Cost:

The opinion of probable construction cost is $27,680 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.19.7 Priority Ranking:

The efficiency ranking factor for this site is 10.81. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.19.8 Site Photos:

Representative photos are provided below.

FIGURE #						
4-19	8830 BRIDGEPORT AVE. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF TRUMAN	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.20 Site 20: 16 Stratford Lane

4.20.1 Concerns:

A resident reported that stormwater flowing east in the alley south of Stratford Lane flows along the edge of the roadway and ends up in the driveway of 16 Stratford Lane. The driveway sits below the grade of the roadway, which allows the stormwater to flow over the apron and into the garage. A driveway drain was installed to mitigate this issue, but the issues still persist.

4.20.2 Observations:

The driveway apron is not properly graded to handle the amount of stormwater flowing over it and instead of flowing past it, it enters the driveway.

Investigation of the site showed that the existing drain was not able to keep up with the amount of drainage directed to it. Debris routinely clogs these types of structures making them ineffective and difficult to maintain.

4.20.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-20. The drainage area includes the rear of the properties along Stratford Lane, from 10 Stratford Lane to 16 Stratford Lane. Drainage south of the alley continues south across a pervious open lot. The total contributing area is approximately 1.2 acres. The design storm peak flow to the depression is calculated at 3.7 cfs.

4.20.4 Preliminary Improvement Recommendation:

In order to reduce the amount of water discharged to the driveway and garage, it is recommended that roof drains be directed away from the impervious surface within the area. A new driveway apron and alley paving with a PCC gutter that directs the stormwater to the south would be proven beneficial results.

The driveway and alley reconstruction would provide for positive drainage along the apron and stormwater to be redirected to the south side of the alley and allowed to continue along its intended path. A layout of the preliminary recommendations is provided in Figure 4-20.

4.20.5 Property Characteristics:

The proposed driveway improvements would be located on private property owned by the above referenced homeowners. Alley paving would be on City right-of-way. This site should be considered a combination site.

4.20.6 Opinion of Probable Cost:

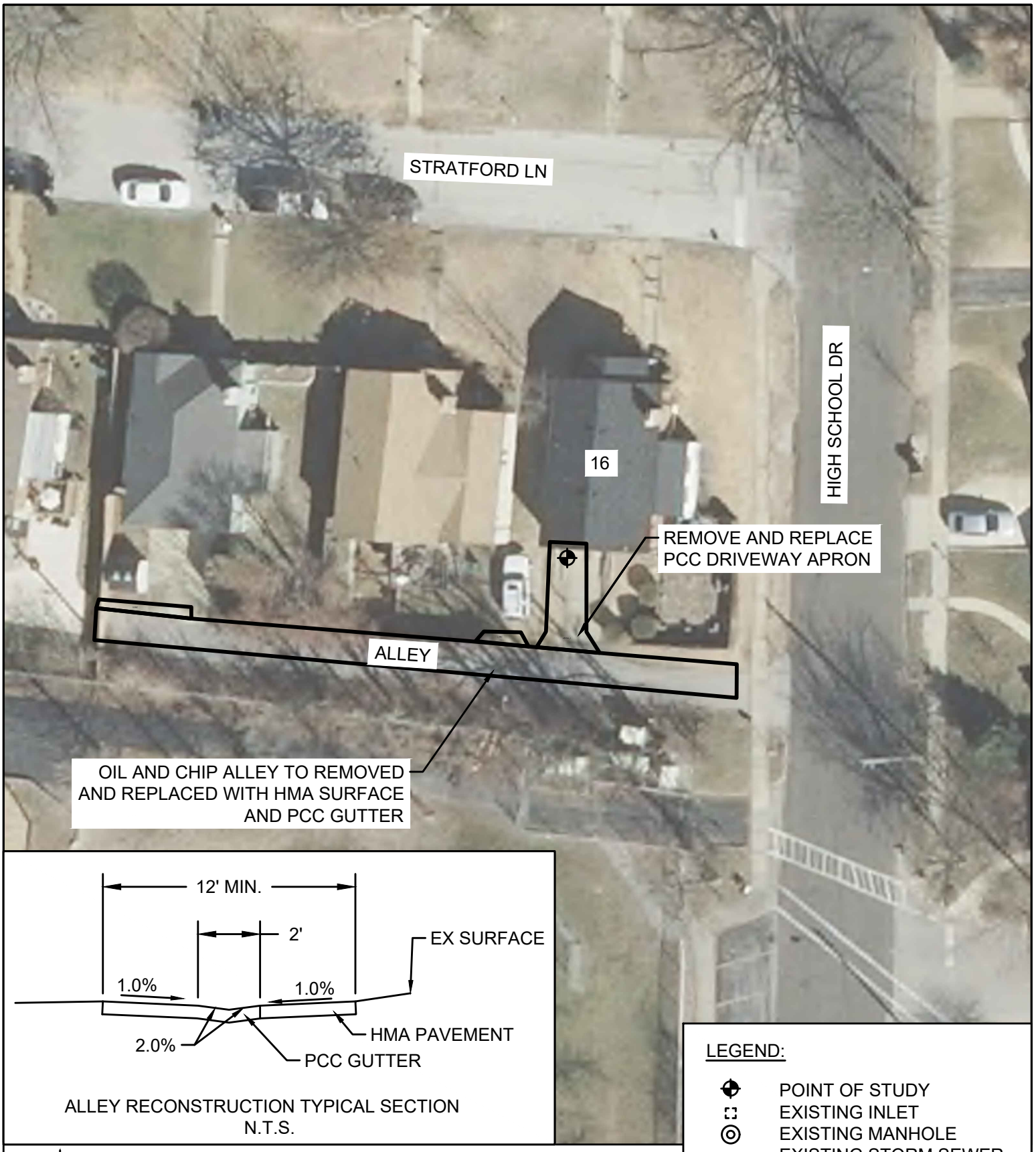
The opinion of probable construction cost is $49,820 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.20.7 Priority Ranking:

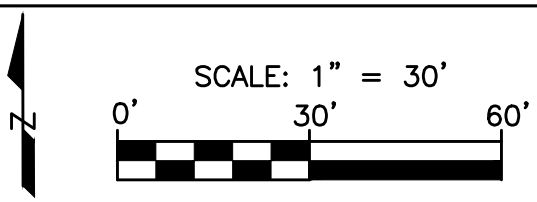
The efficiency ranking factor for this site is 76.65. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.20.8 Site Photos:

Representative photos are provided below.



ALLEY RECONSTRUCTION TYPICAL SECTION
N.T.S.



LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

FIGURE #						
4-20	16 STRATFORD LN. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.21 Site 21: 24 Stratford Lane

4.21.1 Concerns:

The homeowner at 24 Stratford Lane has reported that the backyard and basement flood during rain events. They have also indicated that they believe the runoff may be due to property maintenance issues and runoff from the surrounding properties.

4.21.2 Observations:

There is an existing sump pump and downspout from the neighbor to the west at 25 Stratford Lane that discharges into the side yard between the two homes. There is also a trench drain installed between the homes intended to carry stormwater away from the space between the homes.

There appears to be inadequate ground slope to route the runoff away from the residences, and the trench drain, and gutters are clogged with debris.

4.21.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-21. The drainage pattern at the problem area generally flows from north to south between the homes toward Stratford Lane, and then southeast towards the intersection of Stratford Lane and High School Drive. The contributing basin area within the problem area is approximately 0.2 acres. The design storm peak flow is calculated at 0.5 cfs.

4.21.4 Preliminary Improvement Recommendation:

Drainage flows to the area are low and this issue is recommended to be rectified by first removing the existing trench drain. Trench drains similar to this are susceptible to clogging and can be difficult to clear of debris, which inhibit surface flows from draining from the area. Improved grading of the ground surface within the vicinity to provide the appropriate slope would provide alleviation of the issue. The existing ground surface does not allow for the water to drain from the property.

Routine maintenance and implementation of a Stormwater BMP could also prove to be beneficial. More information on these can be found in Appendix F.

A layout of the preliminary recommendations for grading improvements is provided in Figure 4-21.

4.21.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners.

4.21.6 Opinion of Probable Cost:

The opinion of probable construction cost is $15,080 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.21.7 Priority Ranking:

The efficiency ranking factor for this site is 22.85. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.21.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-21

24 STRATFORD LN.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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4.22 Site 22: 2434 High School Drive

4.22.1 Concerns:

The homeowner at 2434 High School Drive has stated that excess surface water flows across several properties and creates a drainage path leading to the location where it ponds behind the home at 2434 High School Drive. It has been reported that the problem has been exacerbated over the past fifteen years as the area has been developed with more impervious surfaces. The ponding area has increased in size, duration, and frequency within the recent years.

4.22.2 Observations:

This address is at a low point in the area and stormwater runoff collects runoff from the neighboring yards. There is no obvious outlet and communication with homeowners indicated that the area used to be “a wetlands.” However, after further investigation and review of contour maps, it was determined that the area behind 2434 High School Drive should have adequate drainage to the northeast where an existing drainage structure exists. This existing drainage structure is noted on MSD maps as a flared end section. However, field investigations show that this flared end section was converted into an area inlet as part of construction of several residences along Annalee Avenue. The area inlet is set higher than the ground surface on the west side of the property, which contributes the ponding surrounding 2434 High School Drive.

Coordination with MSD confirmed that they did not receive a permit or any submittals requesting conversion of the flared end section to an area inlet, or for the sanitary sewer connection for the new residences.

4.22.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-22. Drainage patterns flow from west to east from High School Drive. The contributing basin area to the depression behind 2434 High School Drive is approximately 7.2 acres. The peak flow for the design storm is calculated at 21.8 cfs.

4.22.4 Preliminary Improvement Recommendation:

Because the overland flow route to the drainage structure that this property historically discharged into is no longer practical due to the construction of the homes along Annalee Avenue, it is recommended that an additional single inlet and a 12” storm sewer be constructed to drain runoff from the newly formed low area. A layout of the preliminary recommendations is provided in Figure 4-22.

4.22.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners. It is unknown if stormwater easements are currently present at this property.

4.22.6 Opinion of Probable Cost:

The opinion of probable construction cost is $78,790 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.22.7 Priority Ranking:

The efficiency ranking factor for this site is 98.49. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.22.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-22

2434 HIGH SCHOOL DR.
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.23 Site 23: High School Drive (Madge Ave. to Litzsinger Rd.)

4.23.1 Concerns:

Several homeowners on this street have reported that stormwater runoff accumulates in the roadway. Standing water in the gutters and driveway aprons freeze in the winter and is responsible for several accidents.

4.23.2 Observations:

The curb and gutter along High School Drive appear to have been affected by a resurfacing job along the roadway. The longitudinal slope of the road has been affected and there are no level areas, which restrict flow toward the intended inlets. The transverse slope is inconsistent. Some portions of the road allow runoff to easily flow across the street and others provide deep pockets that collect the effluent water and ponding occurs within the street. The poorly graded curb and gutter system is unable to provide an adequate flow line.

It was noted during site investigations that the resurfacing also raised the elevation of the pavement adjacent to the inlet throats along the road. This restricts the capacity to accept runoff and the effluent stormwater is unable to drain as intended.

During field investigations, it was discovered that several properties along High School Drive illicitly drain water to the road via downspouts discharging to impervious pavement or through cut sections of curb. The lack of Stormwater Best Management Practices has provided additional runoff to High School Drive and contributes to the accumulation of water along the curb and gutter.

4.23.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-23. Drainage patterns flow east from the back of the properties towards High School Drive. The contributing basin area to the inlets on this section of High School Drive is approximately 7.6 acres. The design peak flow to the inlets is 23.0 cfs.

4.23.4 Preliminary Improvement Recommendation:

Hydraulic calculations confirm that the storm sewer inlet size and pipe capacity are sufficient to carry the amount of stormwater from the drainage area for the design storm. Therefore, it is recommended the curb and gutter is replaced and the roadway is milled and resurfaced to allow for positive grading. These improvements would establish a flowline that would properly direct effluent water to the inlets in place.

It is also recommended that Stormwater Best Management Practices are implemented to decrease the amount of water illicitly discharging to High School Drive. See Appendix F for more information.

A layout of the preliminary recommendations is provided in as Figure 4-23.

4.23.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.23.6 Opinion of Probable Cost:

The opinion of probable construction cost is $483,990 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.23.7 Priority Ranking:

The efficiency ranking factor for this site is 24.20. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.23.8 Site Photos:

Representative photos are provided below.

FIGURE # 4-23

HIGH SCHOOL DR. (MADGE AVE. - LTZ RD.) SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.24 Site 24: 2726 Brentwood Boulevard

4.24.1 Concerns:

The business owner for the property at 2726 Brentwood Boulevard reported that there is standing water in the alley behind the property regularly. This area is reported to flood with very little rain, and standing water is observed for multiple days after storm events.

4.24.2 Observations:

During a dry weather field visit, it was observed that the storm system pipes in the inlets did not appear to be clogged.

During wet weather events, the exposed pipe on the east side of the alley has two 1 1/4" reinforcing steel bars hammered into the ground, which did cause leaves and debris to get caught, and led to water pooling on the roadway. Clearing the debris did not allow the water to drain from the area.

There is also a grated inlet that sits in the road. This inlet sits above the grade of the low spots. There are other inlets within the problem area, which appear to be very ineffectively placed as well.

Looking north or south from the low point, the edge of the alley shows erosion and pieces of the pavement have broken loose along the west side of the roadway.

Through coordination with MSD, it was determined that there is a sinkhole in the vicinity of the alley, which all of these drainage structures ultimately drain into.

4.24.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-24. Since this is in an area of a sinkhole, the drainage flow comes from all directions towards the area of interest. The contributing basin area to the depression is approximately 3.0 acres. The design peak flow to the depression is estimated at 9.1 cfs.

4.24.4 Preliminary Improvement Recommendation:

Due the existence of the sinkhole, the improvements for this area will need to comply with Section 4.020.08, Sinkhole Areas of MSD's Rules and Regulations and Engineering Design Requirements manual. Per this document, projects that are located within the tributary area of a sinkhole shall employ Best Management Practices (BMPs) to protect the water quality and preserve the sinkhole's existing hydrologic condition (tributary flow rate and tributary flow volume) to the maximum extent practicable. More information on BMP's can be found in Appendix F.

Additionally, based on MSD's regulations an overland flow route or appropriately sized pipe should be constructed to a natural drainageway to prevent the sinkhole from being the only means of outlet for the area. The existing overflow pipe is the exposed pipe along the east side of the property, which continues east across private property, east on Brentshire Walk, and northeast on Mary until it discharges into the tributary to Deer Creek.

It is recommended that this overflow pipe be redesigned to 18" in order to handle the appropriate flow and correct deficiencies. Removing and replacing the current curb and gutter along the alley and adding the recommended inlets would help divert water from the sinkhole. A layout of the preliminary surface improvement recommendations is provided in Figure 4-24.

4.24.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements of if there are adequate storm sewer easements.

4.24.6 Opinion of Probable Cost:

The opinion of probable construction cost is $394,640 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.24.7 Priority Ranking:

The efficiency ranking factor for this site is 131.55. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.24.8 Site Photos:

Representative photos are provided below.

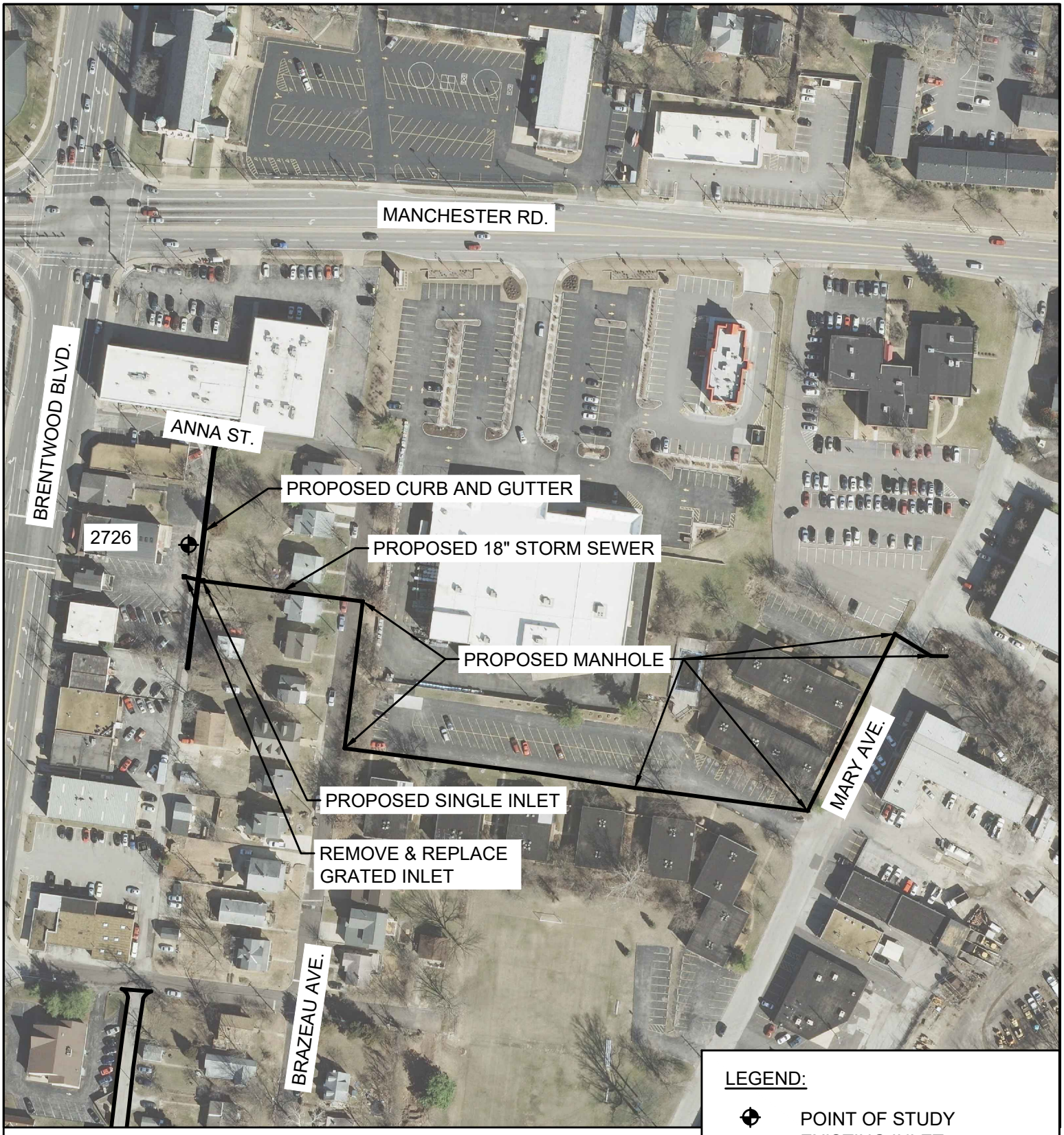


FIGURE #						
4-24	2726 BRENTWOOD BLVD. SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF TRUMAN	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.25 Site 25: 2925 Brazeau Avenue

4.25.1 Concerns:

The property owner indicated that excess stormwater comes from the alley behind 2925 Brazeau Avenue. The homeowner reports that increase in impervious surfaces from recent construction and development in the area has led to an increase in runoff. The garage floods even during moderate rain events, and the pavement between the road and garage has started to erode.

4.25.2 Observations:

The garage at this property is at a lower elevation than the road. Stormwater drains down the alley, across the roadway, and diverts down the driveway and garage. While there is not an adjacent storm sewer system, the roadway has favorable longitudinal slope for drainage away from the structure. The transverse slope of the alley is intended to keep water from crossing the street, but the existing crown elevation is insufficient to keep the stormwater from doing this.

4.25.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-25. Drainage patterns are generally south and east. The contributing basin area is approximately 0.8 acres. The design peak flow to the depression is estimated at 2.3 cfs.

4.25.4 Preliminary Improvement Recommendation:

It is recommended that the alley is milled and replaced with a HMA surface and PCC gutter to allow the stormwater to be properly directed. The gutter should keep direct the runoff away from the garage and down the alley until it reaches the underground conveyance along the adjacent roadway. A layout of the preliminary recommendations is provided in Figure 4-25.

4.25.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.25.6 Opinion of Probable Cost:

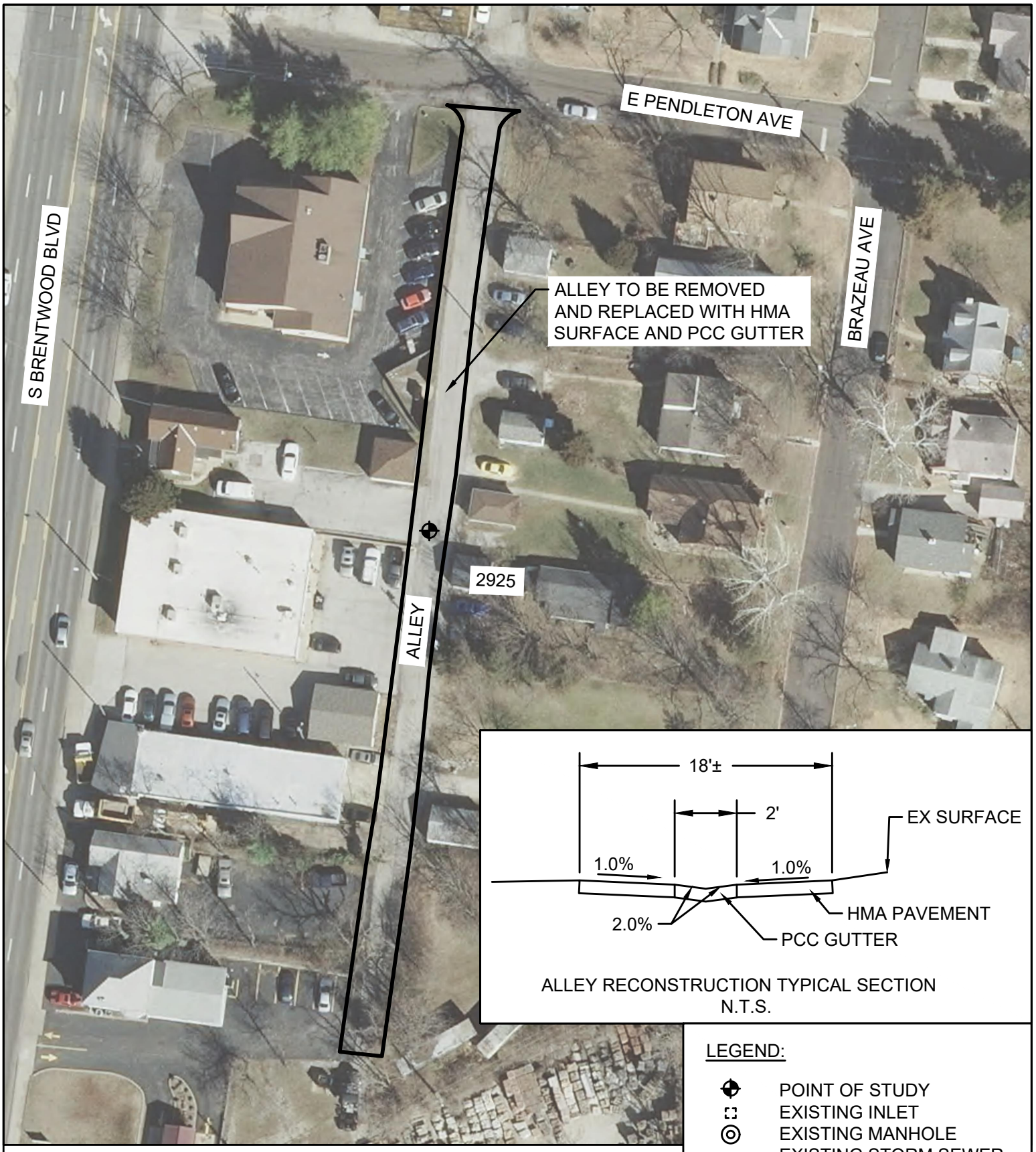
The opinion of probable construction cost is $154,180 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.25.7 Priority Ranking:

The efficiency ranking factor for this site is 25.70. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.25.8 Site Photos:

Representative photos are provided below.



ALLEY RECONSTRUCTION TYPICAL SECTION
N.T.S.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 60'

0' 60' 120'

FIGURE # 4-25

2925 BRAZEAU AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
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1750 BRENTWOOD BOULEVARD
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ST. LOUIS, MISSOURI 63144
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MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

4.26 Site 26: 9333 Parkside Avenue

4.26.1 Concerns:

Residents in the area of Parkside Avenue claim the excessive stormwater comes off of the Mount Cavalry Church parking lot due the large impervious area. Generally, stormwater drains towards 9333 Parkside Avenue and neighboring properties. The runoff flows through several yards causing erosion and ponding. Stormwater also pools at the intersection of Parkside Avenue and Litzsinger Road as it bypasses existing curb inlets. During the winter, this intersection freezes on the roadway and sidewalks. It is claimed that this issue has caused property damage to several properties and is a hazard in the winter.

4.26.2 Observations:

Several drainage structures were added to the storm sewer system along Litzsinger Road to handle the stormwater runoff. A hydraulic evaluation of the storm sewer system and allowable gutter spread within the area indicated that both inlet and storm sewer pipe capacity is sufficient for the design storm.

Information gathered during field investigation and discussion with the residents showed that many of the issues arise from water diverting through the yards and sidewalks, which makes its way into the intersection. Although the existing inlets along Litzsinger Road have sufficient capacity, the intersection at Parkside Avenue has poor drainage with localized depressions allowing stormwater to pool near within the curb and gutter, and on the curb ramp.

4.26.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-26. The basin maps show the drainage patterns flowing westward from the Mount Cavalry Church property along Litzsinger Road and through the back yards along Parkside Drive. The contributing basin area to these inlets along Litzsinger Road is approximately 3.2 acres. The peak flow for the design storm along this area is calculated at 9.7 cfs.

4.26.4 Preliminary Improvement Recommendation:

Based on discussion with the residents and information gathered on site, it is recommended that two additional inlets be constructed. One inlet should be on the north side of Litzsinger Road between 9333 Parkside Drive and 9365 Litzsinger Road that would connect to the existing storm sewer along Litzsinger Road via a 12” storm sewer. This inlet would be placed behind the existing sidewalk in order to drain the back yards via a new constructed ditch along the property line.

The other proposed inlet is at the intersection of Parkside Drive and Litzsinger Road on the northeast corner. While by-pass along Litzsinger Road is within acceptable limits, the poor drainage at the intersection needs to be corrected and these additional inlets would eliminate this characteristic.

The proposed inlets would collect runoff that flows through the properties and any by-pass from the inlets located at Litzsinger Road, which pools at the intersection. A layout of the preliminary recommendations is provided in Figure 4-26.

4.26.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.26.6 Opinion of Probable Cost:

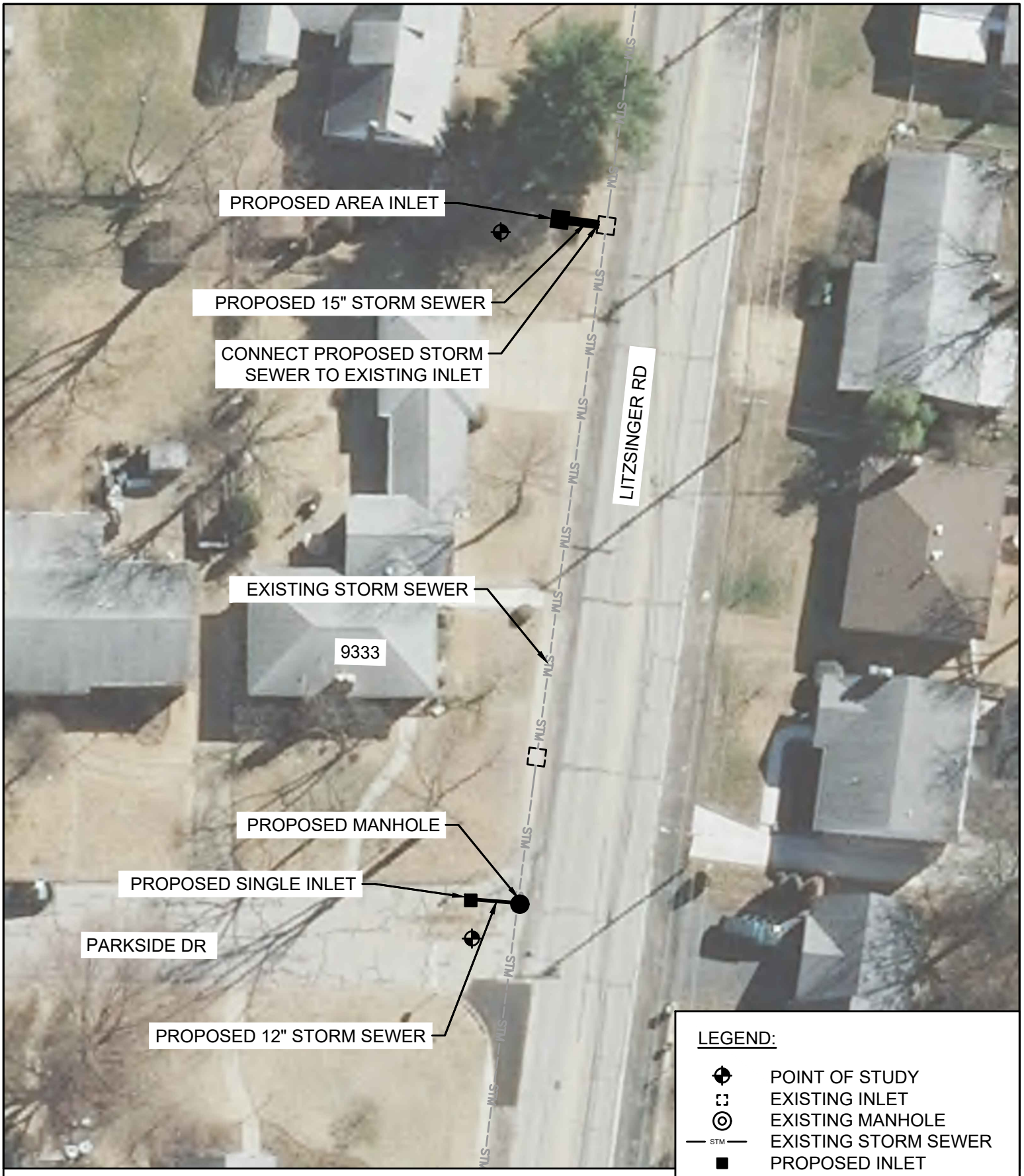
The opinion of probable construction cost is $49,990 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.26.7 Priority Ranking:

The efficiency ranking factor for this site is 22.22. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.26.8 Site Photos:

Representative photos are provided below.



LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

SCALE: 1" = 30'

0' 30' 60'

FIGURE # 4-26

9333 PARKSIDE DR SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.27 Site 27: 8703 Eulalie Avenue

4.27.1 Concerns:

A detached garage sits below the grade of the road in the middle of Mary Avenue, between Eulalie Avenue and Rosalie Avenue. The owner of this garage and resident of 8703 Eulalie Avenue has expressed concerns about stormwater entering the garage and the adjacent yard.

They claim that during heavy rain events water originates from the backyards east of Broughton Park and flows east to west across the park. The stormwater then flows across Mary Avenue, over the curb, and into their garage and backyard, as well as 8702 Rosalie Avenue.

Additionally, there are several locations where water ponds along the edge of the roadway on Mary Avenue.

4.27.2 Observations:

The site was visited during wet conditions, as well as periods of little to no rainfall. The curb and gutter along this portion of Mary Avenue consistently held water, at times ponding extended several feet into the roadway. A lack of drainage structures along this stretch of road, along with the poor longitudinal grade of the roadway, does not allow for proper flow.

It appears that this portion of Mary Avenue was resurfaced, raising the elevation of the road and changing the flowlines of the gutter. It was noted during field investigations that both transverse and longitudinal slopes of the road restricted the flow of water. Raising the elevation of the road also caused the driveway apron to 8703 Eulalie Avenue's garage to sit below the flowline elevation. This location has a localized depression in the roadway and during heavy rain events water enters the garage or spills over the curb into the surrounding yards.

4.27.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-27. Drainage patterns are to the southwest from north of Rosalie Avenue and from east to west along Mary Avenue. There is little longitudinal slope along Mary Avenue, which is a contributing factor to the area of concern. The contributing basin area to this site is approximately 3.8 acres. The combined design storm flow to the area of concern is calculated at 11.6 cfs.

4.27.4 Preliminary Improvement Recommendation:

Based on the proximity of the existing stormwater system near the intersection of Mary Avenue and Rosalie Avenue, it is recommended that new double inlets and a new storm 12" sewer system is placed along the southbound lane of Mary Avenue, as well as making profile improvements to the curb and gutter. Proposed inlets drain to the north, and outlets to the existing system on Rosalie Avenue. These improvements would alleviate the standing water on the road and reduce the potential for water from entering the yards and garage. A layout of the preliminary recommendations is provided in Figure 4-27.

4.27.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.27.6 Opinion of Probable Cost:

The opinion of probable construction cost is $146,340 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.27.7 Priority Ranking:

The efficiency ranking factor for this site is 34.84. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.27.8 Site Photos:

Representative photos are provided below.

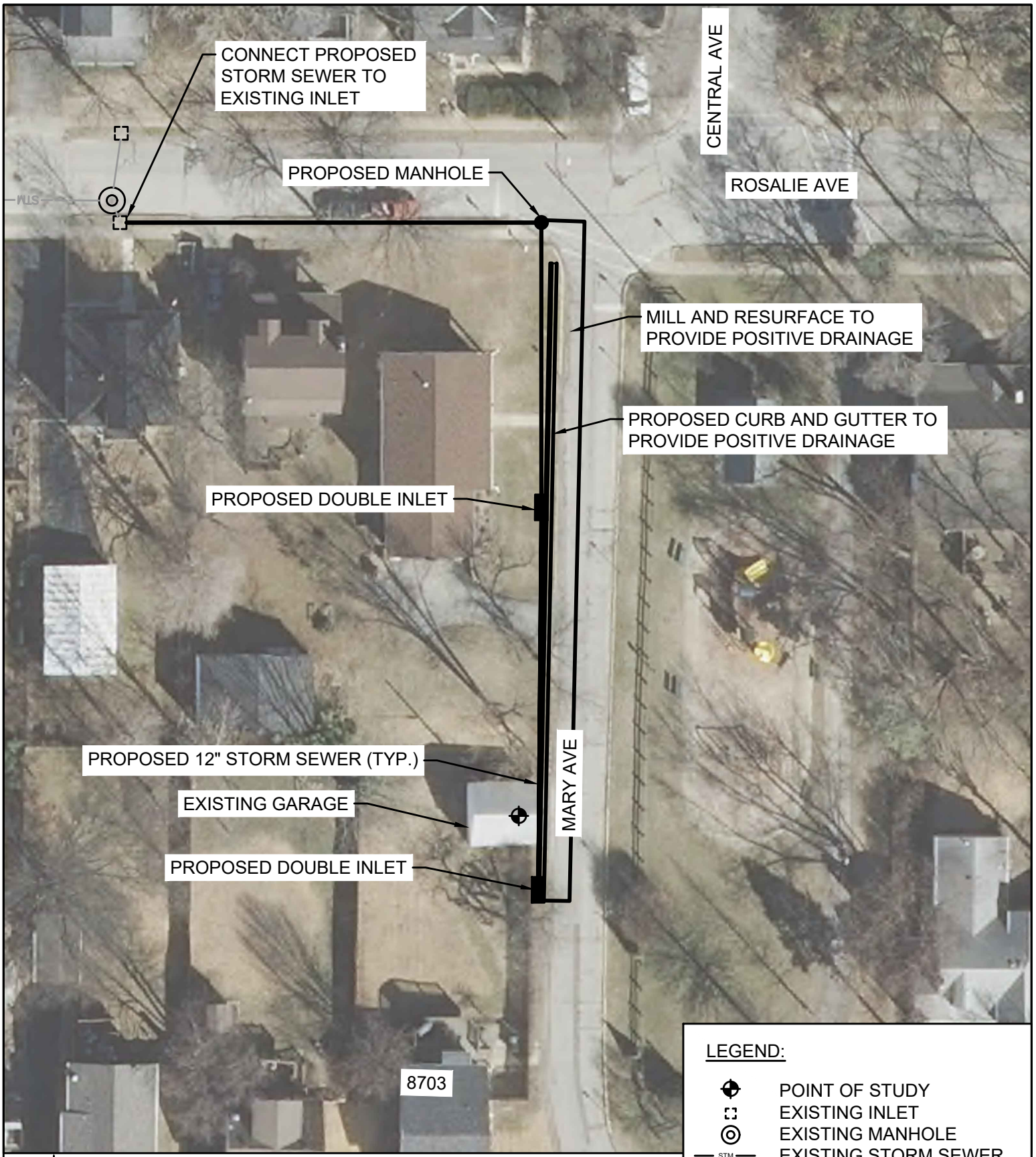


FIGURE #						
4-27	8703 EULALIE AVE BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.28 Site 28: Laverne Court

4.28.1 Concerns:

The resident at 2238 Laverne Court has reported water backing up through the floor drain into the basement. They claim this typically happens during periods of heavy rainfall and has caused damage to the property. The property owner said that MSD has investigated the sanitary sewer numerous times and have not been able to identify any issues. The resident has contacted plumbers to investigate the issue and again has received reports that do not indicate any problems. The resident was not aware of any other sources of water entering the basement; however, it was mentioned that ponding occurs in the yard.

4.28.2 Observations:

Initially, it was presumed that these issues were due to a combined sewer system on Laverne Court overloading and backing up through the drain located in the resident's basement. This theory was disproven once field investigation and coordination with MSD provided that the existing storm and sanitary sewers on Laverne Court are separate systems. Further investigation showed that the water coming from the floor drainpipe was clear water, suggesting sanitary sewer was the problem.

A hydraulic evaluation was conducted on the storm sewer system located on Laverne Court to determine if the issue stemmed from insufficient system capacity. The storm sewer system within the area indicated that both inlet and storm sewer capacity is sufficient for the design storm, and it was unlikely that overtopping would occur.

While discussing the issues with the resident during a field investigation, it was noted that the water affecting the basement was consistent with an inadequate connection between the standpipe and floor drain and washing machine.

Standing water in the backyard was also investigated at this site. It was discovered that a downspout from 8613 White Avenue discharges stormwater under the fence and into the resident's yard. The yard has poor slope, and it is likely the water may enter from a low sitting window well in the rear of the house.

4.28.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-28. Drainage patterns were established to determine if the inlet on the east side of the cul-de-sac had sufficient capacity in order to eliminate the storm sewer issues as a possible cause for the backup. The drainage pattern flowed west from the backyards, along White Avenue and Laverne Court, to the inlet in question. The contributing basin area to the inlet in front of 2238 Laverne Court is approximately 1.5 acres. The design storm peak flow to the depression is calculated at 4.6 cfs.

4.28.4 Preliminary Improvement Recommendation:

Based upon the observations in the field and hydraulic analysis, it has been determined that stormwater infrastructure improvements are not needed for this site.

The resident should make repairs to their sewer connections, backflow preventer, redirect downspouts, and adjust grading to reduce the chance of water entering into the basement. If issues persist, an investigation on the inflow and infiltration of the sewers should be conducted.

4.28.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners.

4.28.6 Opinion of Probable Cost:

This site was not calculated for improvement as the improvements were not stormwater related.

4.28.7 Priority Ranking:

The site has not been included in the priority ranking as the improvements were not stormwater related.

4.28.8 Site Photos:

Representative photos are provided below.

4.29 Site 29: 8547 Eulalie Avenue

4.29.1 Concerns:

Residents at 8547 and 8543 Eulalie Avenue have voiced concerns over a large amount of water entering their backyards, resulting in standing water. The residents believe that the stormwater comes from the north and additional storm sewer capacity should be investigated.

4.29.2 Observations:

Discussion with the residents provided that the surface runoff depositing and ponding in low points on the properties was the major concern. The stormwater has no outlet and saturates the ground, resulting in unfavorable conditions that last long after the standing water evaporates.

While performing field investigations, it was noted that Helen Avenue was graded with a good longitudinal slope and inlets were placed to accept the roadway runoff. The transverse slope of the road allows some water to flow through the intersections with Rosalie Avenue and Eulalie Avenue.

Concrete curb and sidewalk along the west side of Helen Avenue create a flowline that carries water to the inlet near the issue at 8547 Eulalie Avenue. However, along the east side there is short asphalt curb, which tapers down as it approaches the double inlet. The height of this curb does not appear to provide suitable constraint for water to stay within the roadway. It appears that water is able to flow over it and into the area of concern, instead of following the proper flowline.

It was determined that the storm sewer system along Helen Avenue should be analyzed to determine the effectiveness of the storm sewer and inlet capacity.

4.29.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-29. Drainage patterns flow from north to south from Rosalie Avenue and beyond. The effluent water is divided by the crown on Helen Avenue with the southbound lane depositing in a single drop inlet and the northbound lane toward the double inlet near the area of concern. The contributing basin area is approximately 17.5 acres. The combined design storm flow to the inlets between Eulalie Avenue and Rosalie Avenue, on Helen Avenue, is calculated at 52.7 cfs.

4.29.4 Preliminary Improvement Recommendation:

A hydraulic evaluation of the storm sewer system and allowable gutter spread within the area indicated that both inlet and storm sewer pipe capacity are not sufficient for design storm. It is recommended that the single inlet located on the southbound side of Helen Avenue be replaced with a double inlet. There is also a proposed curb and gutter on the northbound side of Helen Avenue. These changes will result in a more efficient drainage system and decrease the risk of water traveling transversally across Helen Avenue. The storm sewer also needs to be increased from 15” to 24” pipe for increased capacity, and the curb and gutter should also be corrected.

A layout of the preliminary recommendations is provided in Figure 4-29.

4.29.5 Property Characteristics:

The improvements would correct deficiencies to public infrastructure. This site is located on both private and public property. It is unknown if improvements recommended outside right-of-way will fall within existing easement. Proposed improvements would be located in the same location as the existing storm sewer.

4.29.6 Opinion of Probable Cost:

The opinion of probable construction cost is $152,710 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.29.7 Priority Ranking:

The efficiency ranking factor for this site is 203.61. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.29.8 Site Photos:

Representative photos are provided below.

FIGURE #						
4-29	8547 EULALIE AVE SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.30 Site 30: 8624 Eulalie Avenue

4.30.1 Concerns:

Stormwater drains from backyards of properties located on Litzsinger Road and Eulalie Avenue toward an existing swale. Property at 8624 Eulalie Avenue and neighboring properties have experienced groundwater entering their homes through cracks in the basement walls. The drainage swale located on the shared property line between Litzsinger Road, and Eulalie Avenue is intended to intercept the runoff and redirect it to an inlet between 8620 and 8616 Eulalie Avenue, but residents are concerned that the system is not working as it is contributing to additional seepage into their homes.

4.30.2 Observations:

Through investigation of the site and speaking to residents in the area it was determined that the drainage system in place is ineffective. Stormwater is not traveling through the drainage swale and to the inlet as it was constructed to operate. It appears the swale has become cluttered with landscaping rocks, dirt, and debris.

The inlet indicated on MSD mapping, which is assumed to be the collection device for this area, was unable to be field located. It is assumed that the landscaping rocks, dirt, and debris have buried the inlet causing it to be ineffective.

4.30.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-30. The contributing drainage area to the runoff that accumulates in the backyards of 8650 to 8620 Eulalie Avenue and 8653 to 8621 Litzsinger Road, is approximately 1.8 acres. The design storm peak flow to the depression is calculated at 5.4 cfs.

4.30.4 Preliminary Improvement Recommendation:

It is recommended that the swale in the backyards of this site be regraded to drain better. Improvements to the existing inlet, including a new top, which will improve capacity, functionality, and reduce the potential for future clogging, is also recommended. These improvements will help remove surface flow, reduce ground saturation, and give the residents within the site some relief from groundwater entering their basements. These recommendations will not eliminate the possibility of groundwater from the area and residents should look into other solutions that will seal cracks in the walls of their basement. A layout of the preliminary recommendations is provided in Figure 4-30.

4.30.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners. It is unknown if stormwater easements are currently present at this property, but it involves public infrastructure. This site should be considered a combination site.

4.30.6 Opinion of Probable Cost:

The opinion of probable construction cost is $20,220 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.30.7 Priority Ranking:

The efficiency ranking factor for this site is 14.44. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.30.8 Site Photos:

Representative photos are provided below.

SCALE: 1" = 30'

0' 30' 60'

N

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

FIGURE #						
4-30	8624 EULALIE AVE SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF TRUMAN	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.31 Site 31: Barnstable Court & Salem Road

4.31.1 Concerns:

The northeast corner of the intersection of Barnstable Court and Salem Road does not have positive drainage. Stormwater pools at this intersection as there is no readily available outlet. Additionally, residents note that properties in the surrounding area have sump pump discharges directly onto the roadway creating wet or icy areas, even during periods of dry weather.

4.31.2 Observations:

The northeast corner of the intersection investigated sits lower than the rest of the roadway. Any stormwater flows on the northbound lane of Salem Road and westbound lane of Barnstable Court ends up in this depression.

A small concrete curb can be found at the edge of pavement on Salem Road. It appears a resurfacing project performed in this area did not include removal and replacement of the adjacent curb. The existing curb tapers to below road grade and water ponds within the area of concern. This resurfacing may have also been a contributing factor in creating the depression when flowlines were not maintained along the curb flowline.

A sump pump pipe drains directly onto Barnstable Court from 2648 Salem Road. A resident has noted that this pipe can be seen discharging to the road even during times where no rainfall has occurred. This is a violation of City of Brentwood Ordinance.

4.31.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-31. Stormwater drains to the area of concern from the northbound lane of Salem Road, roughly 150 ft north of the intersection. The drainage area also accounts for the properties north of Barnstable Court that discharge water to the street, which flows to the area. This results in approximately 0.6 acres draining to the northeast corner of the Barnstable Court and Salem Road intersection. The design storm peak flow to the depression is calculated at 1.9 cfs.

4.31.4 Preliminary Improvement Recommendation:

In order to mitigate this issue, it is recommended that inlets are installed at the northeast corner of the intersection of Barnstable Court and Salem Road. The proposed inlets would collect the runoff converging at the intersection and redirect it to an existing system on Marblehead Drive. A layout of the proposed improvements can be seen in Figure 4-31.

It is also recommended that the discharge pipes from 2648 Salem Road, and any other properties along Barnstable Court, be redirected to decrease the amount of stormwater flowing to the roadway. This can be done by relocating the discharge onto pervious surface or utilizing one of the stormwater management technologies outlined in the City of Brentwood Best Management Practices for Stormwater Control. More information on the BMP practices can be found in Appendix F.

4.31.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements. Disconnection of the discharge pipes would be on private property.

4.31.6 Opinion of Probable Cost:

The opinion of probable construction cost is $192,170 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.31.7 Priority Ranking:

The efficiency ranking factor for this site is 48.04. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.31.8 Site Photos:

Representative photos are provided below.

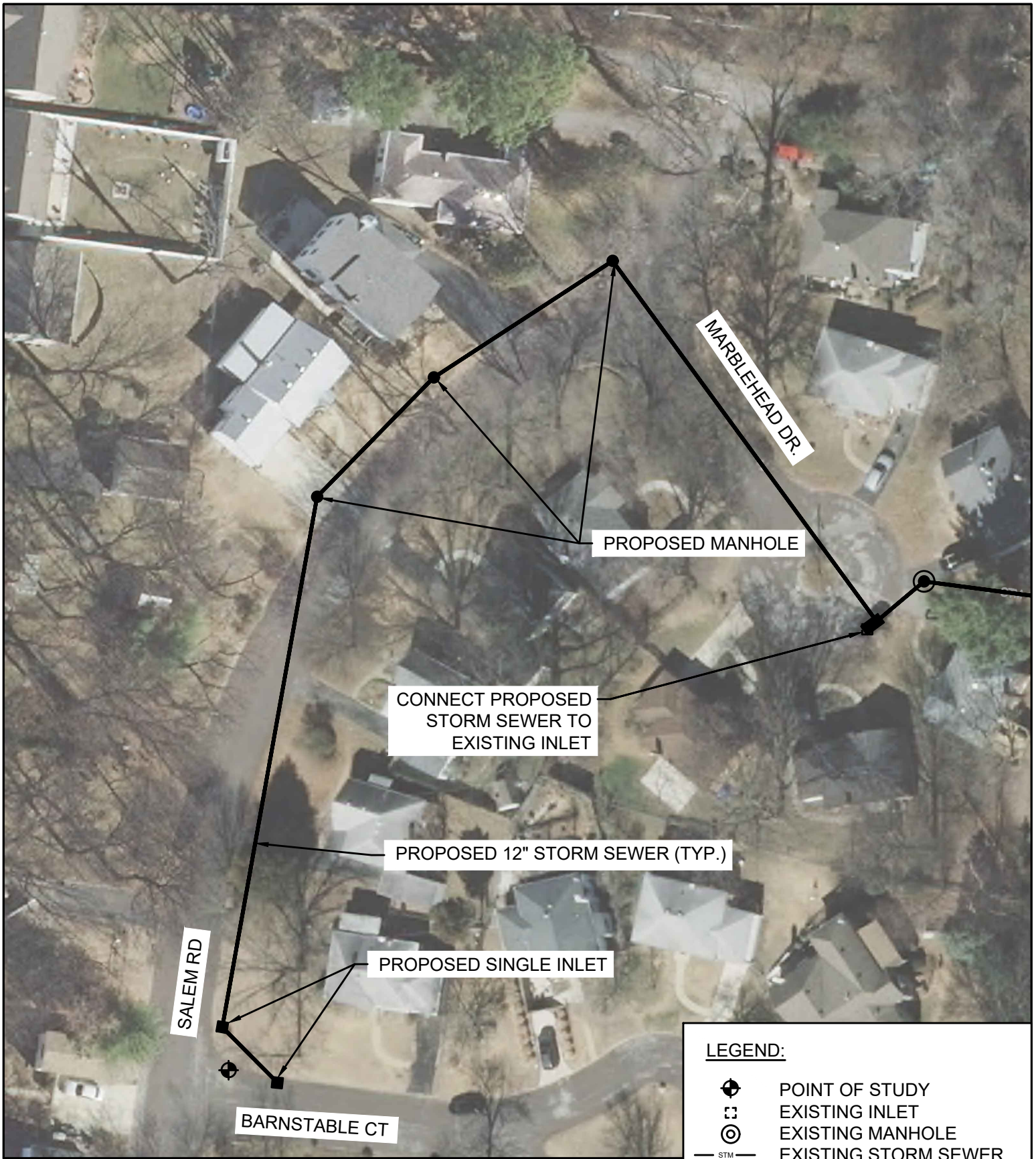


FIGURE #
4-31

BARNSTABLE CT & SALEM RD SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.32 Site 32: 8637 Henrietta Avenue

4.32.1 Concerns:

Stormwater flowing south on Dorothy Avenue follows the curb and discharges into the driveway of 8637 Henrietta Avenue. The driveway sits below the grade of the roadway, which allows the water to flow over the apron and into the carport. A driveway drain was installed to mitigate this issue, but the issues still persist.

4.32.2 Observations:

The driveway apron is not properly graded to manage the amount of water flowing over it. An asphalt overlay has raised the pavement over the crown of the apron, directing the flow into the carport. Inlets along Dorothy Avenue accept water flowing from Eulalie Avenue, however, over 200 ft of impervious pavement still drains directly to the property.

Investigation of the site showed that the drain was not able to keep up with the amount of drainage directed to it. Debris routinely clogs the structure making it ineffective and difficult to maintain.

4.32.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-32. The drainage area includes the northbound lane of Dorothy Avenue, from the inlet 200 ft north to the driveway at 8637 Henrietta Avenue, as well as runoff from the surrounding properties. The total contributing area is approximately 4.0 acres. The design storm peak flow to the depression is calculated at 12.0 cfs.

4.32.4 Preliminary Improvement Recommendation:

In order to reduce the amount of water discharged to the driveway and carport, it is recommended that roof drains be directed away from the impervious surface within the area. A new driveway apron that directs the runoff back into the street would be proven to be beneficial.

The driveway reconstruction should allow for positive grading along the apron and stormwater to be redirected to continue along its intended path. A layout of the preliminary recommendations is provided in Figure 4-32.

4.32.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners.

4.32.6 Opinion of Probable Cost:

The opinion of probable construction cost is $14,380 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.32.7 Priority Ranking:

The efficiency ranking factor for this site is 26.15. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.32.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 20'

0' 20' 40'

FIGURE # 4-32

8637 HENRIETTA AVE SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD CITY OF BRENTWOOD
CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.33 Site 33: Mary Avenue (Florence Ave. to Litzsinger Rd.)

4.33.1 Concerns:

Stormwater ponding exists between 2443 and 2449 Mary Avenue for several days after even small rain events. The stormwater generally flows along the southbound curb line but is not able to continue south towards Florence Avenue due to poor longitudinal slope.

4.33.2 Observations:

Mary Avenue was recently resurfaced, and it appears that the newly formed longitudinal slopes do not allow for stormwater to flow from the problem area. The flowline of the curb and gutter at the does not provide positive drainage and substantial amounts of water becomes trapped. Investigation of the area showed that the southbound flowline remains level for approximately 50 ft.

Drainage structures have been placed along the bike trail that sits between Dorothy Avenue and Mary Avenue. A portion of curb, 125 ft north of the problem area, has been cut to allow drainage along the northbound lane of Mary Avenue. The system flows south and incorporates several inlets at the intersection near Florence Avenue.

4.33.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-33. The drainage area at the standing water includes the southbound lane of Mary Avenue until its intersection with Litzsinger Road and is approximately 1.1 acres. The peak design flow for this area is calculated at 3.2 cfs.

4.33.4 Preliminary Improvement Recommendation:

In order to correct the standing water, it is recommended that a proposed storm inlet be placed at the area experiencing standing water. The proposed inlet would flow north via a new 12” underground storm sewer and tie into the existing sewer system located to the east of Mary Avenue through a series of inlets, junction chambers, and storm sewers. A layout of the preliminary recommendations can be seen as Figure 4-33.

4.33.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether easements would be required to complete the improvements.

4.33.6 Opinion of Probable Cost:

The opinion of probable construction cost is $68,890 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.33.7 Priority Ranking:

The efficiency ranking factor for this site is 34.45. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.33.8 Site Photos:

Representative photos are provided below.

FIGURE #
4-33

MARY AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

4.34 Site 34: 9212 Eager Road

4.34.1 Concerns:

A resident at 9212 Eager Road has been experiencing localized flooding and water getting into their basement. Stormwater flows south from Chafford Woods, through the parking lot, and diverts around the northwest corner of the building. It follows the landscaping and grade of the yard around the southwest corner where it pools and eventually enters the walkout basement during heavy rain events.

4.34.2 Observations:

An open concrete channel carries water southeast to a detention basin located near the intersection of Brentwood Boulevard and Wrenwood Lane. An existing berm sits between the parking lot and channel, and partially blocks the flow of stormwater from leaving the area of concern. The elevation difference between the discharge point of the parking lot to the nearest point along the channel is more than sufficient to provide positive grading. Runoff from the parking lot would then drain away from the building and discharge to the channel, however, poor grading surrounding the project site keeps this from happening.

After investigating the area, it was determined that no MSD utilities would need to be relocated in order to institute positive grading in this area.

4.34.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-34. The contributing basin area to the area behind 9212 Eager Road was determined to be approximately 0.7 acres of runoff from the southbound lane of Chafford Woods, a section of parking lot near the northwest corner of the building, and a small pervious area off the western face of the building. The design storm peak flow to the depression is calculated at 2.6 cfs.

4.34.4 Preliminary Improvement Recommendation:

It is recommended that the ground west of 9212 Eager Road be regraded, and the berm removed to allow for positive drainage away from the building. The new drainage channel that would lead to an existing open channel, which would remove stormwater from this low area. A layout of the preliminary recommendations can be seen as Figure 4-34.

4.34.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners.

4.34.6 Opinion of Probable Cost:

The opinion of probable construction cost is $11,440 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.34.7 Priority Ranking:

The efficiency ranking factor for this site is 35.75. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.34.8 Site Photos:

Representative photos are provided below.

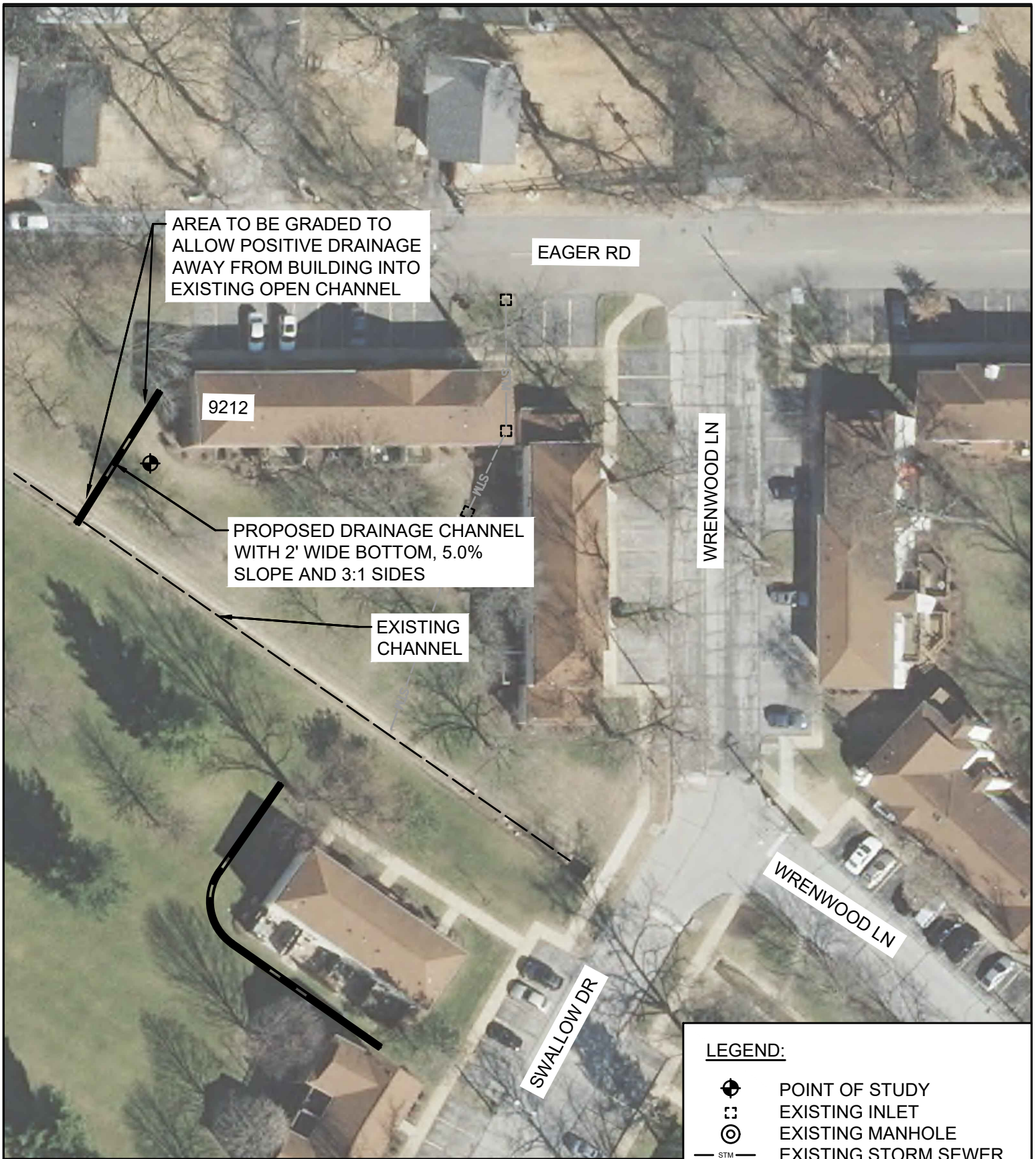

FIGURE #
4-34

9212 EAGER RD
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.35 Site 35: 2217 Parkridge Avenue

4.35.1 Concerns:

The resident at 2217 Parkridge Avenue reported that an MSD easement has been responsible for several issues to their property and the surrounding properties. The easement was located between 2217 Parkridge Avenue and 2214 Hatton Lane. The easement consists of a drainage swale collecting runoff from the backyards of the properties to the north, and discharges to a box inlet near the southwest corner of 2217 Parkridge Avenue. The resident claims that the area becomes infested with mosquitos and ponding water infiltrates into the basement of the property.

4.35.2 Observations:

At first glance, it appears as if the easement has been forgotten after the inlet has been plugged. The easement itself has become overgrown with vegetation and is a nuisance to the surrounding properties.

While investigating this area, it was discovered that the easement is not effectively being drained. The inlet in the area has been disconnected from the combined sewer. The only outlet pipe was grouted, restricting any flows into the sewer. During heavy rain events, the inlet fills to capacity and water is unable to leave the easement. Erosion around the inlet has made it even more difficult for the area to drain. Standing water saturates the soil and groundwater seeps downhill to 2217 Parkridge Avenue.

CSO – Mary is planned to provide a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.35.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-35. The drainage area for the area near the abandoned inlet at 2217 Parkridge Avenue accounts for runoff from backyards between Hatton Lane and Parkridge Avenue north of White Avenue and is approximately 2.2 acres. The design storm peak flow to the depression is calculated at 6.6 cfs.

4.35.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that a new single inlet with three open sides and 12” connecting storm sewer be constructed at the area of concern. These inlets and storm sewers will discharge into the CSO project being planned project being for this area. The layout and sizes of these improvements has been included in Figure 4-35.

4.35.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners but is believed to be on a stormwater easement maintained by MSD.

4.35.6 Opinion of Probable Cost:

The opinion of probable construction cost is $36,070 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.35.7 Priority Ranking:

The efficiency ranking factor for this site is 24.05. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.35.8 Site Photos:

Representative photos are provided below.

N

SCALE: 1" = 30'

0' 30' 60'

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

FIGURE #						
4-35	2217 PARKRIDGE AVE SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.36 Site 36: 2441 Louis Avenue

4.36.1 Concerns:

2441 Louis Avenue sits southwest of the intersection of Louis Avenue and Oak Tree Park Trail. Stormwater flows downhill from both areas and meets near the northeast corner of the property, then continues downhill. The resident of 2441 Louis Avenue expressed that sediment build-up and standing water occur near the front of the property and questions the effectiveness of the inlet located at east end of the property. Several other properties at the northern end of Louis Avenue have reported excessive stormwater creating icy conditions during winter months.

4.36.2 Observations:

Several properties on Louis Avenue are not implementing Stormwater Best Management Practices. Downspouts can be seen draining to the driveways and traveling along impervious pavement to Louis Avenue. This is in violation of City Ordinance, which is intended to prevent improperly discharging stormwater onto the street. These illicit discharges can overload the existing drainage system.

A grated manhole and a drop inlet are the effluent stormwater collections system in this area. It was noted that the grated manhole near 2441 Louis Avenue was full of debris and does not function as efficiently as it should.

4.36.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-36. The inlet located east of 2441 Louis Avenue collects water traveling north from Louis Avenue, and accounts for stormwater collected and discharged to the street by surrounding properties. This area was determined to be approximately 0.5 acres. The inlet located near the north terminus of Louis Avenue collects the runoff from Louis Avenue north of the adjacent inlet, backyards to the northwest, and along Oak Tree Park Trail. This drainage area was determined to be approximately 4.0 acres. The design storm peak flow to the depression is calculated at 12.1 cfs.

4.36.4 Preliminary Improvement Recommendation:

A hydraulic evaluation of the storm sewer system and inlet capacity checking for allowable gutter spread within the area indicated that both inlet and storm sewer pipe capacity are insufficient for the design storm. It is recommended that a double inlet on Marblehead Drive is implemented and two inlets on Louis Avenue are replaced to allow for appropriate capacity during the design storm and to minimize surface runoff.

Additional capacity is also required within the storm sewer pipes to convey stormwater away from the problem area, resulting in the current 12” storm sewer upgrading to an 18”. The layout and sizes of these improvements has been included in Figure 4-36.

4.36.5 Property Characteristics:

The proposed improvements would be located on private property owned by the above referenced homeowners, as well as on City right-of-way. It is assumed that these improvements are on existing stormwater as the improvements would replace existing infrastructure. It is unknown if additional construction easements would be required to construct the proposed improvements.

4.36.6 Opinion of Probable Cost:

The opinion of probable construction cost is $397,040 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.36.7 Priority Ranking:

The efficiency ranking factor for this site is 128.49. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.36.8 Site Photos:

Representative photos are provided below.

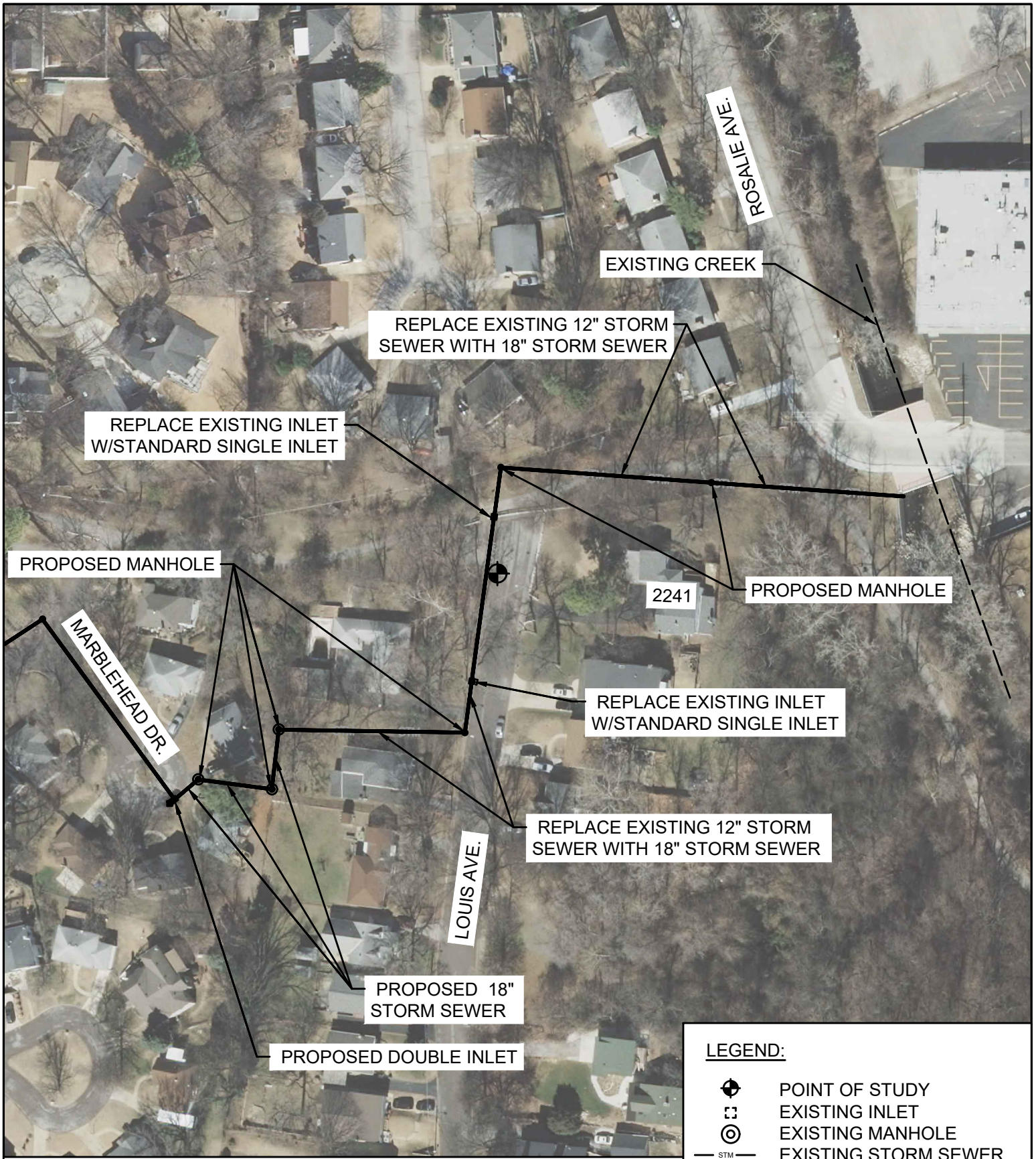

FIGURE #
4-36

LOUIS AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
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OF AUTHORITY #2005038353

4.37 Site 37: 8930 Harrison Avenue

4.37.1 Concerns:

Residents along Harrison Avenue have raised concerns with the storm sewer system in place along the road. Several reports from this street have reported icy conditions and similar issues. Harrison Avenue has stormwater runoff from several surrounding roads.

4.37.2 Observations:

The drainage system located on Harrison Avenue are compiled of a series of single, double, and grated inlets on both sides of the road. Hilton Avenue, Annalee Avenue, and Patton Avenue slope towards Harrison Avenue. During the investigation, it was determined that all inlets located on and around Harrison Avenue have been capped, plugged, or grouted to eliminate flow to the existing sanitary sewer. The incoming stormwater has little to no outlet and remains trapped inside the plugged drainage structures until evaporating.

It is suspected that plugging of the receiving inlets was done to mitigate issue of stormwater overloading the sanitary system, causing sewage to back up at the surrounding properties. Although the sewer backups were mitigated, there remains the issue of stormwater backing up into the streets.

Further investigation and coordination with MSD confirmed that Harrison Avenue historically drained into a combined sewer. A concrete box culvert was installed to increase the capacity of the sanitary sewer and no inlets were reintegrated to the system.

Additionally, many of the properties along Harrison Avenue are not following Stormwater Best Management Practices. Downspouts drain through impervious pavement to the street, tie into the existing sanitary sewer, or drain to pop-up emitters discharging less than 10’ from the property line.

4.37.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-37. The contributing basin area consists of all impervious pavement on Harrison Avenue, as well as stormwater discharged to the street from the adjacent properties. The contributing basin area totals to approximately 3.6 acres. The design storm peak flow to the depression is calculated at 10.8 cfs.

4.37.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern, and these recommendations assume that the relief sewer has already been constructed.

It is recommended that new inlets and storm pipes be constructed along Harrison Avenue. These inlets and storm sewers will discharge into the CSO project being planned for this area. The layout and sizes of these improvements has been included in Figure 4-37.

4.37.5 Property Characteristics:

The proposed improvements would be located on City right-of-way. It is assumed that these improvements are on existing stormwater as the improvements would replace existing infrastructure. It is unknown if additional construction easements would be required to construct the proposed improvements.

4.37.6 Opinion of Probable Cost:

The opinion of probable construction cost is $109,940 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.37.7 Priority Ranking:

The efficiency ranking factor for this site is 81.44. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.37.8 Site Photos:

Representative photos are provided below.

FIGURE #						
4-37	8930 HARRISON AVE SITE MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

4.38 Site 38: 9429 Sonora Avenue

4.38.1 Concerns:

Stormwater flowing south on McKnight Road follows the curb and discharges into a localized depression in the driveway of 9429 Sonora Avenue. The driveway sits below the road and is unable to allow the water to return to the gutter. Stormwater collects and remains until evaporation, leaving sediments and debris behind. The resident provided a picture to show the stormwater issue affecting 9429 Sonora Avenue and it is included below.

4.38.2 Observations:

The driveway apron is not properly graded to provide for positive drainage. It appears as if an asphalt overlay may have raised the pavement, or poor reconstruction of the concrete sidewalk prevents the water from leaving the area. Reconstruction of the apron and adjacent sidewalk would form a crown in the driveway and redirect stormwater down the driveway toward the garage and home, possibly causing property damage.

There are several inlets located in the sidewalk and curb along the west side of McKnight Road. These inlets collect stormwater and drain to a storm sewer system that runs north and south along the west side of the street.

4.38.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-38. The drainage area attributed to 9429 Sonora Avenue consists of runoff from the area between Pine Avenue and the driveway on the property. The contributing basin area to the driveway apron of 9429 Sonora Avenue is approximately 0.3 acres. The peak flow for the design storm at the area of concern was calculated at 0.8 cfs.

4.38.4 Preliminary Improvement Recommendation:

Based on the proximity of an existing storm sewer system and the potential risks of regrading the driveway apron, it is recommended that the driveway be replaced, and a drainage swale be constructed through the driveway. The proposed drainage swale would direct runoff to a proposed area inlet located to the south. The inlet would be tied into the existing storm sewer along McKnight Road. These improvements would allow the previously trapped stormwater to be discharged into the existing system. A layout of the preliminary recommendations can be seen in Figure 4-38.

4.38.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way, however private property is also involved. Both the private drive and public infrastructure will be impacted, and it is unclear as the ultimate cause of the issues. This site is recommended to be considered a combination site.

4.38.6 Opinion of Probable Cost:

The opinion of probable construction cost is $27,140 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.38.7 Priority Ranking:

The efficiency ranking factor for this site is 27.14. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.38.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- EXISTING STORM SEWER (STM)
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 30'

0' 30' 60'

FIGURE # 4-38

9429 SONORA AVE SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

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4.39 Site 39: Pine Avenue & Hatton Lane

4.39.1 Concerns:

Stormwater flows along Pine Avenue and across the intersection with Hatton Lane causing slippery conditions and freezing during the winter. These issues are present during moderate to light rain events and stormwater can even be seen in this area even during dry periods.

4.39.2 Observations:

There are three curb inlets near the intersection of Pine Avenue and Hatton Lane stormwater drains from the northeast curb and gutter along Pine Avenue some of which by-passes the inlets, flows to the middle of the intersection, and continues towards Pine Avenue.

While performing site investigations, it was discovered that the pipe's existing two curb inlets have been plugged. The pipes have been disconnected from the sanitary sewer system and were not provided an outlet. Heavy rain events cause runoff from the surrounding area to fill the inlets and backup into the street.

After further investigation and coordination with MSD, it was determined that this intersection historically drained into a combined a sewer. However, after repeated backups and combined sewer overflows, it was decided that capping the inlets would be beneficial until a CSO could be constructed. The construction of this project would involve a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.39.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-39. Drainage patterns are from Pine Avenue, with both sides of the intersection converging at a low point and continuing south along Hatton Lane approximately 5.5 acres. The design storm peak flow to the depression is calculated at 16.6 cfs.

4.39.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that new inlets and storm pipes be constructed at the intersection of Pine Avenue and Hatton Lane. These inlets and storm sewers will discharge into the CSO project being planned for this area. The layout and sizes of these improvements has been included in Figure 4-39.

4.39.5 Property Characteristics:

The proposed improvements are located at an access easement and involve infrastructure located within the City limits. It is unclear whether or not easements would be required. At a minimum, coordination with the property owner is recommended.

4.39.6 Opinion of Probable Cost:

The opinion of probable construction cost is $108,840 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.39.7 Priority Ranking:

The efficiency ranking factor for this site is 120.93. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.39.8 Site Photos:

Representative photos are provided below.

FIGURE #

4-39

PINE AVE & HATTON LN
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

CITY OF BRENTWOOD
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MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

4.40 Site 40: Moritz Avenue (Brentwood Blvd. to High School Dr.)

4.40.1 Concerns:

Several residents along Moritz Avenue have reported icy conditions due to poor drainage within the roadway. Many driveway aprons hold water after rain events.

4.40.2 Observations:

It appears that when Moritz Avenue was resurfaced the flow lines of the curb and gutter became higher than several driveway aprons. Stormwater collects in the newly formed low areas that disrupt the intended flow lines. Existing inlets have been affected as well. The elevation of the pavement adjacent to the inlet throats were raised and causes water to drain less efficiently. The resurfacing also appeared to decrease the overall longitudinal slopes near the inlets, allowing stormwater to reduce velocity and pond before it can discharge into the storm sewer system.

It was noted during site investigations that the longitudinal and transverse slope of Moritz Avenue is not suitable to maximize drainage throughout the roadway.

Site investigations also showed that many properties along Moritz Avenue are not maintaining Stormwater Best Management Practice. Downspouts and pop-up emitters can be seen discharging less than 10 ft. from the property line or directly on to impervious pavement. These instances are a violation of City Code of Ordinances.

4.40.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-40. The drainage area for the problem area includes all of Moritz Avenue, from High School Drive to Brentwood Boulevard, and stretches north to where runoff from the houses on the south half of Pine Avenue flow toward Moritz Avenue. The contributing basin area was divided into four sections using elevations and the crown of the road to find the runoff directed to each inlet on Moritz Avenue.

The combined drainage area for the Moritz Avenue storm sewer system is approximately 8.6 acres. The area associated to each inlet can be seen in Figure B-40. The design storm peak flow to the depression is calculated at 25.8 cfs.

4.40.4 Preliminary Improvement Recommendation:

Proposed recommendations for this site include replacing the curb and gutter to provide positive grading and allow water to easily follow the flowline. Sections of the road that restrict drainage to the inlet throats should be milled and resurfaced to allow positive grading and sufficient access. There are also several proposed double inlets to replace existing single inlets, along with replacing 12” storm sewer to a 30” storm sewer to improve the storm sewer capacity. A layout of the preliminary recommendations is provided in Figure 4-40.

4.40.5 Property Characteristics:

The proposed improvements are located on the roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether or not easements would be required. At a minimum, coordination with the property owner is recommended.

4.40.6 Opinion of Probable Cost:

The opinion of probable construction cost is $880,640 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.40.7 Priority Ranking:

The efficiency ranking factor for this site is 48.92. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.40.8 Site Photos:

Representative photos are provided below.

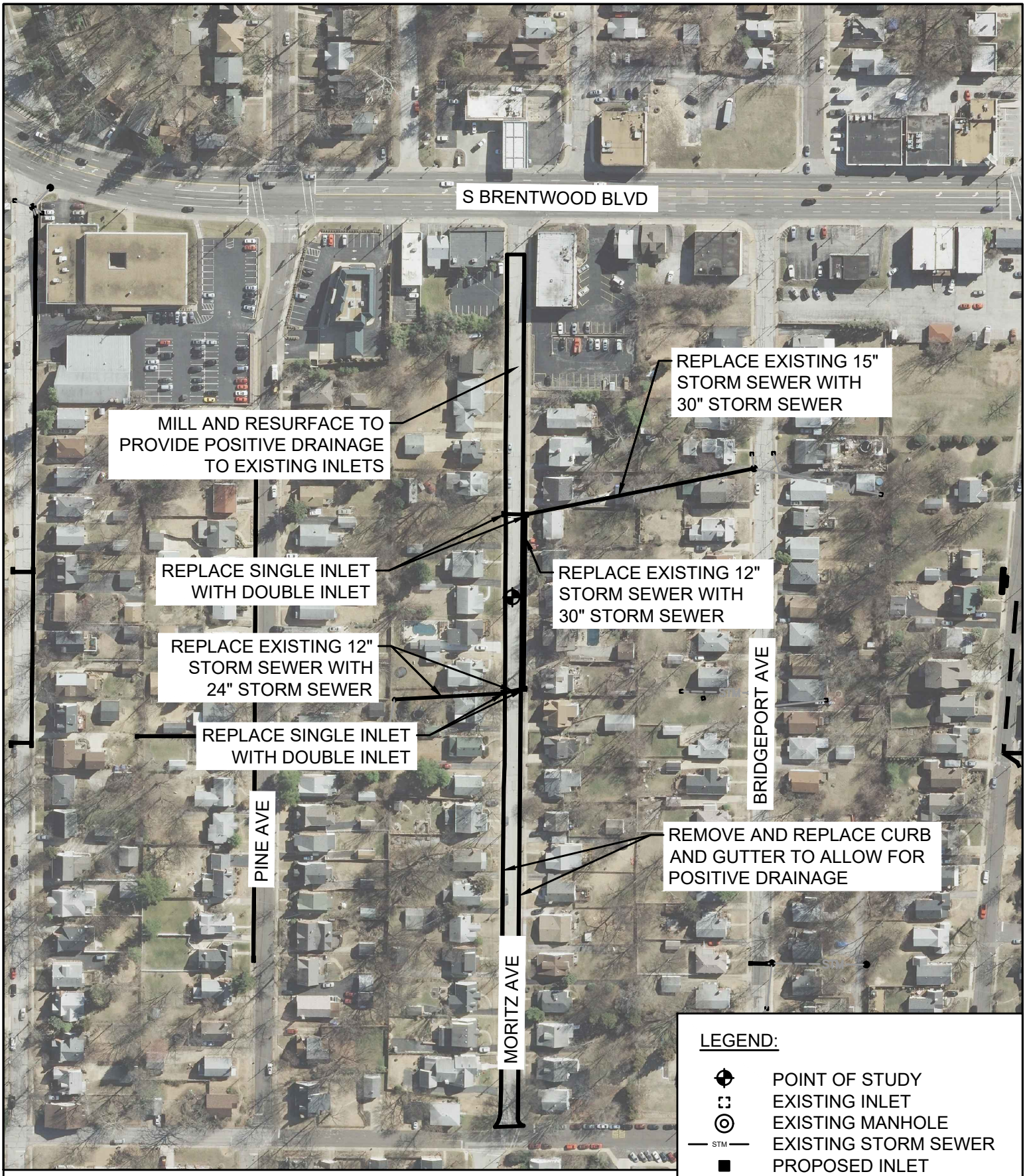

FIGURE #
4-40

MORITZ AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD

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OF AUTHORITY #2005038353

4.41 Site 41: 9144 Pine Avenue

4.41.1 Concerns:

Residents of Pine Avenue near the intersection with St. Clair Avenue have reported issues concerning the inlets located in front of 9144 Pine Avenue. They claim that water ponds before entering the inlets and backs up to the street.

4.41.2 Observations:

Two curb inlets help convey stormwater from Pine Avenue near this address, and an area inlet located between 2020 St. Clair Avenue and 9143 Pine Avenue collects runoff from properties to the north. During field investigations it was noted that all three inlets have been plugged and retain water.

The longitudinal slope near the inlets and elevated pavement adjacent to the inlet throats seem to be restricting the rate at which water can drain. This causes water to pool in the flowline on either side of Pine Avenue.

After further investigation and coordination with MSD, it was determined that these inlets previously drained into a combined a sewer. However, after repeated backups and combined sewer overflows, it was decided that capping the inlets would be beneficial until a CSO could be constructed. The construction of this project would involve a new relief storm sewer in this area. Additional coordination with MSD is required to determine the timeline for implementation of these improvements.

4.41.3 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-41. Drainage patterns flow towards the inlets adjacent to 9144 Pine Avenue from properties and pavement between St. Clair Avenue to 9108 Pine Avenue. The yard inlet collects water from properties along St. Clair Avenue and Lawn Avenue from the north. The total drainage area contributing to these inlets is approximately 4.4 acres. The design storm peak flow to the depression is calculated at 13.3 cfs.

4.41.4 Preliminary Improvement Recommendation:

Based on the fact that MSD is planning a capital improvement project in the area that will provide a relief storm sewer, the preliminary recommendation has considered the drainage area contributing to the stormwater collecting at the area of concern and these recommendations assume that the relief sewer has already been constructed.

It is recommended that new inlets and storm pipes be constructed in this area. These inlets and storm sewers will discharge into the CSO project being planned for this area. The proposed changes would also allow for positive drainage and additional capacity with improved inlet throats. The layout and sizes of these improvements has been included in Figure 4-41.

4.41.5 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits. It is unclear whether or not easements would be required. At a minimum, coordination with the property owner is recommended.

4.41.6 Opinion of Probable Cost:

The opinion of probable construction cost is $87,010 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.41.7 Priority Ranking:

The efficiency ranking factor for this site is 48.34. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.41.8 Site Photos:

Representative photos are provided below.

LEGEND:

- POINT OF STUDY
- EXISTING INLET
- EXISTING MANHOLE
- STM — EXISTING STORM SEWER
- PROPOSED INLET
- PROPOSED MANHOLE
- PROPOSED PIPE
- PIPE INLET/OUTFALL
- SWALE/DITCH FLOWLINE

N

SCALE: 1" = 30'

0' 30' 60'

FIGURE #
4-41

9144 PINE AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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4.42 Site 42: 8837 White Avenue

4.42.1 Concerns:

The resident at 8837 White Avenue has been concerned with the standing water where the driveway apron meets White Avenue. The existing concrete apron and sidewalk hold a substantial amount of stormwater after rain events.

4.42.1 Observations:

Based on conversations, the resident that is planning to move to 8837 White Avenue provided several pictures, which show examples of water pooling in the driveway apron, gutter, and sidewalk in front of the property.

Generally, stormwater in this area flows west along the curb of White Avenue until discharging into an inlet located near Hill Avenue. Most driveway aprons located between this inlet and Brentwood Boulevard are sloped to ensure that water can move freely through the gutter. It appears that the driveway apron and adjacent sidewalk have begun to sink, allowing water to settle and pool in the depressed area. The concrete apron offers no outlet, and the water remains until evaporation. There is no clear indication what could have caused the settlement of this driveway.

4.42.2 Drainage Characteristics:

A basin map is presented in Appendix B, as Figure B-42. Drainage areas from the east include runoff from properties along White Avenue, a portion of Brentwood Boulevard, and several commercial properties and parking lots located on Brentwood Boulevard. The contributing basin area to the driveway apron for 8837 White Avenue is approximately 1.3 acres. The design storm peak flow to the depression is calculated at 3.8 cfs.

4.42.3 Preliminary Improvement Recommendation:

Based on a hydraulic investigation, the stormwater infrastructure in the area is sufficient to handle the design storm. It is proposed that improvements to this site include removal and replacement of the existing driveway apron, adjacent sidewalk, and roadway pavement, as necessary, to allow for positive drainage. The proposed changes would allow stormwater to continue to flow along the curb until reaching the intended drainage systems. A layout of the preliminary recommendations is provided in Figure 4-42.

4.42.4 Property Characteristics:

The proposed improvements are located on roadway right-of-way and involve infrastructure located within the City limits, as well as portions of private property. It is unclear as to the ultimate cause of the issue or whether or not easements would be required.

4.42.5 Opinion of Probable Cost:

The opinion of probable construction cost is $5,310 for incorporating the recommendations at this site. Please note that this cost does not include engineering services, permit acquisition, and property acquisition as may be required.

4.42.6 Priority Ranking:

The efficiency ranking factor for this site is 35.40. The ranking of this site in comparison with each of the other sites is provided in Section 6.

4.42.7 Site Photos:

Representative photos are provided below.

FIGURE #
4-42

8837 WHITE AVE
SITE MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD
2348 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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OF AUTHORITY #2005038353

5. SECTION 5. Opinion of Probable Cost

An opinion of probable construction cost was developed for each of the 42 areas of concern studied in detail as part of this project. The preliminary estimate for each site includes a 30% contingency as utility conflicts, and other considerations that are determined during detailed design and have the potential to affect the final construction cost.

Table 5-1 summarizes the basic improvement recommendation and provides the opinion of probable construction cost for each of the locations. Detailed calculations for each site are provided in Appendix C. ***Please note that these costs do not include engineering services, permit acquisition, and property acquisition as may be required.***

Table 5-1: Opinion of Probable Cost Summary

Site #	Site Name	Opinion of Probable Cost
1	8 Southcote Rd.	$ 34,450.00
2	28 York Dr.	$ 30,340.00
3	5 & 6 Cricket Ln.	$ 39,390.00
4	York Village	$ 6,500.00
5	9433 Pine Ave.	$ 187,020.00
6	50 Whitehall Ct.	$ 580,660.00
7	98 & 99 Whitehall Ct.	$ 136,700.00
8	9402 White Ave.	$ 140,290.00
9	Parkridge Ave. & White Ave.	$ 125,230.00
10	St. Clair Ave. & White Ave.	$ 149,970.00
11	1501-1507 Swallow Dr.	$ 37,180.00
12	1723 Redbird Cv.	$ 18,590.00
13	9000 Wrenwood Ln.	$ 25,190.00
14	Lawn Ave.	$ 376,290.00
15	8922 Lawn Ave.	$ 75,960.00
16	Pine Ave.	$ 479,380.00
17	9000/9004 Bridgeport Ave.	$ 18,080.00
18	8908-8914 Bridgeport Ave.	$ 129,850.00
19	8830 Bridgeport Ave.	$ 27,680.00
20	16 Stratford Ln.	$ 49,820.00
21	24 Stratford Ln.	$ 15,080.00
22	2434 High School Dr.	$ 78,790.00
23	High School Dr.	$ 483,990.00
24	2726 Brentwood Blvd.	$ 394,640.00
25	2925 Brazeau Ave.	$ 154,180.00
26	9333 Parkside Ave.	$ 49,990.00
27	8703 Eulalie Ave.	$ 146,340.00
28	Laverne Ct.	Not Estimated
29	8547 Eulalie Ave.	$ 152,710.00
30	8624 Eulalie Ave.	$ 20,220.00
31	Barnstable Ct. & Salem Rd.	$ 192,170.00

32	**8637 Henrietta** Ave.	**$**	**14,380.00**
33	Mary Ave.	$	68,890.00
34	9212 Eager Rd.	$	11,440.00
35	2217 Parkridge Ave.	$	36,070.00
36	Louis Ave.	$	397,040.00
37	Harrison Ave.	$	109,940.00
38	9429 Sonora Ave.	$	27,140.00
39	Pine Ave. & Hatton Ln.	$	108,840.00
40	Moritz Ave.	$	880,640.00
41	9144 Pine Ave.	$	87,010.00
42	8837 White Ave.	$	5,310.00

6. SECTION 6. Priority Ranking Recommendations

Each project site was given a priority ranking. The priority ranking system used to assess each location was jointly developed between Gonzalez Companies and City of Brentwood staff.

6.1 Prioritization

A prioritization plan was developed to rank each of the locations identified by the City and its residents experiencing stormwater issues and was included in this study. These projects were ranked according to weighting factors determined through engineering standard practice and discussions with City staff.

6.1.1 Evaluation of Categories

The process of prioritizing the project locations were based on the following categories:

6.1.1.1 Erosion

Erosion is defined by transport and undermining of soil by stream flow or overland flow in such a manner the buildings and other structures are threatened. Such conditions are most notable along watercourses but may also result from overland flow eroding embankments. Erosion can be detected by field inspections, particularly during or immediately after a storm, and from reports of historical problems identified by residents and City staff. This category is given a weighting factor of 10.

6.1.1.2 Structure Flooding

Structure flooding is defined by the number of affected structures experiencing entry of overland flow into homes and other buildings. The flooding of a building is identified through field investigations, study of topographic maps, and complaints by residents. This category is given a weighting factor of 20.

6.1.1.3 Property Structure Damage

Damage to private property structures is categorized by proximity to structure and means of entry. The frequency of structure damage is identified through field investigation and resident complaints. This category is given a weighting factor of 30.

6.1.1.4 Obstruction of Traffic

Obstruction of traffic is defined by overtopping drainage structures and flooding streets in a manner that slows vehicles or forces motorists to select alternative routes. This category also applies to streets and utilities damaged by high flows. This category also includes conditions where poor drainage creates dangerous conditions due to icy or slippery conditions. Obstruction of traffic can be identified by field investigations, reviewing the City's maintenance records, inspecting topographic maps, resident complaints, and by computer modeling. This category is given a weighting factor of 20.

6.1.1.5 Property Ponding

Property ponding is defined by water standing in streets, or on public or private property for extended periods. Although it does not pose a threat to life or property, this condition is an inconvenience to motorists, pedestrians, and homeowners. Isolated ponding can be identified from field inspections after storm events, but reports and complaints from residents are often more helpful. This category is given a weighting factor of 10.

6.1.1.6 Cost per Resident Benefited

The cost per resident benefit is defined by the number of residents to benefit from the proposed improvement. This category can be identified through resident complaints. This category was applied to all project rankings.

6.1.2 Severity Multiplier

For each of the six evaluation categories described above, a multiplier is applied to quantify the severity of the stormwater issue. Table 6-1 summarizes the severity multiplier quantification categories used on this project.

Table 6-1: Severity Multiplier Summary

Multiplier	*Erosion*	*No. of Structures Flooding*	*Property Structure Damage*	*Obstruction of Traffic*	*Property Ponding/ Nuisance*
1	Localized	1 Buildings	Water on property, not near home	Stays within infrastructure (gutters, pipes, inlets) and drains as designed	Water stays confined to drainage ways
2	Loss of Yard	2 Buildings	Near home, no entry	Localized ponding around drainage structures, during storm event	Creates standing water > than 2 Hours
3	Damage to property	3 Buildings	Water in home, through walls, etc. (walkout basement)	Overtopping roadway pavement, residents have secondary access to property	Creates standing water > than 1/2 Day
4	Structural Stability	>4 Buildings	Water in home, through doors, windows, etc. (non-walkouts)	Overtopping roadway pavement, residents have NO secondary access to property	Creates standing water > than 1 Day

6.1.3 Stormwater Priority Rating Form

The Stormwater Priority Rating Form was used to prioritize each recommended improvement. Figure 6-1, attached, shows an example rating form. The first step in completing the form is to identify the applicable flooding categories listed on the form and described above, and then to assign the number of occurrences under each category. The weighting factors remain constant. The number of occurrences for each category was based on the historical data gathered during the public meeting, review of City records, and completed resident surveys.

Figure 6-1

Stormwater Ranking Form					
City of Brentwood - Stormwater Management Plan					
Project Location:					
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurances	0.00	0.00	0.00	0.00	0.00
Frequency Factor	0.0	0.0	0.0	0.0	0.0
Severity					
Severity Multiplier	0	0	0	0	0
Frequency Factor	0.00	0.00	0.00	0.00	0.00
Sum of Severity Factors:	0.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	0				
Benefit Factor:	0.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	0				
Funding Factor:	0.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	0.00				
Probable Cost of Improvement	$0				
ERF		**0**			

For each category, a Severity Factor is computed as the product of the Frequency Factor and the Severity Multiplier. The sum of the Severity Factors is then multiplied by a Source Factor. The sum of the Source Factor is then multiplied by a Benefits Factor. The Benefits Factor is then multiplied by a Funding Factor.

The Efficiency Rating Factor (ERF) is compiled by dividing the probable cost of the improvement by the Overall Benefit Factor. The resulting ERF forms the basis for the prioritization plan. The lower the ERF, the more efficient the product should be with respect to consequences remediation and cost. Therefore, the project with the lowest ERF is given the highest priority.

6.2 Site Classification

The City of Brentwood requested that Gonzalez Companies classify each site studied in this report as Public, Private, or Combination. A description of each classification is provided below:

- **Public:** Sites with capacity issues related to undersized storm sewer infrastructure, erosion issues related to discharge from outfalls, issues related to City performed grading modifications, or other issues within City right-of-way.
- **Private:** Sites where issues were related to privately installed infrastructure, private grading modifications, or lack of maintenance by private owners.
- **Combination:** Sites exhibiting a mixture of the public and private classifications described above.

Please note, a number of improvements recommended for public sites may need to occur on private property. Property owners may be required to grant the City temporary or permanent easements to facilitate construction and maintenance of the recommended improvements.

6.3 Priority Ranking Results

Table 6-2 summarizes the results of the Priority Rankings for locations classified as public in order by calculated priority. Table 6-3 summarizes the results of the Priority Rankings for locations classified as combination order by calculated priority. Table 6-4 summarizes the results of the Priority Rankings for locations classified as private. A ranking sheet for each site is provided in Appendix D.

Table 6-2: Priority Ranking Recommendations (Combination Site Classification Only)

Site #	Responsibility	Cost Estimate	Site Name	Efficiency Rating	Rank
30	Combination	$ 20,220.00	8624 Eulalie Ave.	14.44	1
38	Combination	$ 27,140.00	9429 Sonora Ave.	27.14	2
20	Combination	$ 49,820.00	16 Stratford Ln.	76.65	3

Table 6-3: Priority Ranking Recommendations (Private Site Classification Only)

Site #	Responsibility	Cost Estimate	Site Name	Efficiency Rating	Rank
1	Private	$ 34,450.00	8 Southcote Rd.	10.07	1
12	Private	$ 18,590.00	1723 Redbird Cv.	16.03	2
11	Private	$ 37,180.00	1501-1507 Swallow Dr.	16.75	3
2	Private	$ 30,340.00	28 York Dr.	19.57	4
3	Private	$ 39,390.00	5 & 6 Cricket Ln.	20.52	5
21	Private	$ 15,080.00	24 Stratford Ln.	22.85	6
4	Private	$ 6,500.00	York Village	24.07	7
32	Private	$ 14,380.00	8637 Henrietta Ave.	26.15	8
34	Private	$ 11,440.00	9212 Eager Rd.	35.75	9
13	Private	$ 25,190.00	9000 Wrenwood Ln.	93.30	10
22	Private	$ 78,790.00	2434 High School Dr.	98.49	11
15	Private	$ 75,960.00	8922 Lawn Ave.	165.13	12
28	Private	Not Estimated	Laverne Ct.	Not Ranked	13

Table 6-4: Priority Ranking Recommendations (Public Site Classification Only)

Site #	Responsibility	Cost Estimate	Site Name	Efficiency Rating	Rank
19	Public	$ 27,680.00	8830 Bridgeport Ave.	10.81	1
17	Public	$ 18,080.00	9000/9004 Bridgeport Ave.	11.44	2
16	Public	$ 479,380.00	Pine Ave.	14.54	3
26	Public	$ 49,990.00	9333 Parkside Ave.	22.22	4
35	Public	$ 36,070.00	2217 Parkridge Ave.	24.05	5
23	Public	$ 483,990.00	High School Dr.	24.20	6
25	Public	$ 154,180.00	2925 Brazeau Ave.	25.70	7
14	Public	$ 376,290.00	Lawn Ave.	32.16	8
33	Public	$ 68,890.00	Mary Ave.	34.45	9
27	Public	$ 146,340.00	8703 Eulalie Ave.	34.84	10
42	Public	$ 5,310.00	8837 White Ave.	35.40	11
9	Public	$ 125,230.00	Parkridge Ave. & White Ave.	37.95	12
5	Public	$ 187,020.00	9433 Pine Ave.	41.56	13
18	Public	$ 129,850.00	8908-8914 Bridgeport Ave.	44.47	14
31	Public	$ 192,170.00	Barnstable Ct. & Salem Rd.	48.04	15
41	Public	$ 87,010.00	9144 Pine Ave.	48.34	16
40	Public	$ 880,640.00	Moritz Ave.	48.92	17
8	Public	$ 140,290.00	9402 White Ave.	62.35	18
10	Public	$ 149,970.00	St. Clair Ave. & White Ave.	66.65	19
37	Public	$ 109,940.00	Harrison Ave.	81.44	20
39	Public	$ 108,840.00	Pine Ave. & Hatton Ln.	120.93	21
36	Public	$ 397,040.00	Louis Ave.	128.49	22
24	Public	$ 394,640.00	2726 Brentwood Blvd.	131.55	23
6	Public	$ 580,660.00	50 Whitehall Ct.	175.96	24
29	Public	$ 152,710.00	8547 Eulalie Ave.	203.61	25
7	Public	$ 136,700.00	98 & 99 Whitehall Ct.	227.83	26

APPENDIX A

SWID Permit Process Flow Chart

SWID PERMIT PROCESS

APPLICABLE PERMITS:

- BUILDING PERMIT NEW (C)
- BUILDING PERMIT NEW (R)
- BUILDING ADDITION (C)
- BUILDING ADDITION (R)
- ACCESSORY RETAINING WALL
- BRENTWOOD FOREST DECK PERMIT (R)
- DECK PERMIT (R)
- GRADING PERMIT
- POOL PERMIT (R)
- SHED PERMIT (R)
- STREET EXCAVATION / CURB CUT PERMIT
- BUILDING PERMIT (R) COMBO

APPLICATION FOR PERMIT VIA MYGOV

DONE

NO SWID PERMIT NEEDED

LESS THAN 200 SQ FT

MSD REVIEW

DISTURBANCE GREATER THAN 1 ACRE

CITY REVIEW FOR NET IMPERVIOUS AREA

GREATER THAN 200 SQ FT

CITY NOTIFIES APPLICANT OF SWID PERMIT REQUIREMENT VIA MYGOV AND SETS DEPOSIT / FEE

LESS THAN 500 SQ FT	*GREATER THAN 500 SQ FT*
$500+110% (NET IMPERVIOUS)	*$1,000+110% (NET IMPERVIOUS)*

APPLICANT PAYS DEPOSIT / FEE, UPLOADS REQUIRED SUBMITTAL DOCUMENTS AND REQUESTS REVIEW

SITE PLAN AND BOUNDARY SURVEY

CITY APPROVES DEPOSIT AND MOVES PROCESS TO "PLAN REVIEW"

CITY STORMWATER CONSULTANT, GONZALEZ, CONDUCTS REVIEW OF SUBMITTAL DOCUMENTS

APPLICANT REVISES DRAWINGS, THEN REQUESTS A RE-REVIEW
MORE THAN TWO REVIEWS WILL REQUIRE AN ADDITIONAL FEE

DENIED

PLAN REVIEW APPROVED

CITY ISSUES SWID PERMIT

APPLICANT PROCEEDS WITH CONSTRUCTION

CONSTRUCTION IS COMPLETE: APPLICANT REQUESTS INSPECTION

APPLICANT MAKES CORRECTIVE ACTIONS

APPROVED

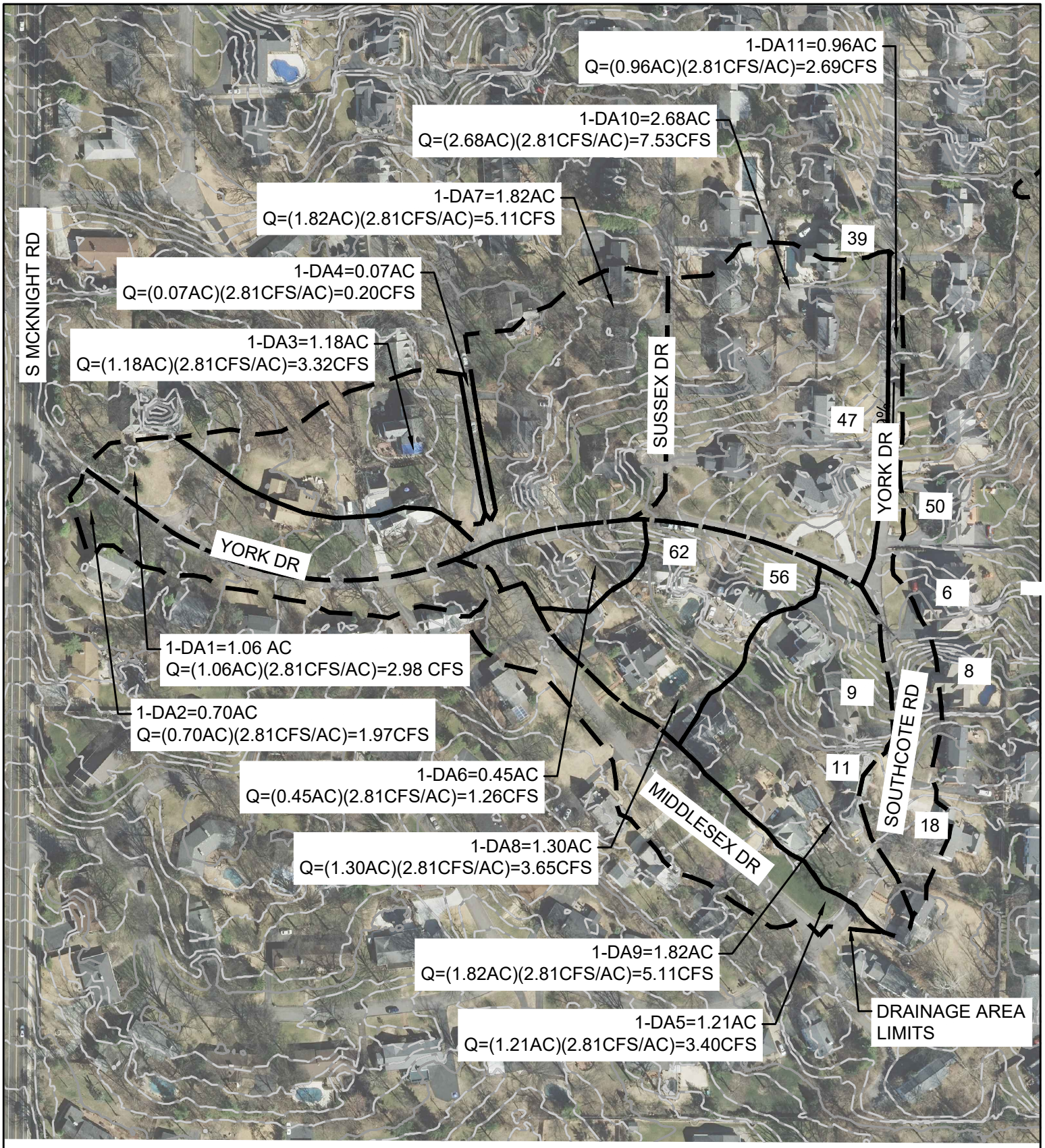
DENIED

DONE

DEPOSIT RELEASE

APPENDIX B

Drainage Basin Maps and Hydraulic Summary



TOTAL DRAINAGE AREA = 20.18 AC
TOTAL Q = 37.22 CFS

N

SCALE: 1" = 175'

0' 175 350

FIGURE # B-1

8 SOUTHCOTE RD.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
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MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

CONTRIBUTING DRAINAGE AREA
DA1 ROOF AREA = 1770 SF
DA2 ROOF AREA = 2277 SF
DA3 ROOF AREA = 1730 SF

SCALE: 1" = 40'
0' 40' 80' N

FIGURE # B-2

28 YORK DR.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
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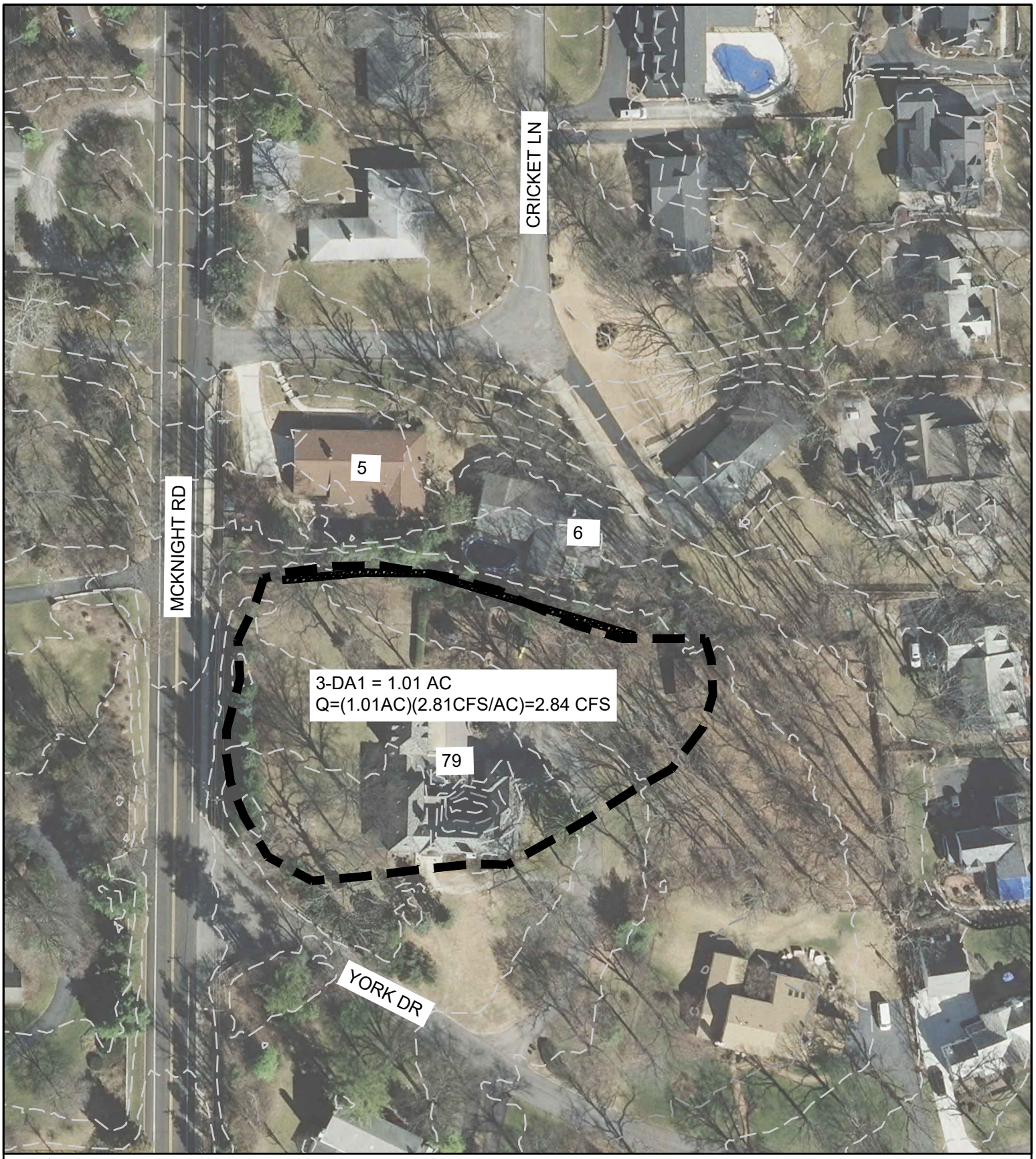
OF AUTHORITY #2005038353



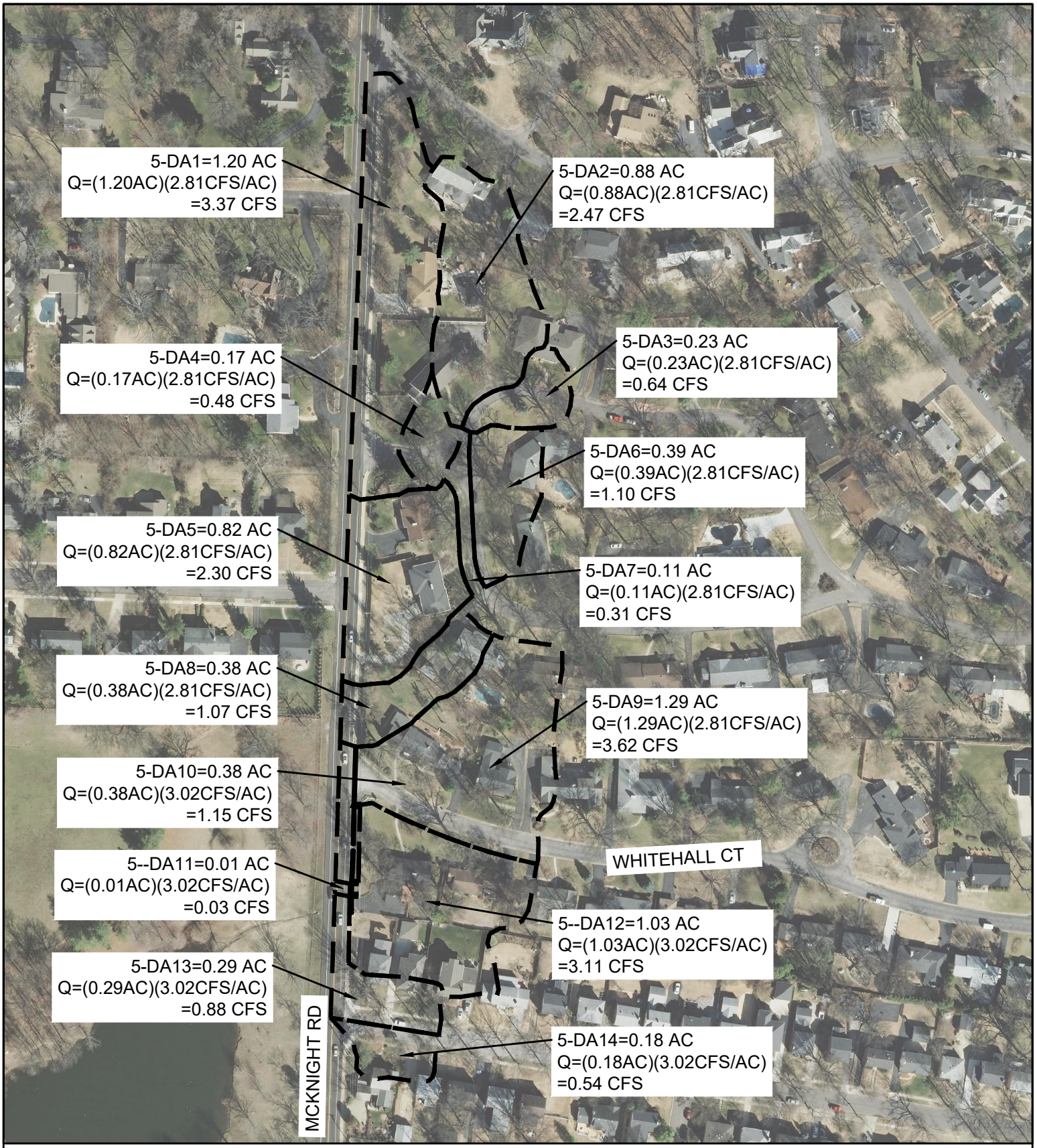
N

SCALE: 1" = 80'

0' 80' 160'

TOTAL DRAINAGE AREA = 1.01 AC
TOTAL Q = 2.84 CFS

FIGURE #						
B-3	5 & 6 CRICKET LN. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



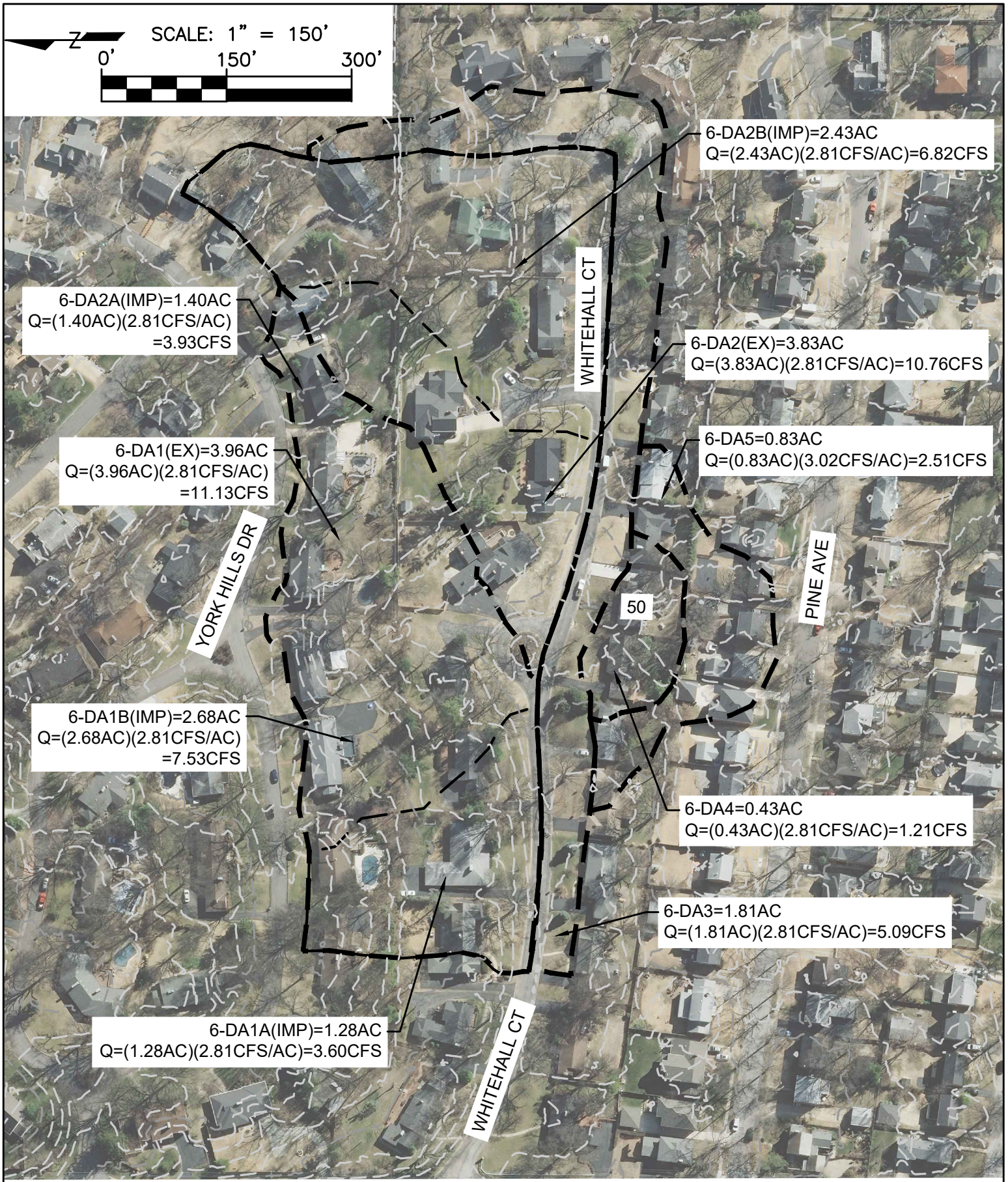
TOTAL DRAINAGE AREA = 9.43 AC
TOTAL Q = 21.07 CFS

SCALE: 1" = 175'

0' 175' 350'

N

FIGURE #						
B-5	9433 PINE AVE. (MCKNIGHT RD.) BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 10.86 AC
TOTAL Q = 30.70 CFS

FIGURE #						
B-6	50 WHITEHALL CT. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

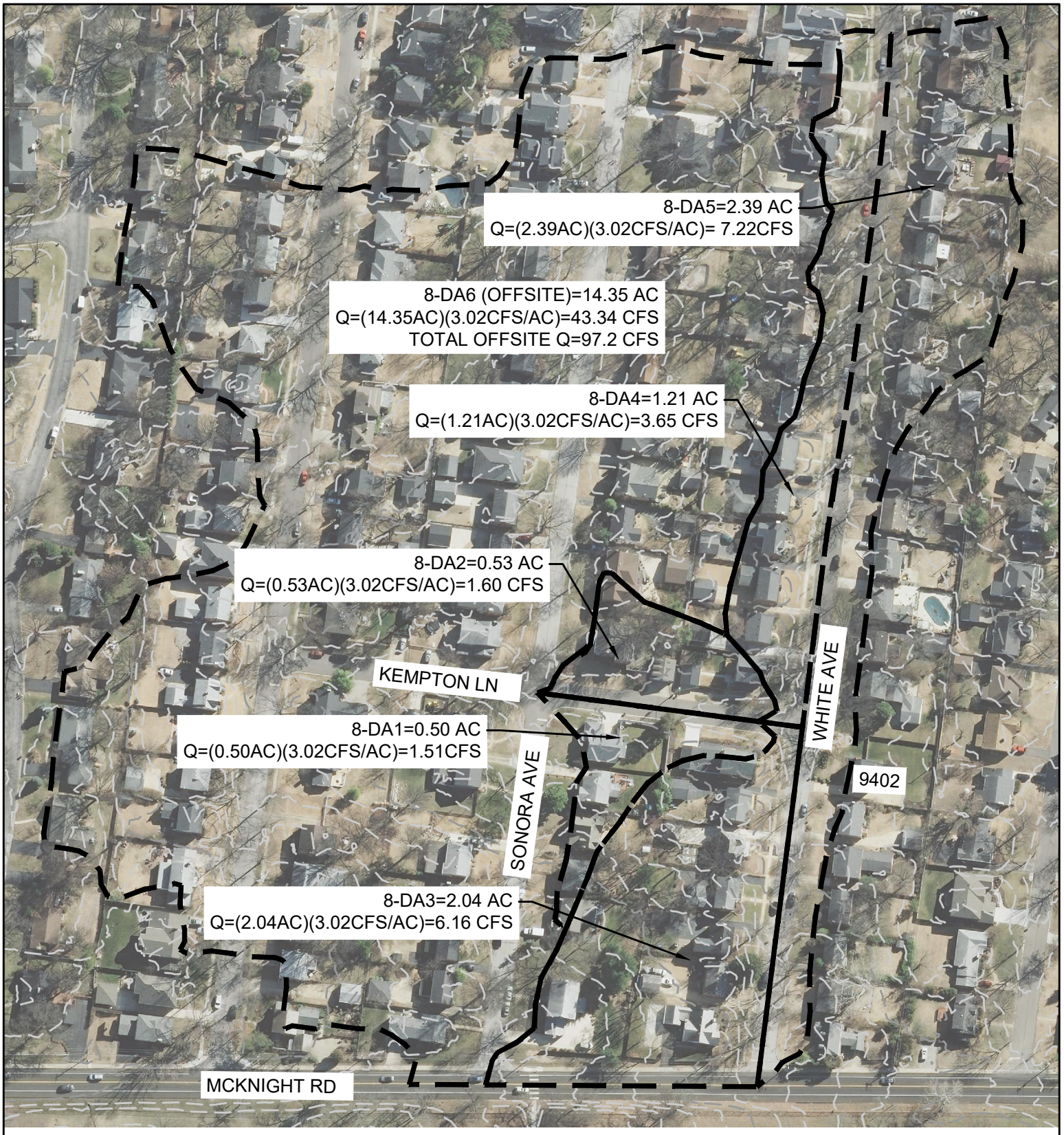
N

SCALE: 1" = 60'

0' 60' 120'

TOTAL DRAINAGE AREA = 0.52 AC
TOTAL Q = 1.57 CFS

FIGURE #						
B-7	98 & 99 WHITEHALL CT. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 6.67 AC
TOTAL Q = 20.14 CFS

INCLUDING OFFSITE:
TOTAL DRAINAGE AREA = 21.02 AC
TOTAL Q = 117.34 CFS

N

SCALE: 1" = 150'

0' 150' 300'

FIGURE #
B-8

9402 WHITE AVE.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
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SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA= 9.17 AC
TOTAL Q = 27.70 CFS

SCALE: 1" = 200'

0' 200' 400'

N

FIGURE #						
B-9	PARKRIDGE AVE. & WHITE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 11.1 AC
TOTAL Q = 33.6 CFS

N

SCALE: 1" = 200'

0' 200' 400'

FIGURE #						
B-10	ST. CLAIR AVE. & WHITE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 1.02 AC
TOTAL Q = 3.66 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #
B-11

1501-1507 SWALLOW DR.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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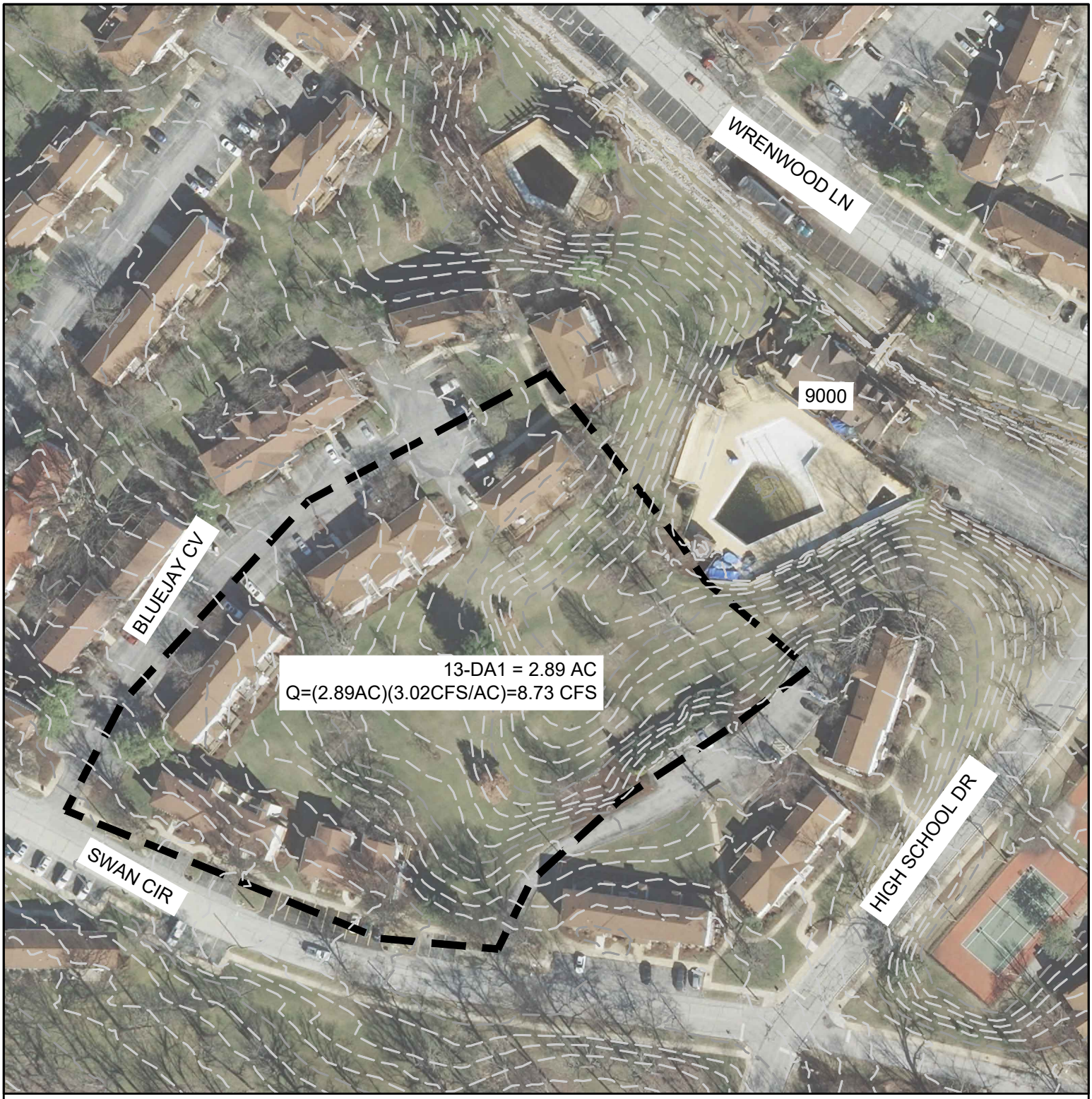
TOTAL DRAINAGE AREA = 0.26 AC
TOTAL Q = 1.10 CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-12	1723 REDBIRD CV. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 2.89 AC
TOTAL Q = 8.73 CFS

SCALE: 1" = 100'

0' 100' 200'

N

FIGURE #
4-13

9000 WRENWOOD LN.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF TRUTH

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
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gonzalez

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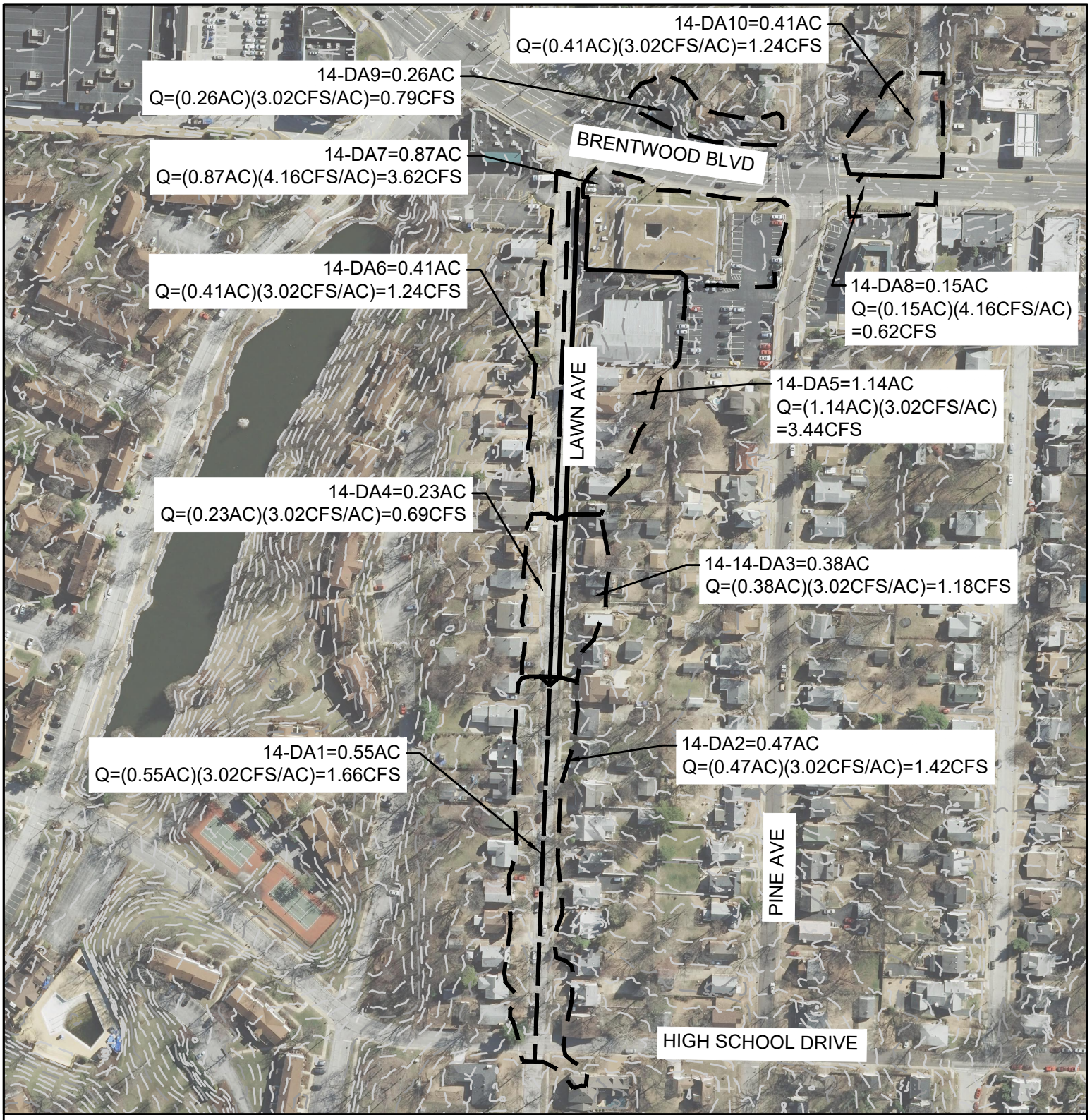
MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 4.87 AC
TOTAL Q = 14.7 CFS

SCALE: 1" = 200'

0' 200' 400'

N

FIGURE #						
B-14	LAWN AVE. (BNTWD BLVD. - HS DR.) BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF EXCELLENCE	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

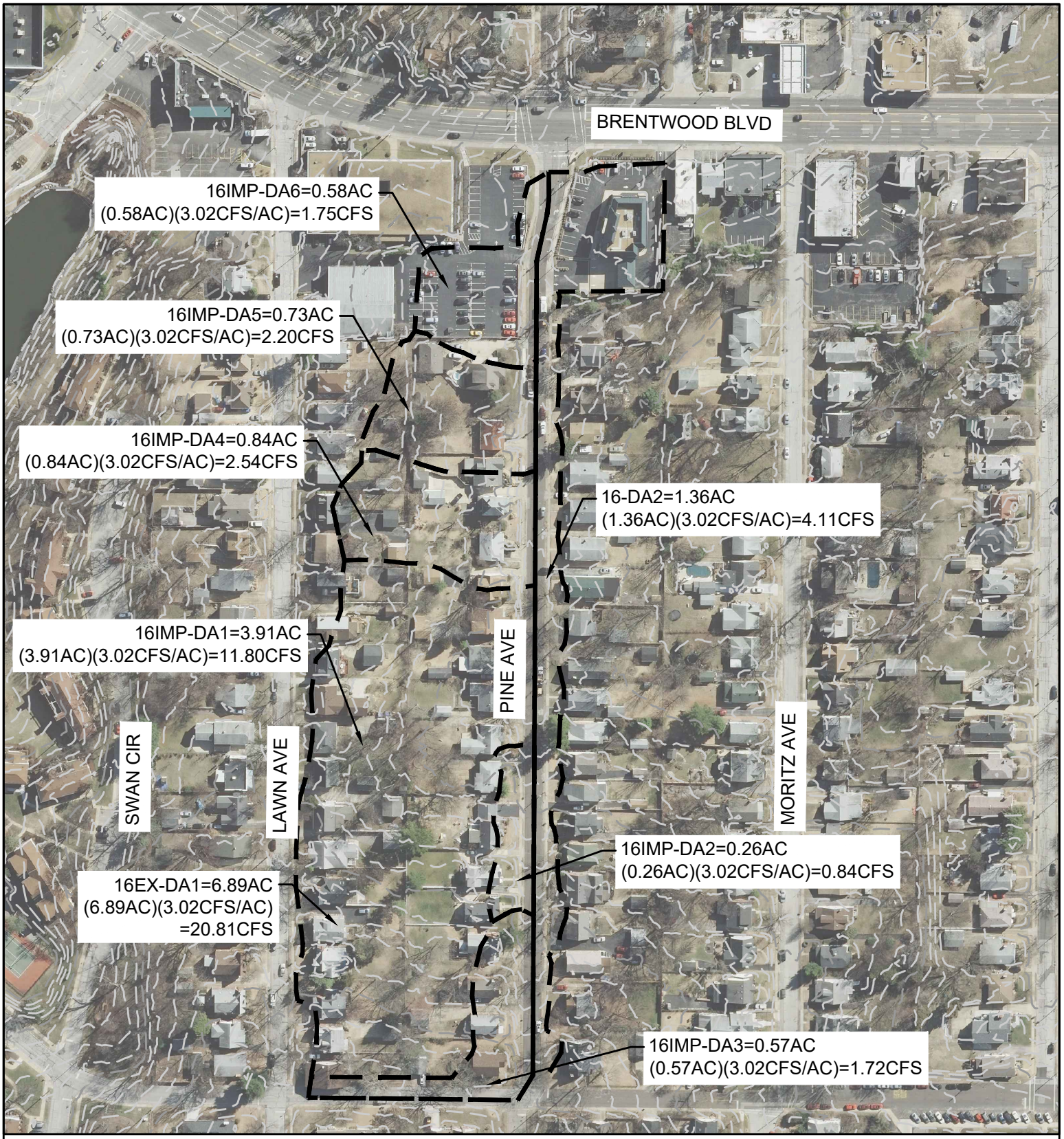
TOTAL DRAINAGE AREA = 0.25 AC
TOTAL Q = 0.85 CFS

SCALE: 1" = 40'

0' 40' 80'

N

FIGURE #						
B-15	8922 LAWN AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



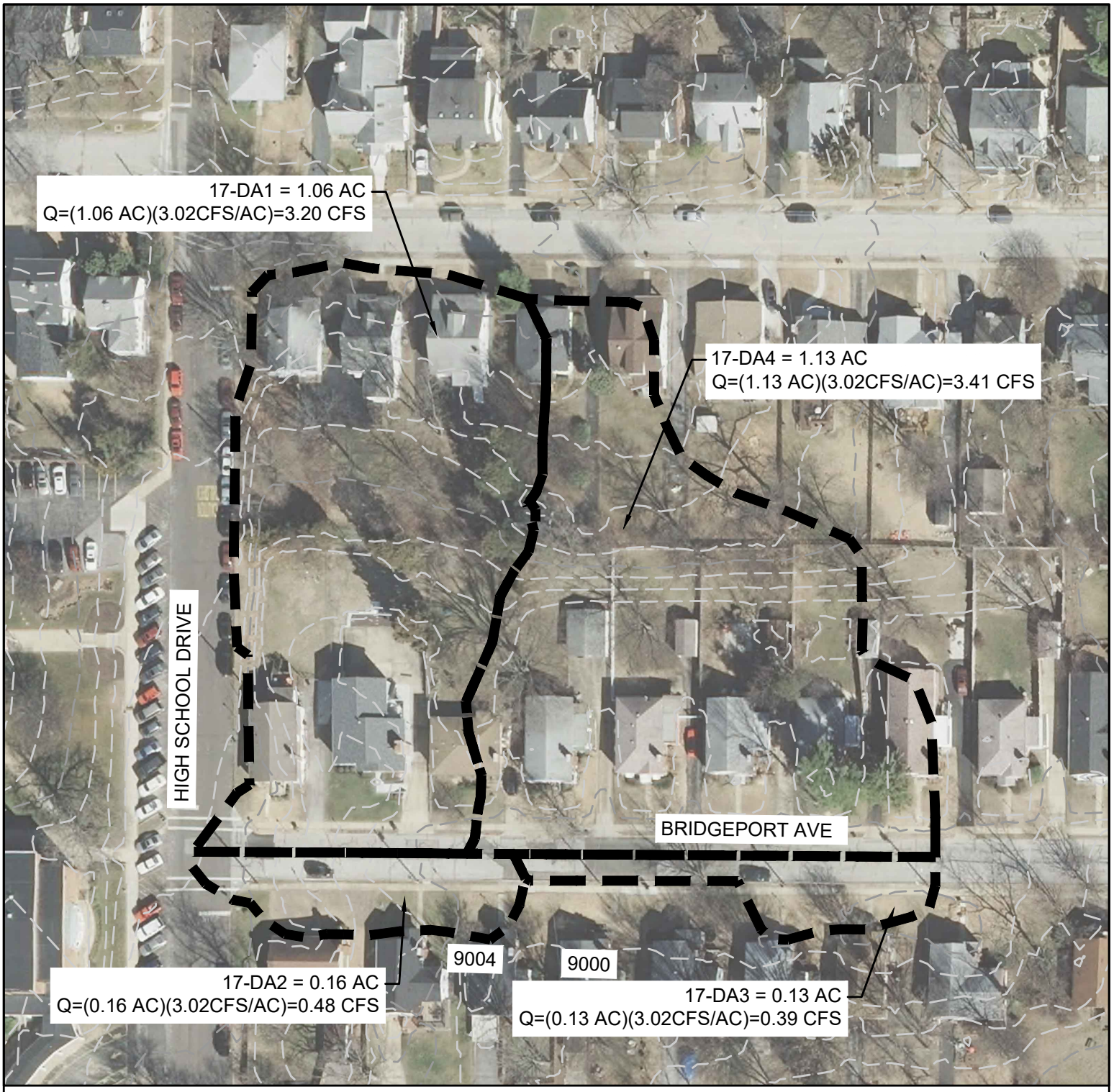
TOTAL DRAINAGE AREA= 8.25 AC
TOTAL Q = 24.9 CFS

SCALE: 1" = 175'

0' 175' 350'

N

FIGURE #						
B-16	PINE AVE. (BNTWD BLVD. - HS DR.) BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



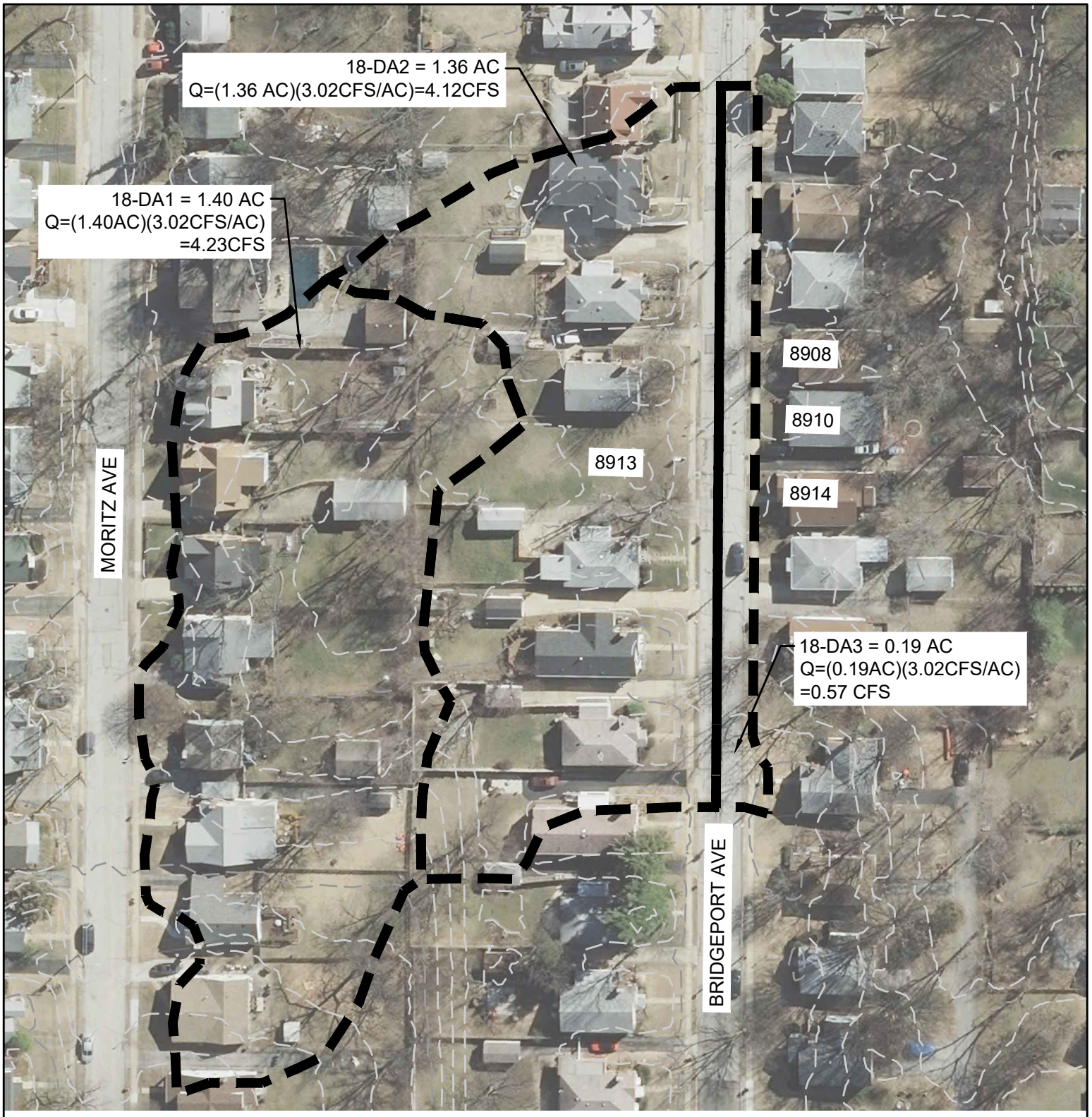
TOTAL DRAINAGE AREA = 2.48 AC
TOTAL Q = 7.49CFS

N

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
B-17	9000 & 9004 BRIDGEPORT AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DA: 2.82 AC
TOTAL Q: 8.52 CFS

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
B-18	8908-8914 BRIDGEPORT AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 3.23 AC
TOTAL Q = 9.76 CFS

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
4-19	8830 BRIDGEPORT AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 1.21 AC
TOTAL Q = 3.65CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-20	16 STRATFORD LN. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 0.15 AC
TOTAL Q = 0.45 CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-21	24 STRATFORD LN. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 7.23 AC
TOTAL Q = 21.83 CFS

N

SCALE: 1" = 175'

0' 175' 350'

FIGURE #						
B-22	2434 HIGH SCHOOL DR. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

N

SCALE: 1" = 175'

0' 175' 350'

TOTAL DRAINAGE AREA = 7.61 AC
TOTAL Q = 22.98CFS

FIGURE #						
B-23	HIGH SCHOOL DR. (MADGE AVE. - LTZ RD.) BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF EXCELLENCE	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 3.00 AC
TOTAL Q = 9.06 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #						
B-24	2726 BRENTWOOD BLVD. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

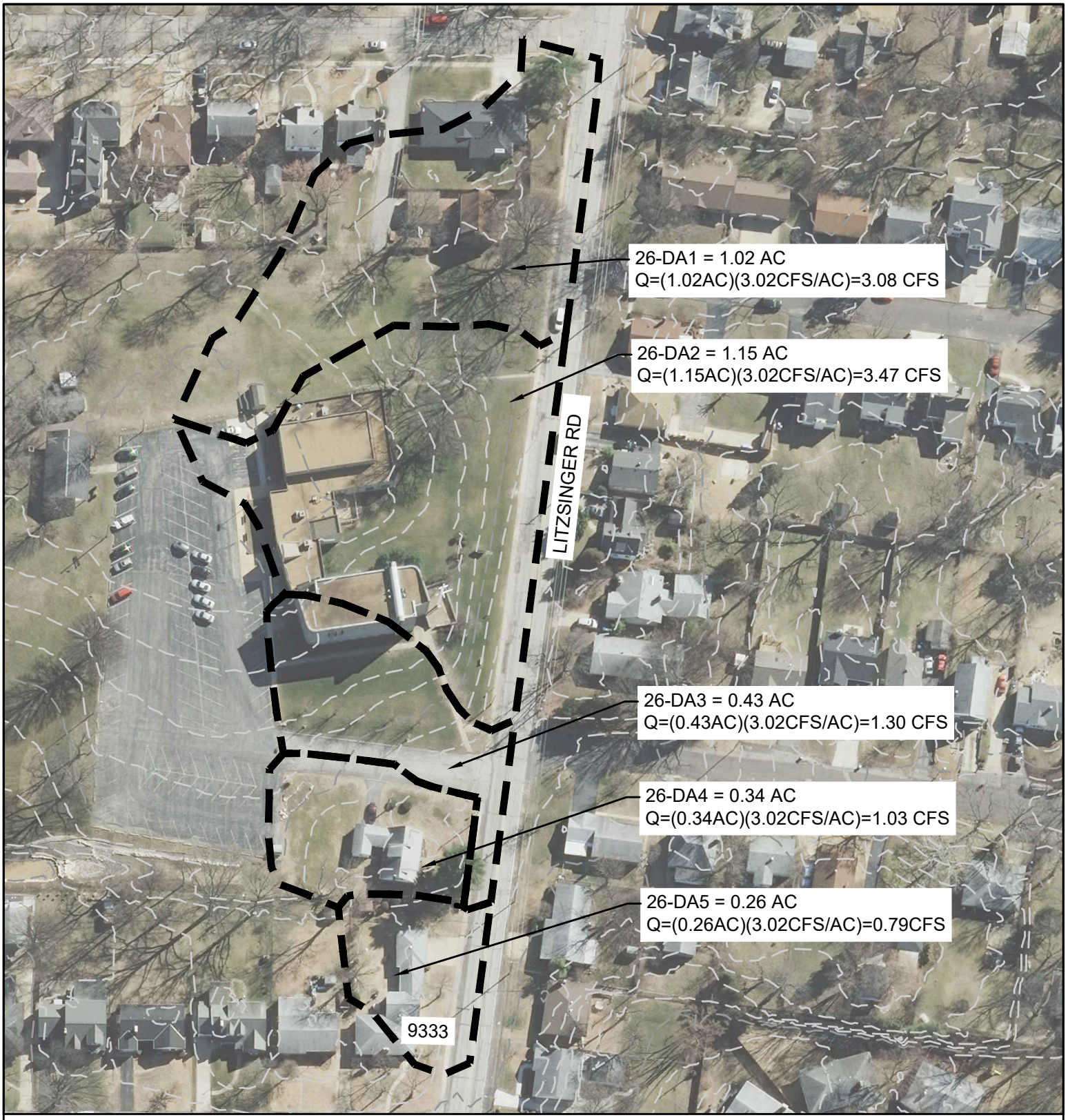
TOTAL DRAINAGE AREA = 0.75 AC
TOTAL Q = 2.27 CFS

N

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
B-25	2925 BRAZEAU AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 3.20 AC
TOTAL Q = 9.66 CFS

SCALE: 1" = 100'

0' 100' 200'

FIGURE #
B-26

9333 PARKSIDE AVE.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 3.84 AC
TOTAL Q = 11.6 CFS

N

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
B-27	8703 EULALIE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD CITY OF WARMTH	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 1.53 AC
TOTAL Q = 4.62 CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-28	LAVERNE CT. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 17.5 AC
TOTAL Q = 52.7 CFS

N

SCALE: 1" = 175'

0' 175' 350'

FIGURE #
B-29

8547 EULALIE AVE.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

gonzalez
GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 1.78 AC
TOTAL Q = 5.38 CFS

SCALE: 1" = 75'

0' 75' 150'

N

FIGURE #						
B-30	8624 EULALIE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 0.63 AC
TOTAL Q = 1.90 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #						
B-31	BARNSTABLE CT. & SALEM RD. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

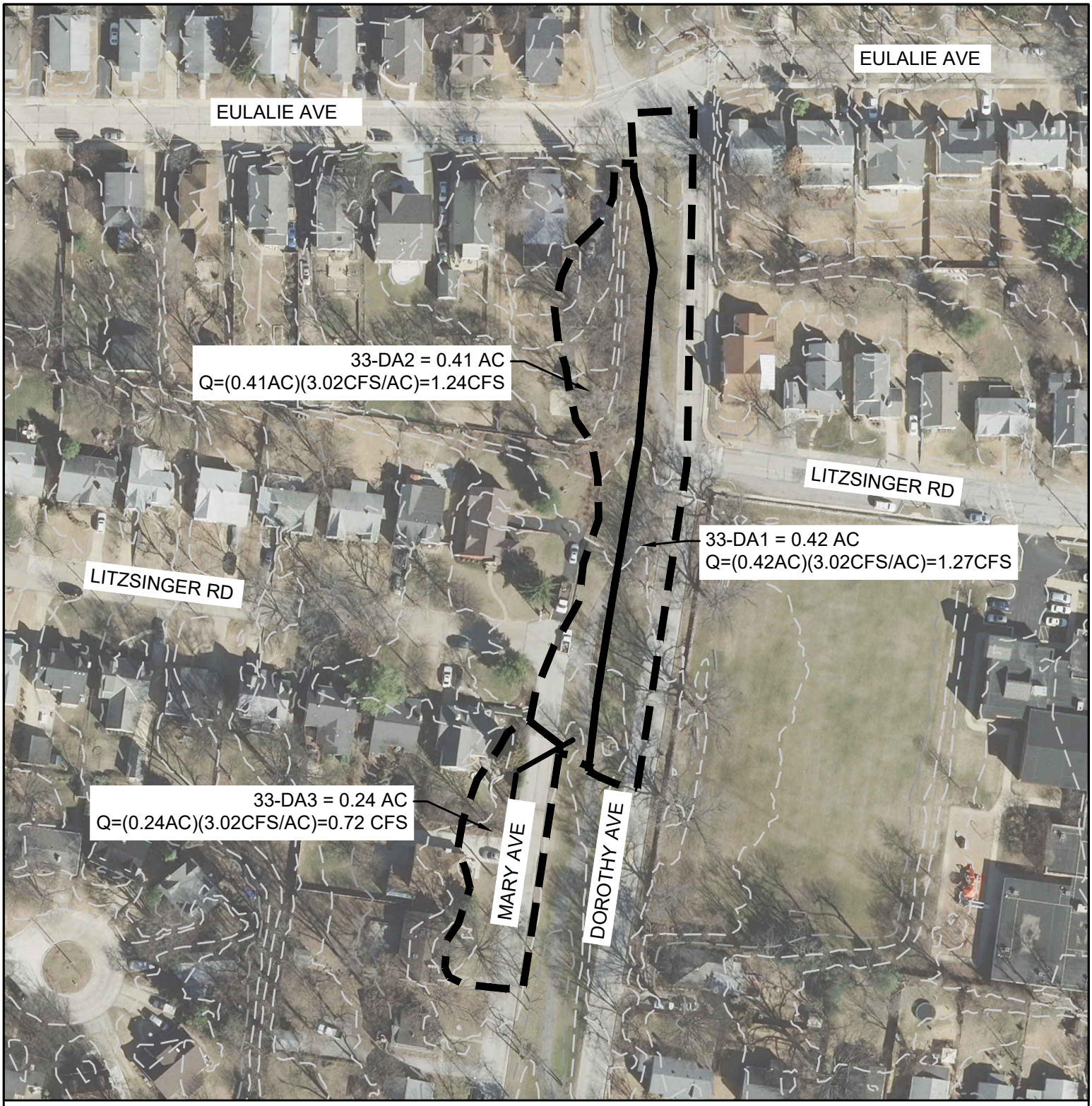
TOTAL DRAINAGE AREA = 3.96 AC
TOTAL Q = 11.96 CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-32	8637 HENRIETTA AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 1.07 AC
TOTAL Q = 3.23 CFS

N

SCALE: 1" = 100'

0' 100' 200'

FIGURE #						
B-33	MARY AVE. (FLORENCE TO LITZSINGER RD.) BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

N

SCALE: 1" = 125'

0' 125' 250'

TOTAL DRAINAGE AREA = 0.73 AC
TOTAL Q = 2.62 CFS

FIGURE #						
B-34	9212 EAGER RD. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 2.20 AC
TOTAL Q = 6.64 CFS

N

SCALE: 1" = 75'

0' 75' 150'

FIGURE #						
B-35	2217 PARKRIDGE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 4.01 AC
TOTAL Q = 12.1 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #

B-36

2441 LOUIS AVE.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

gonzalez
GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 3.59 AC
TOTAL Q = 10.84 CFS

SCALE: 1" = 175'

0' 175' 350'

N

FIGURE #						
B-37	8930 HARRISON AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

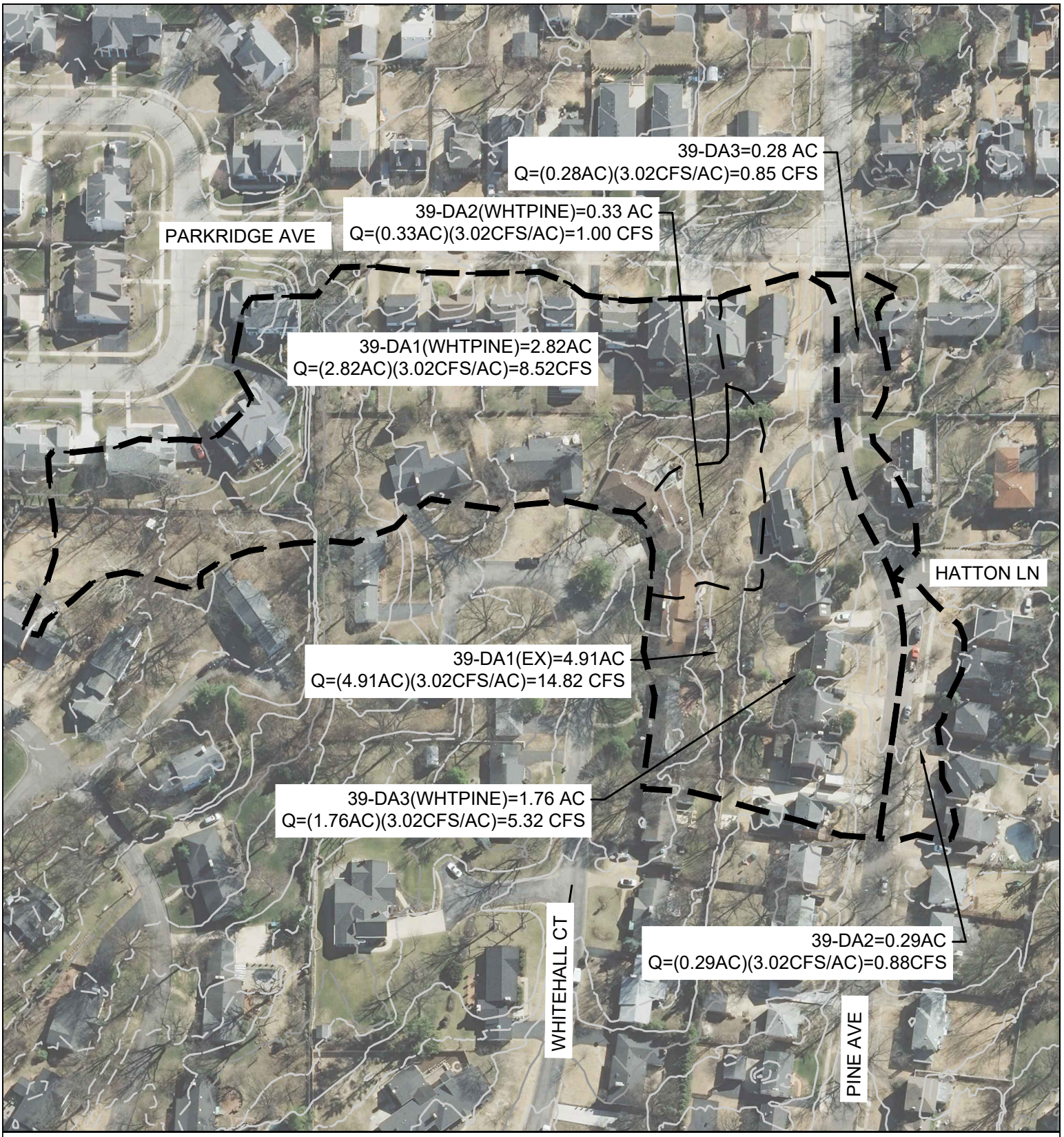
TOTAL DRAINAGE AREA = 0.26 AC
TOTAL Q = 0.79 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #						
B-38	9429 SONORA AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353



TOTAL DRAINAGE AREA = 5.48 AC
TOTAL Q = 16.55 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #
B-39

PINE AVE. & HATTON LN.
BASIN MAP

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE
OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 8.55 AC
TOTAL Q = 25.8 CFS

SCALE: 1" = 175'

0' 175' 350'

N

FIGURE #						
B-40	MORITZ AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 4.42 AC
TOTAL Q = 13.3 CFS

N

SCALE: 1" = 125'

0' 125' 250'

FIGURE #						
B-41	9144 PINE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

TOTAL DRAINAGE AREA = 1.27 AC
TOTAL Q = 3.84CFS

SCALE: 1" = 100'
0' 100' 200' N

FIGURE #						
B-42	8837 WHITE AVE. BASIN MAP	CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN ST. LOUIS COUNTY, MO	BRENTWOOD	CITY OF BRENTWOOD 2438 BRENTWOOD BOULEVARD ST. LOUIS, MISSOURI 63144 PHONE: (314) 962-4800 WWW.BRENTWOODMO.ORG	gonzalez	GONZALEZ COMPANIES, LLC 1750 BRENTWOOD BOULEVARD SUITE 700 ST. LOUIS, MISSOURI 63144 PHONE: (314) 961-1888 WWW.GONZALEZCOS.COM MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

APPENDIX C

Opinion of Probable Cost Calculations

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 1 - 8 Southcote Rd.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 2,400.00	$ 2,400.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	DRY WELL	LS	1	$ 5,000.00	$ 5,000.00
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 2,500.00	$ -
	Preliminary Estimated Construction Cost				$ 26,500.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 34,450.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 2 - 28 York Dr.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 2,100.00	$ 2,100.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	RAIN GARDEN	SF	1,062.00	$ 20.00	$ 21,240.00
25	MISC. REMOVAL	LS	-	$ 1,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	-	$ 2,500.00	$ -
28	TRAFFIC CONTROL	LS	-	$ 2,500.00	$ -
	Preliminary Estimated Construction Cost				$ 23,340.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 30,340.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 3 - 5 & 6 Cricket Ln.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 2,800.00	$ 2,800.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	FRENCH DRAIN	FT	225.00	$ 100.00	$ 22,500.00
25	MISC. REMOVAL	LS	-	$ 1,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1.00	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 2,500.00	$ -
	Preliminary Estimated Construction Cost				$ 30,300.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 39,390.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 4 - York Village
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 500.00	$ 500.00
2	12" STORM SEWER	LF		$ 143.00	$ -
3	15" STORM SEWER	LF		$ 149.00	$ -
4	18" STORM SEWER	LF		$ 160.00	$ -
5	24" STORM SEWER	LF		$ 171.00	$ -
6	30" STORM SEWER	LF		$ 187.00	$ -
7	PIPE UNDERDRAIN	LF		$ 77.00	$ -
8	SINGLE INLET	EA		$ 4,500.00	$ -
9	DOUBLE INLET	EA		$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA		$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA		$ 1,000.00	$ -
11	MANHOLE	EA		$ 4,000.00	$ -
12	INLET REMOVAL	EA		$ 2,000.00	$ -
13	PIPE REMOVAL	LF		$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY		$ 13.00	$ -
15	PAVEMENT REMOVAL	SY		$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY		$ 30.00	$ -
17	SIDEWALK REMOVAL	SF		$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF		$ 12.00	$ -
19	HMA PAVEMENT	TON		$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY		$ 85.00	$ -
21	PCC SIDEWALK	SF		$ 7.50	$ -
22	PCC CURB AND GUTTER	LF		$ 44.00	$ -
23	PCC GUTTER	LF		$ 44.00	$ -
24	MISC. STORMWATER BMP	LS	1.00	$ 4,500.00	$ 4,500.00
25	MISC. REMOVAL	LS		$ 1,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS		$ 2,500.00	$ -
27	SITE RESTORATION	LS		$ 2,000.00	$ -
28	TRAFFIC CONTROL	LS		$ 1,000.00	$ -
	Preliminary Estimated Construction Cost				$ 5,000.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 6,500.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 5 - 9433 Pine Ave. (McKnight Rd.)
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 13,100.00	$ 13,100.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	225	$ 171.00	$ 38,475.00
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	3	$ 6,600.00	$ 19,800.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	4	$ 1,000.00	$ 4,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	3	$ 2,000.00	$ 6,000.00
13	PIPE REMOVAL	LF	225	$ 80.00	$ 18,000.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	78	$ 20.00	$ 1,560.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	56	$ 30.00	$ 1,680.00
17	SIDEWALK REMOVAL	SF	1,125	$ 4.00	$ 4,500.00
18	CURB AND GUTTER REMOVAL	LF	225	$ 12.00	$ 2,700.00
19	HMA PAVEMENT	TON	22	$ 225.00	$ 4,950.00
20	PCC DRIVEWAY PAVEMENT	SY	56	$ 85.00	$ 4,760.00
21	PCC SIDEWALK	SF	1,125	$ 7.50	$ 8,437.50
22	PCC CURB AND GUTTER	LF	225	$ 44.00	$ 9,900.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,500.00	$ 2,500.00
28	TRAFFIC CONTROL	LS	1	$ 2,500.00	$ 2,500.00
	Preliminary Estimated Construction Cost				$ 143,862.50
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 187,020.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 6 - 50 Whitehall Ct.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 40,600.00	$ 40,600.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	318	$ 160.00	$ 50,880.00
5	24" STORM SEWER	LF	292	$ 171.00	$ 49,932.00
6	30" STORM SEWER	LF	363	$ 187.00	$ 67,881.00
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	4	$ 6,600.00	$ 26,400.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	11	$ 1,000.00	$ 11,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	2	$ 2,000.00	$ 4,000.00
13	PIPE REMOVAL	LF	655	$ 80.00	$ 52,400.00
14	PAVEMENT SURFACE REMOVAL	SY	1,681	$ 13.00	$ 21,853.00
15	PAVEMENT REMOVAL	SY	56	$ 20.00	$ 1,120.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	33	$ 30.00	$ 990.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	525	$ 12.00	$ 6,300.00
19	HMA PAVEMENT	TON	204	$ 225.00	$ 45,900.00
20	PCC DRIVEWAY PAVEMENT	SY	33	$ 85.00	$ 2,805.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	525	$ 44.00	$ 23,100.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 15,000.00	$ 15,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 20,000.00	$ 20,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,500.00	$ 2,500.00
	Preliminary Estimated Construction Cost				$ 446,661.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 580,660.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 7 - 98 & 99 Whitehall Ct.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 9,600.00	$ 9,600.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	350	$ 77.00	$ 26,950.00
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	1,400	$ 4.00	$ 5,600.00
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	1,400	$ 40.00	$ 56,000.00
25	MISC. REMOVAL	LS	1	$ 2,000.00	$ 2,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 2,500.00	$ -
	Preliminary Estimated Construction Cost				$ 105,150.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 136,700.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 8 - 9402 White Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 9,800.00	$ 9,800.00
2	12" STORM SEWER	LF	55	$ 143.00	$ 7,865.00
3	15" STORM SEWER	LF	90	$ 149.00	$ 13,410.00
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	8	$ 1,000.00	$ 8,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	274	$ 80.00	$ 21,920.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	305	$ 20.00	$ 6,100.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	100	$ 4.00	$ 400.00
18	CURB AND GUTTER REMOVAL	LF	20	$ 12.00	$ 240.00
19	HMA PAVEMENT	TON	102	$ 225.00	$ 22,950.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	100	$ 7.50	$ 750.00
22	PCC CURB AND GUTTER	LF	20	$ 44.00	$ 880.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 2,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 1,000.00	$ 1,000.00
	Preliminary Estimated Construction Cost				$ 107,915.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 140,290.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 9 - Parkridge Ave. & White Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 8,800.00	$ 8,800.00
2	12" STORM SEWER	LF		$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	170.00	$ 160.00	$ 27,200.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	7	$ 1,000.00	$ 7,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	182	$ 80.00	$ 14,560.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	202	$ 20.00	$ 4,040.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	100	$ 4.00	$ 400.00
18	CURB AND GUTTER REMOVAL	LF	30	$ 12.00	$ 360.00
19	HMA PAVEMENT	TON	68	$ 225.00	$ 15,300.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	100	$ 7.50	$ 750.00
22	PCC CURB AND GUTTER	LF	30	$ 44.00	$ 1,320.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 1,000.00	$ 1,000.00
	Preliminary Estimated Construction Cost				$ 96,330.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 125,230.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 10 - St. Clair Ave. & White Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 10,500.00	$ 10,500.00
2	12" STORM SEWER	LF	30	$ 143.00	$ 4,290.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	195	$ 160.00	$ 31,200.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	2	$ 6,600.00	$ 13,200.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	8	$ 1,000.00	$ 8,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	2	$ 2,000.00	$ 4,000.00
13	PIPE REMOVAL	LF	194	$ 80.00	$ 15,520.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	180	$ 20.00	$ 3,600.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	100	$ 4.00	$ 400.00
18	CURB AND GUTTER REMOVAL	LF	30	$ 12.00	$ 360.00
19	HMA PAVEMENT	TON	61	$ 225.00	$ 13,725.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	100	$ 7.50	$ 750.00
22	PCC CURB AND GUTTER	LF	30	$ 44.00	$ 1,320.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,500.00	$ 2,500.00
28	TRAFFIC CONTROL	LS	1	$ 1,000.00	$ 1,000.00
	Preliminary Estimated Construction Cost				$ 115,365.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 149,970.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 11 - 1501-1057 Swallow Dr.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 2,600.00	$ 2,600.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 5,000.00	$ 5,000.00
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 15,000.00	$ 15,000.00
27	SITE RESTORATION	LS	1	$ 6,000.00	$ 6,000.00
28	TRAFFIC CONTROL	LS	-	$ 1,000.00	$ -
	Preliminary Estimated Construction Cost				$ 28,600.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 37,180.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 12 - 1723 Redbird Cv.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,300.00	$ 1,300.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,500.00	$ 2,500.00
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 7,500.00	$ 7,500.00
27	SITE RESTORATION	LS	1	$ 3,000.00	$ 3,000.00
28	TRAFFIC CONTROL	LS	-	$ 1,000.00	$ -
	Preliminary Estimated Construction Cost				$ 14,300.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 18,590.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 13 - 9000 Wrenwood Ln.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,800.00	$ 1,800.00
2	12" STORM SEWER	LF	10	$ 143.00	$ 1,430.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	1	$ 1,650.00	$ 1,650.00
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	GROUND WATER RELIEF PIT AND RIP RAP	LS	1	$ 7,500.00	$ 7,500.00
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 2,000.00	$ 2,000.00
27	SITE RESTORATION	LS	1	$ 3,000.00	$ 3,000.00
28	TRAFFIC CONTROL	LS	-	$ 1,000.00	$ -
	Preliminary Estimated Construction Cost				$ 19,380.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 25,190.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 14 - Lawn Ave. (Brentwood Blvd to Highschool Dr.)
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 26,300.00	$ 26,300.00
2	12" STORM SEWER	LF	756	$ 143.00	$ 108,108.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	4	$ 6,600.00	$ 26,400.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	53	$ 20.00	$ 1,060.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	147	$ 30.00	$ 4,410.00
17	SIDEWALK REMOVAL	SF	3,780	$ 4.00	$ 15,120.00
18	CURB AND GUTTER REMOVAL	LF	756.00	$ 12.00	$ 9,072.00
19	HMA PAVEMENT	TON	15	$ 225.00	$ 3,375.00
20	PCC DRIVEWAY PAVEMENT	SY	147	$ 85.00	$ 12,495.00
21	PCC SIDEWALK	SF	3,780	$ 7.50	$ 28,350.00
22	PCC CURB AND GUTTER	LF	756.00	$ 44.00	$ 33,264.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 4,000.00	$ 4,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 7,500.00	$ 7,500.00
28	TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
	Preliminary Estimated Construction Cost				$ 289,454.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 376,290.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 15 - 8922 Lawn Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 5,300.00	$ 5,300.00
2	12" STORM SEWER	LF	162	$ 143.00	$ 23,166.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	141	$ 30.00	$ 4,230.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	141	$ 85.00	$ 11,985.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 4,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 7,500.00	$ 7,500.00
28	TRAFFIC CONTROL	LS	1	$ 750.00	$ 750.00
	Preliminary Estimated Construction Cost				$ 58,431.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 75,960.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 16 - Pine Ave. (Brentwood Blvd. to Highschool Dr.)
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 33,500.00	$ 33,500.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	725	$ 149.00	$ 108,025.00
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	183	$ 171.00	$ 31,293.00
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	6	$ 6,600.00	$ 39,600.00
10	INLET TO BE ADJUSTED	EA	4	$ 1,650.00	$ 6,600.00
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	183	$ 80.00	$ 14,640.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	32	$ 20.00	$ 640.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	173	$ 30.00	$ 5,190.00
17	SIDEWALK REMOVAL	SF	3,625	$ 4.00	$ 14,500.00
18	CURB AND GUTTER REMOVAL	LF	908	$ 12.00	$ 10,896.00
19	HMA PAVEMENT	TON	9	$ 225.00	$ 2,025.00
20	PCC DRIVEWAY PAVEMENT	SY	173	$ 85.00	$ 14,705.00
21	PCC SIDEWALK	SF	3,625	$ 7.50	$ 27,187.50
22	PCC CURB AND GUTTER	LF	908	$ 44.00	$ 39,952.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 5,000.00	$ 5,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 7,500.00	$ 7,500.00
28	TRAFFIC CONTROL	LS	1	$ 7,500.00	$ 7,500.00
	Preliminary Estimated Construction Cost				$ 368,753.50
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 479,380.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 17 - 9000 & 9004 Bridgeport Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,300.00	$ 1,300.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	20	$ 160.00	$ 3,200.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	22	$ 20.00	$ 440.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	20	$ 12.00	$ 240.00
19	HMA PAVEMENT	TON	6	$ 225.00	$ 1,350.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	20	$ 44.00	$ 880.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 5,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 500.00	$ 500.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 13,910.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 18,080.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 18 - 8908-8914 Bridgeport Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 9,100.00	$ 9,100.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	158	$ 160.00	$ 25,280.00
5	24" STORM SEWER	LF	77	$ 171.00	$ 13,167.00
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	1	$ 1,650.00	$ 1,650.00
12	CONNECTION TO EXISTING INLET	EA	8	$ 1,000.00	$ 8,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	235	$ 80.00	$ 18,800.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	36	$ 20.00	$ 720.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	96	$ 30.00	$ 2,880.00
17	SIDEWALK REMOVAL	SF	50	$ 4.00	$ 200.00
18	CURB AND GUTTER REMOVAL	LF	50	$ 12.00	$ 600.00
19	HMA PAVEMENT	TON	10	$ 225.00	$ 2,250.00
20	PCC DRIVEWAY PAVEMENT	SY	96	$ 85.00	$ 8,160.00
21	PCC SIDEWALK	SF	50	$ 7.50	$ 375.00
22	PCC CURB AND GUTTER	LF	50	$ 44.00	$ 2,200.00
23	PCC GUTTER	LF		$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 2,500.00	$ 2,500.00
28	TRAFFIC CONTROL	LS	1	$ 1,000.00	$ 1,000.00
	Preliminary Estimated Construction Cost				$ 99,882.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 129,850.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 19 - 8830 Bridgeport Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,900.00	$ 1,900.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	2	$ 6,600.00	$ 13,200.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	2	$ 2,000.00	$ 4,000.00
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	50	$ 4.00	$ 200.00
18	CURB AND GUTTER REMOVAL	LF	20	$ 12.00	$ 240.00
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	50	$ 7.50	$ 375.00
22	PCC CURB AND GUTTER	LF	20	$ 44.00	$ 880.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 1,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	-	$ 2,500.00	$ -
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 21,295.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 27,680.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 20 - 16 Stratford Ln.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 3,500.00	$ 3,500.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY		$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	200	$ 20.00	$ 4,000.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	60	$ 30.00	$ 1,800.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	67	$ 225.00	$ 15,075.00
20	PCC DRIVEWAY PAVEMENT	SY	60	$ 85.00	$ 5,100.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	150	$ 44.00	$ 6,600.00
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 1,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 1,000.00	$ 1,000.00
28	TRAFFIC CONTROL	LS	1	$ 1,250.00	$ 1,250.00
	Preliminary Estimated Construction Cost				$ 38,325.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 49,820.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 21 - 24 Stratford Ln.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,100.00	$ 1,100.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,000.00	$ 2,000.00
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 7,500.00	$ 7,500.00
27	SITE RESTORATION	LS	1	$ 1,000.00	$ 1,000.00
28	TRAFFIC CONTROL	LS	-	$ 1,250.00	$ -
	Preliminary Estimated Construction Cost				$ 11,600.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 15,080.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 22 - 2434 High School Dr.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 5,500.00	$ 5,500.00
2	12" STORM SEWER	LF	249	$ 143.00	$ 35,607.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 5,000.00	$ 5,000.00
26	GRADING AND SHAPING OF DITCHES	LS		$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 1,250.00	$ -
	Preliminary Estimated Construction Cost				$ 60,607.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 78,790.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 23 - High School Dr.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 33,800.00	$ 33,800.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	3,951	$ 13.00	$ 51,363.00
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	328	$ 30.00	$ 9,840.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	2,540	$ 12.00	$ 30,480.00
19	HMA PAVEMENT	TON	443	$ 225.00	$ 99,675.00
20	PCC DRIVEWAY PAVEMENT	SY	328	$ 85.00	$ 27,880.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	2,540	$ 44.00	$ 111,760.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 5,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	-	$ 5,000.00	$ -
28	TRAFFIC CONTROL	LS	1	$ 7,500.00	$ 7,500.00
	Preliminary Estimated Construction Cost				$ 372,298.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 483,990.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 24 - 2726 Brentwood Blvd.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 27,600.00	$ 27,600.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	1,194	$ 160.00	$ 191,040.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	2	$ 4,500.00	$ 9,000.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	6	$ 4,000.00	$ 24,000.00
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	87	$ 20.00	$ 1,740.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	138	$ 30.00	$ 4,140.00
17	SIDEWALK REMOVAL	SF	80	$ 4.00	$ 320.00
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	24	$ 225.00	$ 5,400.00
20	PCC DRIVEWAY PAVEMENT	SY	138	$ 85.00	$ 11,730.00
21	PCC SIDEWALK	SF	80	$ 7.50	$ 600.00
22	PCC CURB AND GUTTER	LF	250	$ 44.00	$ 11,000.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 5,000.00	$ 5,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	1	$ 5,000.00	$ 5,000.00
	Preliminary Estimated Construction Cost				$ 303,570.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 394,640.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 25 - 2825 Brazeau Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 10,800.00	$ 10,800.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY		$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	900	$ 20.00	$ 18,000.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	300	$ 225.00	$ 67,500.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	450	$ 44.00	$ 19,800.00
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 5,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	-	$ 5,000.00	$ -
28	TRAFFIC CONTROL	LS	1	$ 2,500.00	$ 2,500.00
	Preliminary Estimated Construction Cost				$ 118,600.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 154,180.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 26 - 9333 Parkside Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 3,500.00	$ 3,500.00
2	12" STORM SEWER	LF	10	$ 143.00	$ 1,430.00
3	15" STORM SEWER	LF	8	$ 149.00	$ 1,192.00
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	2	$ 4,500.00	$ 9,000.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	100	$ 4.00	$ 400.00
18	CURB AND GUTTER REMOVAL	LF	30	$ 12.00	$ 360.00
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	100	$ 7.50	$ 750.00
22	PCC CURB AND GUTTER	LF	30	$ 44.00	$ 1,320.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 5,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 7,500.00	$ 7,500.00
27	SITE RESTORATION	LS	1	$ 7,500.00	$ 7,500.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 38,452.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 49,990.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 27 - 8703 Eulalie Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 10,200.00	$ 10,200.00
2	12" STORM SEWER	LF	337	$ 143.00	$ 48,191.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	2	$ 6,600.00	$ 13,200.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	267	$ 13.00	$ 3,471.00
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	27	$ 30.00	$ 810.00
17	SIDEWALK REMOVAL	SF	650	$ 4.00	$ 2,600.00
18	CURB AND GUTTER REMOVAL	LF	200	$ 12.00	$ 2,400.00
19	HMA PAVEMENT	TON	30	$ 225.00	$ 6,728.40
20	PCC DRIVEWAY PAVEMENT	SY	27	$ 85.00	$ 2,295.00
21	PCC SIDEWALK	SF	650	$ 7.50	$ 4,875.00
22	PCC CURB AND GUTTER	LF	200	$ 44.00	$ 8,800.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 5,000.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,000.00	$ 2,000.00
	Preliminary Estimated Construction Cost				$ 112,570.40
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 146,340.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 29 - 8547 Eulalie Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 10,700.00	$ 10,700.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	256	$ 171.00	$ 43,776.00
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	1	$ 1,650.00	$ 1,650.00
12	CONNECTION TO EXISTING INLET	EA	2	$ 1,000.00	$ 2,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	1	$ 2,000.00	$ 2,000.00
13	PIPE REMOVAL	LF	256	$ 80.00	$ 20,480.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	140	$ 30.00	$ 4,200.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	110	$ 12.00	$ 1,320.00
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	140	$ 85.00	$ 11,900.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	110	$ 44.00	$ 4,840.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,500.00	$ 2,500.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 117,466.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 152,710.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 30 - 8624 Eulaliea Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,400.00	$ 1,400.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	1	$ 1,650.00	$ 1,650.00
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 2,500.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 7,500.00	$ 7,500.00
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 500.00	$ -
	Preliminary Estimated Construction Cost				$ 15,550.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 20,220.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 31 - Barnstable Ct. & Salem Rd.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 13,400.00	$ 13,400.00
2	12" STORM SEWER	LF	563	$ 143.00	$ 80,509.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	2	$ 4,500.00	$ 9,000.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	3	$ 4,000.00	$ 12,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	272	$ 20.00	$ 5,440.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	91	$ 225.00	$ 20,475.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,000.00	$ 2,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,000.00	$ 2,000.00
	Preliminary Estimated Construction Cost				$ 147,824.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 192,170.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 32 - 8637 Henrietta Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,000.00	$ 1,000.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	44	$ 30.00	$ 1,320.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	44	$ 85.00	$ 3,740.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 2,500.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	-	$ 500.00	$ -
	Preliminary Estimated Construction Cost				$ 11,060.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 14,380.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 33 - Mary Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 4,800.00	$ 4,800.00
2	12" STORM SEWER	LF	135	$ 143.00	$ 19,305.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	1	$ 1,000.00	$ 1,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	50	$ 20.00	$ 1,000.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	165	$ 12.00	$ 1,980.00
19	HMA PAVEMENT	TON	14	$ 225.00	$ 3,150.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	165	$ 44.00	$ 7,260.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 500.00	$ 500.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 52,995.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 68,890.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 34 - 9212 Eager Rd.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 800.00	$ 800.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	1	$ 5,000.00	$ 5,000.00
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	-	$ 500.00	$ -
	Preliminary Estimated Construction Cost				$ 8,800.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 11,440.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 35 - 2217 Parkridge Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 2,500.00	$ 2,500.00
2	12" STORM SEWER	LF	40	$ 143.00	$ 5,720.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	25	$ 20.00	$ 500.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	9	$ 225.00	$ 2,025.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 3,000.00	$ 3,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 5,000.00	$ 5,000.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 27,745.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 36,070.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 36 - Louis Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 27,800.00	$ 27,800.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	798	$ 160.00	$ 127,680.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	2	$ 4,500.00	$ 9,000.00
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	6	$ 4,000.00	$ 24,000.00
12	INLET REMOVAL	EA	4	$ 2,000.00	$ 8,000.00
13	PIPE REMOVAL	LF	670	$ 80.00	$ 53,600.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	56	$ 20.00	$ 1,120.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	61	$ 30.00	$ 1,830.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	16	$ 225.00	$ 3,600.00
20	PCC DRIVEWAY PAVEMENT	SY	61	$ 85.00	$ 5,185.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 10,000.00	$ 10,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 25,000.00	$ 25,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,000.00	$ 2,000.00
	Preliminary Estimated Construction Cost				$ 305,415.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 397,040.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 37 - 8930 Harrison Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 7,700.00	$ 7,700.00
2	12" STORM SEWER	LF	116	$ 143.00	$ 16,588.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	3	$ 4,500.00	$ 13,500.00
9	DOUBLE INLET	EA	1	$ 6,600.00	$ 6,600.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	4	$ 2,000.00	$ 8,000.00
13	PIPE REMOVAL	LF	116	$ 80.00	$ 9,280.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	129	$ 20.00	$ 2,580.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	150	$ 4.00	$ 600.00
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	36	$ 225.00	$ 8,100.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	150	$ 7.50	$ 1,125.00
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,000.00	$ 2,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 2,000.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,500.00	$ 2,500.00
	Preliminary Estimated Construction Cost				$ 84,573.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 109,940.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 38 - 9429 Sonora Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 1,900.00	$ 1,900.00
2	12" STORM SEWER	LF	8	$ 143.00	$ 1,144.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	1	$ 4,500.00	$ 4,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	2	$ 1,000.00	$ 2,000.00
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	42	$ 30.00	$ 1,260.00
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	42	$ 85.00	$ 3,570.00
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 1,000.00	$ 1,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 1,000.00	$ 1,000.00
28	TRAFFIC CONTROL	LS	1	$ 500.00	$ 500.00
	Preliminary Estimated Construction Cost				$ 20,874.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 27,140.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 39 - Pine Ave. & Hatton Ln.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 7,600.00	$ 7,600.00
2	12" STORM SEWER	LF	30	$ 143.00	$ 4,290.00
3	15" STORM SEWER	LF	30	$ 149.00	$ 4,470.00
4	18" STORM SEWER	LF	100	$ 160.00	$ 16,000.00
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	3	$ 4,500.00	$ 13,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	155	$ 80.00	$ 12,400.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	172	$ 20.00	$ 3,440.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	-	$ 4.00	$ -
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	49	$ 225.00	$ 11,025.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	-	$ 7.50	$ -
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,500.00	$ 2,500.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 2,500.00	$ 2,500.00
	Preliminary Estimated Construction Cost				$ 83,725.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 108,840.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 40 - Moritz Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 61,600.00	$ 61,600.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	179	$ 171.00	$ 30,609.00
6	30" STORM SEWER	LF	559	$ 187.00	$ 104,533.00
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	4	$ 6,600.00	$ 26,400.00
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	2	$ 1,000.00	$ 2,000.00
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	4	$ 2,000.00	$ 8,000.00
13	PIPE REMOVAL	LF	738	$ 80.00	$ 59,040.00
14	PAVEMENT SURFACE REMOVAL	SY	3,467	$ 13.00	$ 45,071.00
15	PAVEMENT REMOVAL	SY	58	$ 20.00	$ 1,160.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	432	$ 30.00	$ 12,960.00
17	SIDEWALK REMOVAL	SF	1,200	$ 4.00	$ 4,800.00
18	CURB AND GUTTER REMOVAL	LF	2,400	$ 12.00	$ 28,800.00
19	HMA PAVEMENT	TON	405	$ 225.00	$ 91,125.00
20	PCC DRIVEWAY PAVEMENT	SY	432	$ 85.00	$ 36,720.00
21	PCC SIDEWALK	SF	1,200	$ 7.50	$ 9,000.00
22	PCC CURB AND GUTTER	LF	2,400	$ 44.00	$ 105,600.00
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 10,000.00	$ 10,000.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 30,000.00	$ 30,000.00
28	TRAFFIC CONTROL	LS	1	$ 10,000.00	$ 10,000.00
	Preliminary Estimated Construction Cost				$ 677,418.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 880,640.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 41 - 9144 Pine Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 6,100.00	$ 6,100.00
2	12" STORM SEWER	LF	99	$ 143.00	$ 14,157.00
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	3	$ 4,500.00	$ 13,500.00
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	1	$ 4,000.00	$ 4,000.00
12	INLET REMOVAL	EA	3	$ 2,000.00	$ 6,000.00
13	PIPE REMOVAL	LF	99	$ 80.00	$ 7,920.00
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	110	$ 20.00	$ 2,200.00
16	DRIVEWAY PAVEMENT REMOVAL	SY	-	$ 30.00	$ -
17	SIDEWALK REMOVAL	SF	50	$ 4.00	$ 200.00
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	31	$ 225.00	$ 6,975.00
20	PCC DRIVEWAY PAVEMENT	SY	-	$ 85.00	$ -
21	PCC SIDEWALK	SF	50	$ 7.50	$ 375.00
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	1	$ 2,500.00	$ 2,500.00
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 2,000.00	$ 2,000.00
28	TRAFFIC CONTROL	LS	1	$ 1,000.00	$ 1,000.00
	Preliminary Estimated Construction Cost				$ 66,927.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 87,010.00**

Engineer's Opinion of Probable Cost

Project: City of Brentwood Stormwater Management Plan
Site 42 - 8837 White Ave.
Location: St. Louis County, IL 63144
Engineer: Gonzalez Companies, LLC

Item No.	Description	Unit	Quantity	Cost Each	Total Cost
1	MOBILIZATION	LS	1	$ 400.00	$ 400.00
2	12" STORM SEWER	LF	-	$ 143.00	$ -
3	15" STORM SEWER	LF	-	$ 149.00	$ -
4	18" STORM SEWER	LF	-	$ 160.00	$ -
5	24" STORM SEWER	LF	-	$ 171.00	$ -
6	30" STORM SEWER	LF	-	$ 187.00	$ -
7	PIPE UNDERDRAIN	LF	-	$ 77.00	$ -
8	SINGLE INLET	EA	-	$ 4,500.00	$ -
9	DOUBLE INLET	EA	-	$ 6,600.00	$ -
10	INLET TO BE ADJUSTED	EA	-	$ 1,650.00	$ -
12	CONNECTION TO EXISTING INLET	EA	-	$ 1,000.00	$ -
11	MANHOLE	EA	-	$ 4,000.00	$ -
12	INLET REMOVAL	EA	-	$ 2,000.00	$ -
13	PIPE REMOVAL	LF	-	$ 80.00	$ -
14	PAVEMENT SURFACE REMOVAL	SY	-	$ 13.00	$ -
15	PAVEMENT REMOVAL	SY	-	$ 20.00	$ -
16	DRIVEWAY PAVEMENT REMOVAL	SY	6	$ 30.00	$ 180.00
17	SIDEWALK REMOVAL	SF	130	$ 4.00	$ 520.00
18	CURB AND GUTTER REMOVAL	LF	-	$ 12.00	$ -
19	HMA PAVEMENT	TON	-	$ 225.00	$ -
20	PCC DRIVEWAY PAVEMENT	SY	6	$ 85.00	$ 510.00
21	PCC SIDEWALK	SF	130	$ 7.50	$ 975.00
22	PCC CURB AND GUTTER	LF	-	$ 44.00	$ -
23	PCC GUTTER	LF	-	$ 44.00	$ -
24	PERMIABLE PAVERS	SF	-	$ 15.00	$ -
25	MISC. REMOVAL	LS	-	$ 2,500.00	$ -
26	GRADING AND SHAPING OF DITCHES	LS	-	$ 7,500.00	$ -
27	SITE RESTORATION	LS	1	$ 1,500.00	$ 1,500.00
28	TRAFFIC CONTROL	LS	-	$ 500.00	$ -
	Preliminary Estimated Construction Cost				$ 4,085.00
	Total Preliminary Estimated Construction Cost w/ 30% Contingency				**$ 5,310.00**

APPENDIX D

Priority Ranking Calculations

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #1 8 Southcote Rd.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	3.00	5.00
Frequency Factor	0.0	0.0	0.0	60.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	4
Frequency Factor	0.00	0.00	0.00	180.00	200.00
Sum of Severity Factors:	380.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	9				
Benefit Factor:	3,420.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	3,420.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	3,420.00				
Probable Cost of Improvement	$34,450				
Efficiency Rating Factor (ERF)		**10.07**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #2 28 York Drive

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	0.00	1.00	1.00	5.00
Frequency Factor	10.0	0.0	30.0	20.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	2	2	4
Frequency Factor	10.00	0.00	60.00	40.00	200.00
Sum of Severity Factors:	310.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	1,550.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,550.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,550.00				
Probable Cost of Improvement	$30,340				
Efficiency Rating Factor (ERF)		**19.57**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #3 5 & 6 Cricket Lane

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	1.00	3.00	2.00	5.00
Frequency Factor	0.0	20.0	90.0	40.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	2	3	2	5
Frequency Factor	0.00	40.00	270.00	80.00	250.00
Sum of Severity Factors:	640.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	3				
Benefit Factor:	1,920.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,920.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,920.00				
Probable Cost of Improvement	$39,390				
Efficiency Rating Factor (ERF)		**20.52**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #4 York Village

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	1.00	5.00
Frequency Factor	0.0	0.0	0.0	20.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	5
Frequency Factor	0.00	0.00	0.00	20.00	250.00
Sum of Severity Factors:	270.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	270.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	270.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	270.00				
Probable Cost of Improvement	$6,500				
Efficiency Rating Factor (ERF)		**24.07**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #5 9433 Pine Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	1.00	1.00	5.00	5.00
Frequency Factor	0.0	20.0	30.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	2
Frequency Factor	0.00	20.00	30.00	300.00	100.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	10				
Benefit Factor:	4,500.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	4,500.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	4,500.00				
Probable Cost of Improvement	$187,020				
Efficiency Rating Factor (ERF)		**41.56**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #6 50 Whitehall Ct.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	3.00	5.00
Frequency Factor	0.0	0.0	0.0	60.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	180.00	150.00
Sum of Severity Factors:	330.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	10				
Benefit Factor:	3,300.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	3,300.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	3,300.00				
Probable Cost of Improvement	$580,660				
Efficiency Rating Factor (ERF)		**175.96**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #7 98 & 99 Whitehall Ct.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	0.00	5.00
Frequency Factor	0.0	0.0	0.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	4
Frequency Factor	0.00	0.00	0.00	0.00	200.00
Sum of Severity Factors:	200.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	3				
Benefit Factor:	600.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	600.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	600.00				
Probable Cost of Improvement	$136,700				
Efficiency Rating Factor (ERF)		**227.83**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #8 9402 White Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	2,250.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,250.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,250.00				
Probable Cost of Improvement	$140,290				
Efficiency Rating Factor (ERF)		**62.35**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #9 Parkridge Ave. & White Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	1.00	1.00	5.00	5.00
Frequency Factor	0.0	20.0	30.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	3	5
Frequency Factor	0.00	20.00	90.00	300.00	250.00
Sum of Severity Factors:	660.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	3,300.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	3,300.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	3,300.00				
Probable Cost of Improvement	$125,230				
Efficiency Rating Factor (ERF)		**37.95**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #10 St. Clair Ave. & White Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	2,250.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,250.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,250.00				
Probable Cost of Improvement	$149,970				
Efficiency Rating Factor (ERF)		**66.65**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #11 1501-1507 Swallow Dr.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	4.00	2.00	2.00	0.00	3.00
Frequency Factor	40.0	40.0	60.0	0.0	30.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	3	1	2	1	3
Frequency Factor	120.00	40.00	120.00	0.00	90.00
Sum of Severity Factors:	370.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	6				
Benefit Factor:	2,220.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,220.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,220.00				
Probable Cost of Improvement	$37,180				
Efficiency Rating Factor (ERF)		**16.75**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location:	#12	1723 Redbird Cv.			
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	1.00	5.00	0.00	5.00
Frequency Factor	10.0	20.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	2	1	5
Frequency Factor	10.00	20.00	300.00	0.00	250.00
Sum of Severity Factors:	580.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	1,160.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,160.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,160.00				
Probable Cost of Improvement	$18,590				
Efficiency Rating Factor (ERF)		**16.03**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #13 Wrenwood Ln.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	3.00	0.00	1.00	0.00	5.00
Frequency Factor	30.0	0.0	30.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	3
Frequency Factor	30.00	0.00	90.00	0.00	150.00
Sum of Severity Factors:	270.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	270.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	270.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	270.00				
Probable Cost of Improvement	$25,190				
Efficiency Rating Factor (ERF)		**93.30**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #14 Lawn Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	26				
Benefit Factor:	11,700.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	11,700.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	11,700.00				
Probable Cost of Improvement	$376,290				
Efficiency Rating Factor (ERF)		**32.16**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #15 8922 Lawn Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	1.00	1.00	1.00	5.00
Frequency Factor	10.0	20.0	30.0	20.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	3
Frequency Factor	10.00	20.00	30.00	20.00	150.00
Sum of Severity Factors:	230.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	460.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	460.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	460.00				
Probable Cost of Improvement	$75,960				
Efficiency Rating Factor (ERF)		**165.13**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #16 Pine Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	4.00	4.00	4.00	5.00	5.00
Frequency Factor	40.0	80.0	120.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	3	2	3	3
Frequency Factor	40.00	240.00	240.00	300.00	150.00
Sum of Severity Factors:	970.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	34				
Benefit Factor:	32,980.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	32,980.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	32,980.00				
Probable Cost of Improvement	$479,380				
Efficiency Rating Factor (ERF)		**14.54**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #17 9000/9004 Bridgeport Ln.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	1.00	5.00
Frequency Factor	0.0	100.0	150.0	20.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	2	3	2	2
Frequency Factor	0.00	200.00	450.00	40.00	100.00
Sum of Severity Factors:	790.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	1,580.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,580.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,580.00				
Probable Cost of Improvement	$18,080				
Efficiency Rating Factor (ERF)		**11.44**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #18 8908/8914 Bridgeport Ln.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	3.00	0.00
Frequency Factor	0.0	100.0	150.0	60.0	0.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	3	1
Frequency Factor	0.00	100.00	450.00	180.00	0.00
Sum of Severity Factors:	730.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	2,920.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,920.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,920.00				
Probable Cost of Improvement	$129,850				
Efficiency Rating Factor (ERF)		**44.47**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location:	#19	8830 Bridgeport Ln.			
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	1.00	5.00	0.00	5.00
Frequency Factor	50.0	20.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	2	3	3	2
Frequency Factor	50.00	40.00	450.00	0.00	100.00
Sum of Severity Factors:	640.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	2,560.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,560.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,560.00				
Probable Cost of Improvement	$27,680				
Efficiency Rating Factor (ERF)		**10.81**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #20 16 Stratford Ln.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	0.00	5.00
Frequency Factor	0.0	100.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	2
Frequency Factor	0.00	100.00	450.00	0.00	100.00
Sum of Severity Factors:	650.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	650.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	650.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	650.00				
Probable Cost of Improvement	$49,820				
Efficiency Rating Factor (ERF)		**76.65**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #21 24 Stratford Ln.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	5.00	5.00	0.00	5.00
Frequency Factor	10.0	100.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	2
Frequency Factor	10.00	100.00	450.00	0.00	100.00
Sum of Severity Factors:	660.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	660.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	660.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	660.00				
Probable Cost of Improvement	$15,080				
Efficiency Rating Factor (ERF)		**22.85**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #22 2434 High School Dr.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	5.00	0.00	0.00	5.00
Frequency Factor	50.0	100.0	0.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	2	1	1	1	4
Frequency Factor	100.00	100.00	0.00	0.00	200.00
Sum of Severity Factors:	400.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	800.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	800.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	800.00				
Probable Cost of Improvement	$78,790				
Efficiency Rating Factor (ERF)		**98.49**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #23 High School Dr.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	0.00
Frequency Factor	0.0	0.0	0.0	100.0	0.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	5	1
Frequency Factor	0.00	0.00	0.00	500.00	0.00
Sum of Severity Factors:	500.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	40				
Benefit Factor:	20,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	20,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	20,000.00				
Probable Cost of Improvement	$483,990				
Efficiency Rating Factor (ERF)		**24.20**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #24 2726 Brentwood Blvd.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	0.00	0.00	5.00	5.00
Frequency Factor	50.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	50.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	500.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	6				
Benefit Factor:	3,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	3,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	3,000.00				
Probable Cost of Improvement	$394,640				
Efficiency Rating Factor (ERF)		**131.55**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #25 2925 Brazeau Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	5.00	5.00	0.00	0.00
Frequency Factor	50.0	100.0	150.0	0.0	0.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	1
Frequency Factor	50.00	100.00	450.00	0.00	0.00
Sum of Severity Factors:	600.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	10				
Benefit Factor:	6,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	6,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	6,000.00				
Probable Cost of Improvement	$154,180				
Efficiency Rating Factor (ERF)		**25.70**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #26 9333 Parkside Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	2,250.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,250.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,250.00				
Probable Cost of Improvement	$49,990				
Efficiency Rating Factor (ERF)		**22.22**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location:	#27	8703 Eulalie Ave.			
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	5.00	5.00	5.00	5.00
Frequency Factor	50.0	100.0	150.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	3	3
Frequency Factor	50.00	100.00	450.00	300.00	150.00
Sum of Severity Factors:	1,050.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	4,200.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	4,200.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	4,200.00				
Probable Cost of Improvement	$146,340				
Efficiency Rating Factor (ERF)		**34.84**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #35 8543 & 8547 Eulalie Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	0.00	5.00
Frequency Factor	0.0	0.0	0.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	3
Frequency Factor	0.00	0.00	0.00	0.00	150.00
Sum of Severity Factors:	150.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	5				
Benefit Factor:	750.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	750.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	750.00				
Probable Cost of Improvement	$152,710				
Efficiency Rating Factor (ERF)		**203.61**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #30 8624 Eulalie Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	0.00	5.00
Frequency Factor	0.0	100.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	3
Frequency Factor	0.00	100.00	450.00	0.00	150.00
Sum of Severity Factors:	700.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	1,400.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,400.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,400.00				
Probable Cost of Improvement	$20,220				
Efficiency Rating Factor (ERF)		**14.44**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #31 Barn Stable Ct. & Salem Rd.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	5.00	5.00
Frequency Factor	0.0	100.0	150.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	3	3
Frequency Factor	0.00	100.00	450.00	300.00	150.00
Sum of Severity Factors:	1,000.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	4,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	4,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	4,000.00				
Probable Cost of Improvement	$192,170				
Efficiency Rating Factor (ERF)		**48.04**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #32 8637 Henrietta Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	5.00	5.00	0.00	0.00
Frequency Factor	0.0	100.0	150.0	0.0	0.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	1
Frequency Factor	0.00	100.00	450.00	0.00	0.00
Sum of Severity Factors:	550.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	550.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	550.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	550.00				
Probable Cost of Improvement	$14,380				
Efficiency Rating Factor (ERF)		**26.15**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #33 Mary Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	4
Frequency Factor	0.00	0.00	0.00	300.00	200.00
Sum of Severity Factors:	500.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	2,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	2,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	2,000.00				
Probable Cost of Improvement	$68,890				
Efficiency Rating Factor (ERF)		**34.45**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #34 9212 Eager Rd.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	0.00	0.00	0.00	5.00
Frequency Factor	10.0	0.0	0.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	3
Frequency Factor	10.00	0.00	0.00	0.00	150.00
Sum of Severity Factors:	160.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	320.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	320.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	320.00				
Probable Cost of Improvement	$11,440				
Efficiency Rating Factor (ERF)		**35.75**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #35 2217 Parkridge Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	1.00	2.00	5.00	0.00	5.00
Frequency Factor	10.0	40.0	150.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	1	5
Frequency Factor	10.00	40.00	450.00	0.00	250.00
Sum of Severity Factors:	750.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	1,500.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,500.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,500.00				
Probable Cost of Improvement	$36,070				
Efficiency Rating Factor (ERF)		**24.05**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #36 Louis Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	5.00	5.00	5.00	2.00	5.00
Frequency Factor	50.0	100.0	150.0	40.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	3	1	3	2	5
Frequency Factor	150.00	100.00	450.00	80.00	250.00
Sum of Severity Factors:	1,030.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	3				
Benefit Factor:	3,090.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	3,090.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	3,090.00				
Probable Cost of Improvement	$397,040				
Efficiency Rating Factor (ERF)		**128.49**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #37 8930 Harrison Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	1.00	1.00	5.00	2.00
Frequency Factor	0.0	20.0	30.0	100.0	20.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	3	3	2
Frequency Factor	0.00	20.00	90.00	300.00	40.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	3				
Benefit Factor:	1,350.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,350.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,350.00				
Probable Cost of Improvement	$109,940				
Efficiency Rating Factor (ERF)		**81.44**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #38 9429 Sonora Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	4
Frequency Factor	0.00	0.00	0.00	300.00	200.00
Sum of Severity Factors:	500.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	2				
Benefit Factor:	1,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,000.00				
Probable Cost of Improvement	$27,140				
Efficiency Rating Factor (ERF)		**27.14**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location:	#39	Pine Ave. and Hatton Ln.			
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	0.00
Frequency Factor	0.0	0.0	0.0	100.0	0.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	4
Frequency Factor	0.00	0.00	0.00	300.00	0.00
Sum of Severity Factors:	300.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	3				
Benefit Factor:	900.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	900.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	900.00				
Probable Cost of Improvement	$108,840				
Efficiency Rating Factor (ERF)		**120.93**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #40 Moritz Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	40				
Benefit Factor:	18,000.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	18,000.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	18,000.00				
Probable Cost of Improvement	$880,640				
Efficiency Rating Factor (ERF)		**48.92**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location:	#41	9144 Pine Ave.			
Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	5.00	5.00
Frequency Factor	0.0	0.0	0.0	100.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	3	3
Frequency Factor	0.00	0.00	0.00	300.00	150.00
Sum of Severity Factors:	450.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	4				
Benefit Factor:	1,800.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	1,800.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	1,800.00				
Probable Cost of Improvement	$87,010				
Efficiency Rating Factor (ERF)		**48.34**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

Stormwater Ranking Form

City of Brentwood - Stormwater Management Plan

Project Location: #42 8837 White Ave.

Evaluation Categories					
	Erosion	Structure Flooding	Structure Damage	Obstruction of Traffic	Property Ponding
Weighting Factor	10	20	30	20	10
Frequency on Events - In Last 5 years					
	1	**2**	**3**	**4**	**5**
Number of Occurrences	0.00	0.00	0.00	0.00	5.00
Frequency Factor	0.0	0.0	0.0	0.0	50.0
Severity					
	See Severity Multiplers For Factor Definitions				
Severity Multiplier	1	1	1	1	3
Frequency Factor	0.00	0.00	0.00	0.00	150.00
Sum of Severity Factors:	150.00				
Benefit Factor (No. of Property Owners Benefited)					
Benefit Multiplier	1				
Benefit Factor:	150.00				
Funding Factor (Current Funding Source Available)					
Funding Multiplier	1	*			
Funding Factor:	150.00				
Efficiency Rating Factor (ERF)					
Overall Benefit Factor	150.00				
Probable Cost of Improvement	$5,310				
Efficiency Rating Factor (ERF)		**35.40**			

*Note: No Funding Factor Included at this time. It is assumed all improvements to be funded utilizing the same source

APPENDIX E

Summary Memo on Results of Public Input

gonzalez

City of Brentwood
Stormwater Engineering Services

The City of Brentwood and its many residents experience stormwater related issues. Gonzalez Companies has compiled a list of problem areas to track these issues and solicited information on additional sites through surveys. Gonzalez was tasked with providing preliminary investigation and analysis of each of those sites and developing a prioritized plan for the City to address these issues. The initial information regarding this investigation is in the following documents.

TABLE OF CONTENTS

Executive Summary

The initial kick-off meeting to begin the Stormwater Management (SWM) project occurred on October 7, 2021. An outline of the tasks for the project and timeline were developed at this meeting.

Gonzalez created a stormwater questionnaire, which was used to collect information from the public. This survey was made available at several locations online starting on October 18, 2021. It was presented during two public meetings on November 16 and 17, 2021. A total of 104 surveys and emails submissions of issues were collected during the public comment period. These 104 surveys and comments added to the 113 addresses that the City recorded prior to SWM project beginning were compiled into a comprehensive list and map exhibit, which are attached at the end of this report.

The majority of the addresses provided by City staff and Alderman were concerns relating to sump pumps, downspouts discharging directly onto sidewalks and pavement, as well as areas that were prone to icy conditions during the winter. Localized flooding and standing water were the main focus of residential surveys and concerns. The localized flooding and standing water concerns ranged widely in severity. Some issues were explained as small areas of water pooling in yards after rain events, while others discussed issues of stormwater entering garages or homes, resulting in damage.

During the next phase of the project, Gonzalez will continue to review each of the concerns in more detail, contacting residents who requested additional coordination and report to the City with a recommendation on which issues need to have corrective measures developed, and which issues should be addressed through regular maintenance or discussions with property owners. Gonzalez will be seeking concurrence with City staff before proceeding to the final phase of the project.

Gonzalez has developed a draft priority ranking system that needs to be discussed in detail with City staff before finalizing. This priority ranking system will be used in conjunction with the preliminary evaluation mentioned above to determine the sites to be fully developed and which sites may be handled separately from the SWM.

Once the focus for the final phases of the project is determined; the detailed field investigation, preliminary drainage analysis and cost estimating, Gonzalez will complete a full priority ranking of the 42 sites as stated in the agreement for the project.

Kick-Off Meeting Summary

Gonzalez Companies participated in an initial project kick-off meeting with City staff as outlined in the executed contract for the City's Stormwater Management Plan (SWP). This initial kick-off meeting was held on October 7, 2021, with Gonzalez and City staff to complete the tasks as outlined in the attached Appendix A and summarized as follows:

- Review, discuss, and modify the proposed schedule for the project.
- Review of previously received problem areas
- Review of comprehensive map

Based on the discussions held at the kick-off meeting, Gonzalez put together minutes of this initial kick-off meeting and have attached those in Appendix B. As discussed in detail within the meeting minutes, shown on the detailed project schedule (Appendix C), and summarized below, the following schedule was developed:

- Initial Public Meeting – November 16 & 17, 2021
- End Public Comment – December 23, 2021
- Summary of Public Comment– January 27, 2022 (This Document)
- Priority and Ranking System – January 27, 2022
- Identification of Problem Areas – February 25, 2022
- Complete Field Investigation of Problem Areas – March 25, 2022
- Summary Report and Final Project Deliverable – April 29, 2022

Gonzalez and staff reviewed a list of previously received problem areas that had been recorded, by the City, based upon complaints over several years. One such list provided was a record of properties and damage caused from flash flood events occurring between August 8-12, 2020. It was determined that most of the properties included on this list were located within the flood plain and should not be included in the SWP, since they were being reviewed with the Brentwood Bound project. Properties located outside the floodplain affected by this particular event would be included for consideration in the SWP.

An additional document reviewed during the initial kick-off meeting was a list of addresses that had been noted to have reoccurring issues with potential ice on roadways or sidewalks during the winter months. The final document that was reviewed was a list of complaints and issues recorded in Ward 1, due to sump pumps and downspouts that emptied onto the roadway. It was noted that these sump pump and downspouts were not in compliance with the City's ordinances and would need to be reviewed to see what remedies would be appropriate or whether the residents should be required to bring their properties within compliance. All of the properties discussed above were reviewed with the comprehensive map provided at that October 7, 2021 meeting and are included in Appendix A.

Figure 1 *Various City of Brentwood Locations*

Summary of Public Involvement

After the initial kick-off meeting, Gonzalez along with City staff, developed a "Stormwater Questionnaire," which was used to collect information from residents and business owners that had concerns about the stormwater infrastructure, lack thereof or experienced issues at their properties during or after rain events. The questionnaire has been attached as Appendix D to this report. This survey, as well as the scheduled open house was advertised and made available starting on October 18, 2021, through several platforms including the City's Facebook page, website and other advertising outlets. Evidence of some of these advertisements and announcements has been included as Appendix E.

The SWP Open House was held on November 16 and 17, 2021 at the City's recreation center. During these open houses 17 participants attended and described their problem to Gonzalez representatives. Sign-in sheets provided at the meeting have been included as Appendix F. Since the advertisement of the survey, to-date there has been significant data received from the public in regard to the stormwater issues within the City. Including the locations recorded by the City prior to beginning the SWP, there have been 217 respondents that have provided information and requested assistance in determining viable solutions to their stormwater problems. Of the 217 total respondents, 113 of these were recorded by City staff noting "ice" as being the issue, but no additional information has been provided. The public involvement meetings have been critical in obtaining valuable information. The other 104 residents have voiced their concerns through either the public involvement meetings, email, or surveys returned. Of the 104 concerns provided 51 residents have provided more detailed information and photos of the issues they are experiencing through surveys. A summary of surveys and supplemental information provided has been attached as Appendix G.

At the request of the City staff, progress documentation of the respondents was provided prior to the advertised end of the public comment period, December 23, 2021. After a review of the progress submittal, it was concurred by the City that as-advertised end date for the public comment would be withheld and no further advertisements would be made. Comments continued to be provided via email and the survey, which was continued to be made available until January 21, 2022.

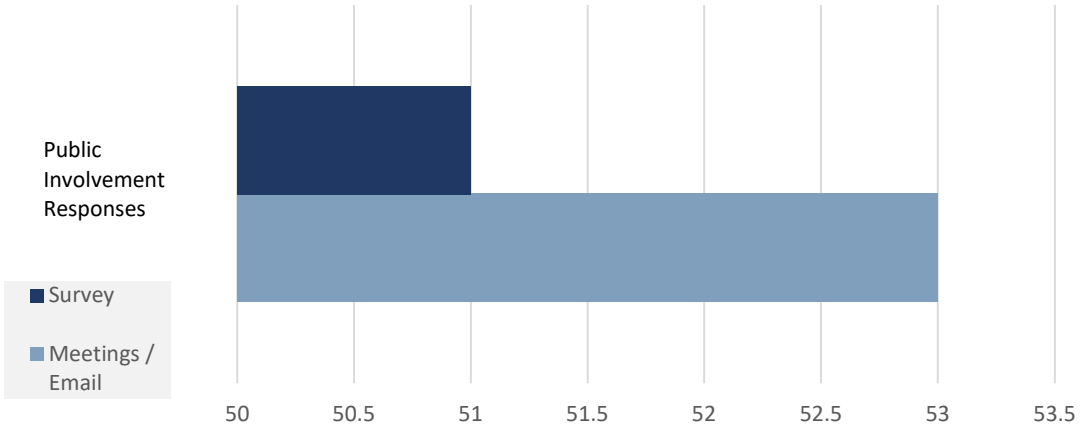


Figure 2 *Public Involvement Communication Methods*

Summary of Areas of Concern

The following information is a summary of the data collected during the public involvement phase. Gonzalez has summarized and mapped the stormwater concerns into the following subcategories:

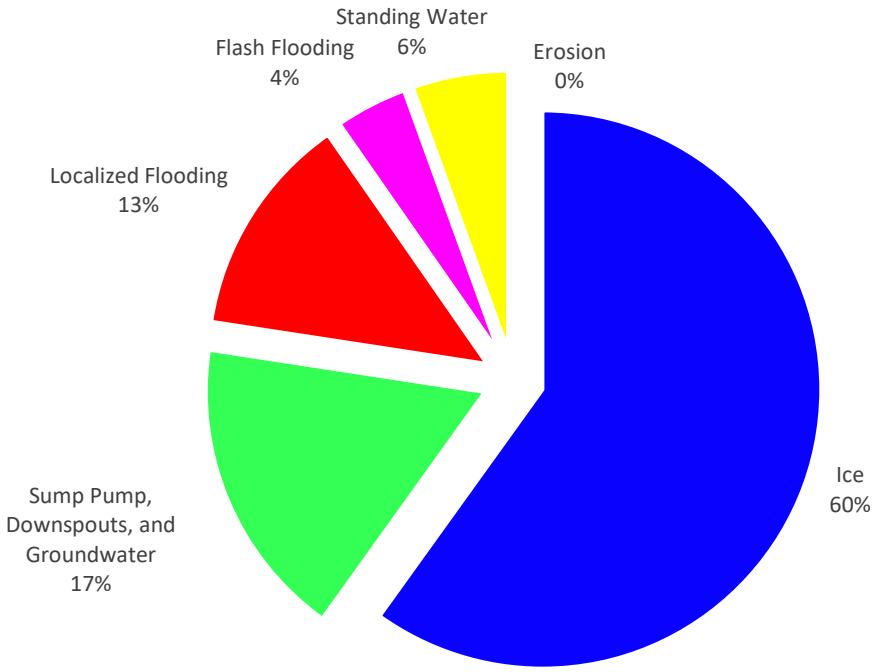
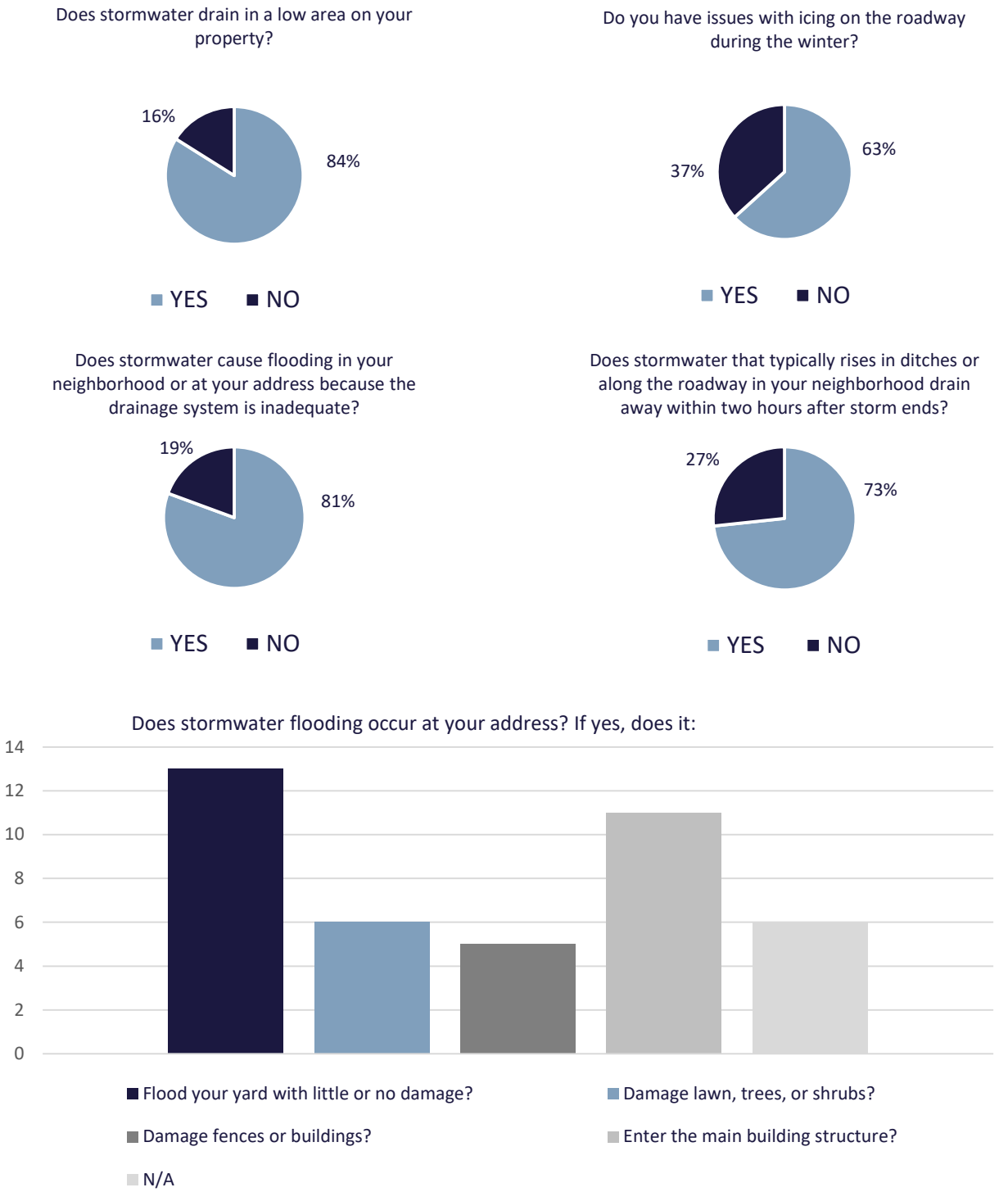


Figure 3 *Types of Concerns*

This information is valuable in providing a comprehensive plan for the City of Brentwood and in determining which concerns will be investigated further. The photos below are a sampling of those submitted by residents involved in the public involvement portion. A summary of all surveys and other information can be found on Appendix G, additionally a comprehensive map has been prepared to show the physical location of each area of concern. This map has been included as Appendix I.

In the following figures we have highlighted some of the statistics recorded with the surveys. These figures do not represent an all-inclusive list but rather some of the more pertinent evidence for deficient stormwater infrastructure. If additional information, specific questions or other information is desired we can provide additional statistics or data.

Figure 4 *Online Survey Highlights*



In general, the highest percentage of concerns surround two of the subgroups:

- Ice issues
- Sump pumps, downspouts, and groundwater

While we categorized these issues into two subcategories, the issues are very closely related, and in most situations, overlap. During our preliminary investigations we have found that the contributions of stormwater discharges by sump pumps and downspouts were a major contribution to the ice buildup in winter months. The City of Brentwood's code of ordinances, Section 500.1770, requires "Stormwater discharges from downspouts or sump pumps shall be located at least 10 feet from the property line whenever possible and shall in every case be located no less than 4 feet from the property line and shall discharge to a pervious surface or stormwater BMP." Nearly all the complaints issued for these two subcategories are a result of the homeowners not complying with this regulation. However, we did find that some of the complaints were made because concerned homeowners felt the ordinance was not beneficial to their property. The constant discharges were blamed for perpetually wet areas in lawns and areas that may contribute to mosquito breeding grounds.

There are couple of purposes for the enforcement of this ordinance. First, the ordinance was implemented to help keep one homeowner from discharging stormwater off their property and onto a neighboring property. Secondly, having the discharge occur a minimum of four feet and more desirably ten feet from the property line would allow these discharges to be reabsorbed into pervious areas rather than discharging onto the roadway, effectively lessening the effects of this urbanized stormwater runoff.

If homeowners are not required by ordinance to disconnect these discharge pipes, the corrective measure would be either fall upon the homeowner or City to construct a stormwater BMP. The stormwater BMP would be used to control the discharge rates, as required by MSD, and the new underground conveyance system would be used to carry the stormwater away from the sites.

Other types of stormwater concerns that were categorized included localized flooding and standing water. From a preliminary review, the causes of localized flooding events were a result of a combination of things such as insufficient infrastructure, additional runoff contributed by development lacking appropriate detention, and modifications due to construction. Causes of standing water may be due to a backup, caused by inadequately sized or clogged pipes/structures or drainageways that are not properly defined. Severity of the localized flooding and standing water ranged from wet areas in yards to excess water on driving surface to property damage with water entering garages and homes. During the upcoming phases of work, it is anticipated that these types of stormwater concerns will be ranked at a higher level than some of the other categories.

The stormwater surveys also inquired about erosion, but none of the evidence provided by the public indicated that erosion was a major concern. If erosion was occurring, it was only a secondary concern of localized flooding.

Conclusion and Next Steps

Gonzalez will need to work with City staff to determine the specific sites that will be evaluated further. These specific sites have previously been referred to as “known problem areas.” Gonzalez’s contract for the SWP was to provide detailed field investigation, conceptual design, cost estimating and priority rankings for forty-two specific sites. During the public involvement phase, we received 217 separate addresses that have varying degrees of stormwater issues ranging from discharges lasting after rain events end, to significant standing water, to property damage. The number of detailed investigations from the complaint list will need to be determined through a desktop survey, coordination with the property owner and concurrence with City staff. It is expected that many of the complaints will not require an in-depth review and Gonzalez can help draft letters explaining the policies and procedures required by MSD and the City for handling issues that are not directly related to insufficient stormwater infrastructure.

In conjunction with the review of the submitted concerns, Gonzalez will work with City staff to develop a priority ranking system to help grade and select each of the problem areas that will receive additional attention. Gonzalez has prepared the first draft of a priority ranking system to be further discussed with City staff. This first draft of the priority ranking system has been included as Appendix H.

Upon concurrence on the priority ranking system and selection of the specific sites to be investigated further, Gonzalez will perform detailed field investigation, preliminary drainage analysis and cost estimating. Additional next steps on the project include the review of the City’s ordinance, MSD policies and collecting data surrounding the ownership and responsibilities for the areas of concern selected for further review. All information collected during these upcoming tasks will be included in the final report at the end of the project.

Appendix A

AGENDA

Kick-Off Meeting - Stormwater Management Plan
Gonzalez Companies / City of Brentwood
10/7/21

I. Attendees

- Pat Judge – pjudge@gocos.net
- Sid LeGrand – slegrand@gocos.net
- Tony Schenk – tschenk@gocos.net
- Bola Akande – bakande@brentwoodmo.org
- Whitney Kelly - wkelly@brentwoodmo.org
- Dan Gummersheimer –dgummersheimer@brentwoodmo.org
- Scott Waggoner – rwaggoner@brentwoodmo.org

II. Review of Proposed Schedule

- Kickoff Meeting – 10/7/21
- Public Meeting – 10/28/21 (TBD – Suggested Date to Allow for Advertisement and Prep Time)
- Post Public Information Meeting Services (End Public Comment) – 11/25/21 (Approximately 1-Month. Additional time could be considered but would ultimately push back the final deliverable.)
- Summary Memo to City/Development of Priority Ranking System – 12/23/21
- Identification of "Known Problem Areas" for Evaluation – 1/27/22
- Field Investigation of Known Problem Areas – 2/25/22
- Summary Report and Final Project Deliverables – 3/25/2022.

III. Review of Previously Received Problem Areas

- August 8-12, 2020 – Flash Flood Events – Majority of the Areas will be taken care of with the Brentwood Bound Project? Gonzalez should focus on the areas that had issues away from Deer/Black Creek.
- Ice-Drainage – Additional Details?
- Ward 1
- York Village

IV. Review of Comprehensive Map

V. Other Discussion

2020 Storm Event/Flash Flood Events with Occurrence Dates of August 9, 10, & 12, 2020
Summary Table of Impacted Respondents

Event #	Property Address	Name of Business or Resident	Commercial [C] or Residential [R]?	Contact Person	Storm Date	Estimated Loss, $	Description of Loss Event
1	155 Hanley Industrial Ct	Little Fishes Swim School	C	Stefan Rosenkoetter	Sunday, August 9, 2020	$ 7,900.00	Water damage to doors, retail products, office equipment, pool operations, utility equipment occurred. Loss of revenue and increased payroll expenses incurred.
2	421 Hanley Industrial Ct	Stricker Auto Center	C	Stricker Auto Center	Wednesday, August 12, 2020	$ 150,000.00	20 automobiles ruined; auto repair equipment ruined; massive building damage.
3	423 Hanley Industrial Ct	Adgraphix, LLC	C	Chris Schreck	Sunday, August 9, 2020	$ 7,471.52	Water damage on reflective and non-reflective print & adhesive materials.
4	425 Hanley Industrial Ct	K. Hall, Aspen, Engraphix, Adgraphix, Meridian, ITC	C	Elizabeth Gray	Sunday, August 9, 2020	$ 30,000.00	Flood water into building from creek overflow.
5	2311 Patton Ave	Nancy Swanson	R	Nancy Swanson	Sunday, August 9, 2020	$ -	Approximately 14 inches of water in basement and 12 inches of water in backyard due to rain. No loss of property was listed, but hours of cleanup.
6	2555 Hermelin Drive	Meridian Medical Technologies/ Pfizer	C	Kevin Beutelmann	Sunday, August 9, 2020	$ 30,000.00	Heavy mud & water inside building required clean-up. Flood impact was to 2555 Hermelin Drive and to 8030 Litzsinger Rd & 8053 Litzsinger Rd which are MMT owned.
7	8037 Litzsinger Rd	Post Holdings, Inc.	C	Pauline Wiegrefe/ Ed Short	Sunday, August 9, 2020; Monday, August 10, 2020; Wednesday, August 12, 2020	$ 140,000.00	Garage door forced inward due to rising water causing building interior flooding of up to 3 feet in depth at 8037 Litzsinger Rd and flooding occurred at 8047 Litzsinger Rd.
8	8047 Litzsinger Rd	Post Holdings, Inc.	C	Pauline Wiegrefe/ Ed Short	Sunday, August 9, 2020; Monday, August 10, 2020; Wednesday, August 12, 2020	$ 85,000.00	The flooding caused mold issues. Costs for mold remediation were not included. Stored furniture & fixtures damaged.
9	8416 Manchester Rd	K. Hall Design	C	Jackie Richert	Sunday, August 9, 2020	$ 100,000.00	Interior damages to floors and walls-approximately 30 inches of rain inside building
10	8600 Manchester Rd	T + C Properties, LLC	C	Tim Hertel	Sunday, August 9, 2020	$ 500,000.00	Flood water into building
11	8922 Lawn Ave	Wes Berg & Katie Berg	R	Wes Berg & Katie Berg	Monday, August 10, 2020	$ 5,000.00	Saturated wall in basement requires removal & demolition; carpet ruined too.
					Total Estimated Losses:	$ 1,055,371.52	

Spreadsheet Labeled "Ice - Drainage"

St. Clair	Tilles	White	Parkside	High School	Lawn	Pine	Moritz	Douglas	Parkridge
2319	9375	8731	9424	2525	9015	9400	9007	8512	1923
2323	9379	9365	9411	2509	9010	9409	8901	8528	1930
2101	9387	9348	9357	2505	9006	9002	8821		2309
	9400	9425	9361		8934	9135	8817		2317
		9320	9333		8917	9327			2351
		9000			8908	Pine/Hatton			
		8656			8835	9425			
		8622			8780	8758			
					8782	8754			
						8734			
						8744			
						8748			

Patton	Rosalie	Harrison	Eulalie	Louis	Radley	Spanish	Henrietta	Joseph	Florence
2326	8731	8936	8639	2440	8741	2015	8601	8624	8112
2324	8727	9014	8651	2449	8729	2023	8506	8627	8601
2311	8724	9000	8655		8726	2027		8616	8611
2301	8658	9004	8745		8736			8614	
	8650	9012						8606	
		8930						8608	
								8514	
								8511	
		2330	**Annalee**		8755	**Litzsinger**		8602	
		2839	**Brazeau**		2429	**Mari Kay**		8506	
		8812	**Bridgeport**		2521	**Melvin**		8505	
		2506	**Cecelia**		2324	**Patton**			
		8730	**Covington**		8828	**Powell**			
		2331	**Hilton**		2618	**Salem**			
		8730	**Keystone**		6611	**Yorkshire**			
		2239	**Laverne**						

Ward 1 water issues

8922 Lawn Ave

- Storm water drainage flowing up through their basement drain. They called MSD, MSD inspected and will have a contractor install a “flap valve” to prevent stormwater backup to their home. Homes on Lawn still have sanitary and stormwater drainage combined.

9402 White

- Storm water gathered extremely high at the intersection of White and Kempton. Homeowner of 9402 White wondered if the recent MDS work on Sonora has partially clogged the MDS pipes that flow just to the west of her home (looks like open lot).

9429/9433 Pine and 2 Whitehall Court

- Email from homeowner of 9429 Pine: Hi Nancy, during last nights storm I walked out to McKnight to observe all of the water coming down McKnight past Whitehall Lane towards Pine ave. There is a curbside storm drain on McKnight between the first house on Whitehall (2 Whitehall Ct) and the first house on Pine Avenue (9433 Pine) Unfortunately the drain seems to have been placed on the wrong side of the Whitehall house’s driveway. Most of the water coming down McKnight enters that person’s driveway instead of flowing into the storm basin and instead enters a culvert in the backyard of 9433 Pine. The first three or four houses on Pine ave have water that drains to the west and ultimately enters the same culvert. The culvert ends up hitting a water pipe that goes under McKnight and into Tilles Park. That culvert and pipe never seem to be able to handle large rains and it seems apparent that with the additional stress of the McKnight water not being routed properly creates an issue for all of us on Pine ave as all of our water has nowhere to go. I’m writing for your help regarding two things. 1. Can something be done about the water coming down McKnight that unfortunately isn’t making its way into the storm basin and is instead flowing into the driveway of 2 Whitehall Court, and subsequently into the local culvert? And/or 2, whose responsibility would it be to put in a larger pipe from the neighborhood culvert under McKnight road into Tilles? Is this MSD? Any advice, guidance and help you can extend would be greatly appreciated. While I realize last nights storm was exceptional, it seems like this type of rain is becoming more common and creating a lot of issues for homeowners. My above suggestions would help us all greatly. Thank you.

Bridgeport

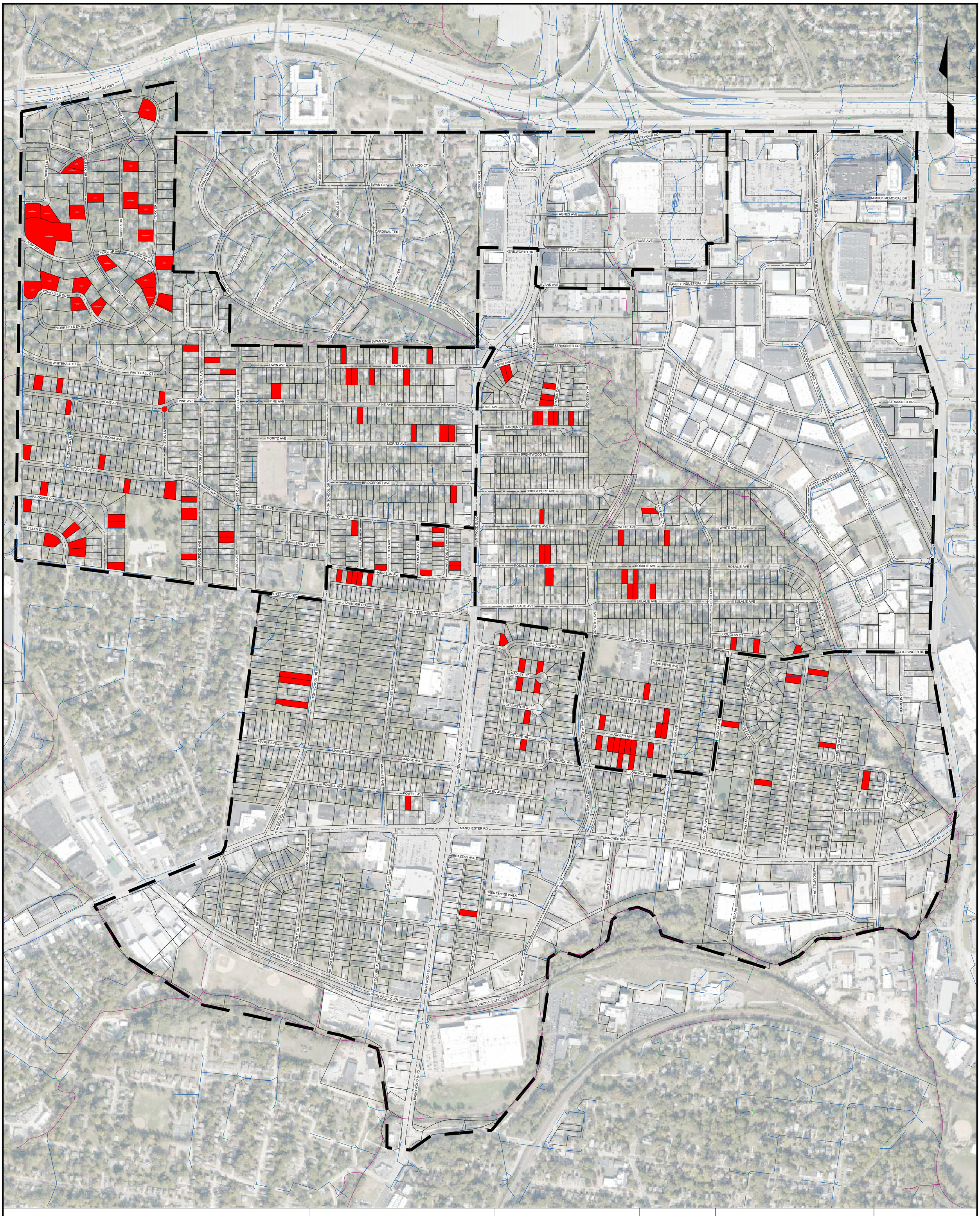
- The lowest part down from the high school. Concern is about backed up drains as well as construction runoff.

"Lack of Underground Conveyance"

23

York Village Owner(s)	Site Address	Pipe Through Curb
Cummings Steven W & Carolyn M H/W	5 Cricket Ln, 63144	X
Obrien Thomas R & Alice M H/W	6 Cricket Ln, 63144	X
Gregory Richard .Kathleen H/W	9 Middlesex Dr, 63144	X
Reese Scott & Eileen T/E	23 Middlesex Dr, 63144	X
Bourke Caron J	26 Middlesex Dr, 63144	X
Martin Jose L & Stephanie C T/E	42 Middlesex Dr, 63144	X
Mcdonald P Ryan & Julie C Qualified Spousal Trust	34 Northcote Rd, 63144	X
Onder James & Maureen	6 Southcote Road	X
Rhodes James E& Mary Schmidtlein T/E	9 Southcote Road	X
CORRIGAN MICHAEL CHRISTOPHER. JR & MELANIE OREAR T/E	11 Southcote Road	X
Schuler Ryan L & Holly E H/W	18 Southcote Road	X
Knight Lisa D Revocable Trust	12 Sussex Dr.	X
Machon Kevin W & Mary M H/W	26 Suss·ex Dr.	X
Guyol Joan P Trustee	39 York Dr.	X

Kretchmar John L & Amy Wellington T/E	47 York Dr.	X
Lavin Lawrence M Jr & Karen B H/W Trs	79 York Dr.	X
Thielemier ,Hannah M	12 York Hills Dr.	X
Clements George W Jr Barbara B H/W Trus	14 York Hills Dr.	X
Kniest Thomas W & Donna D H/W	20 York Hills Dr.	X
Stauffacher Stevan & Ryan Kathleen H/W	21 York Hills Dr.	X
Guyol Mary Grace Trustee	24 York Hills Dr.	X
Gunther Mary Revocable Trust	26 York Hills Dr.	X
Peat Easterling Family Qualified Spousal Trust Share W	27 York Hills Dr.	X



AERIAL MAP EXHIBIT

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

BRENTWOOD
CITY OF WARMTH

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

gonzalez

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

Appendix B

Meeting Minutes

Subject	20-219-08
Date	10/7/21
Time	3:00p.m. to 4:00 p.m.
Location	Brentwood City Hall

Attendees

Sid LeGrand – slegrand@gocos.net
Tony Schenk – tschenk@gocos.net
Bola Akande – bakande@brentwoodmo.org
Whitney Kelly - wkelly@brentwoodmo.org
Dan Gummersheimer –dgummersheimer@brentwoodmo.org
Scott Waggoner – rwaggoner@brentwoodmo.org

Prepared	10/8/21
Prepared by	Tony Schenk

1) Review of Proposed Schedule

Gonzalez provided the proposed schedule and the attendees tentatively agreed upon the following schedule for the initial public meeting and major deliverables:

- Iniital Public Meeting – 11/16/21 – 5:00 p.m.-7:00 p.m. (Location TBD)
  - City to provide comments on meeting content by 10/11/21
  - Gonzalez to revise announcement and relevant information prior to public works committee meeting on 10/14/21.
  - Public meeting announcement to be made by the City approximately five weeks prior to meeting 10/19/21.
  - The City will verify the meeting location and update the announcements accordingly.
- End Public Comment Period – 12/23/21
- Summary of Pubic Comment and Priority Ranking System Memo Due – 1/27/22
- Identification of "42 Known Problem Areas" to be Analyzed – 2/25/22
- Complete Field Investigation of Known Problem Areas – 3/25/22
- Summary Report and Final Project Deliverable – 4/29/22

2) Review of Previously Received Problem Areas Provided by the City

- August 8-12, 2020 Flash Flood Events
  - It was discussed that the majority of the events listed where the result of flooding from Deer Creek or Black Creek. It was agreed that these flooding events would be ignored for the purpose of the storm water management plan and would require separate, in depth, regional considerations.
  - Properties currently being shown from this list include:
    - 2311 Patton Ave.
    - 8922 Lawn Ave.
  - Ice-Drainage, Ward 1 and York Village
    - It was noted that all of these locations are currently shown on the map exhibit.

3) Review of Comprehensive Map

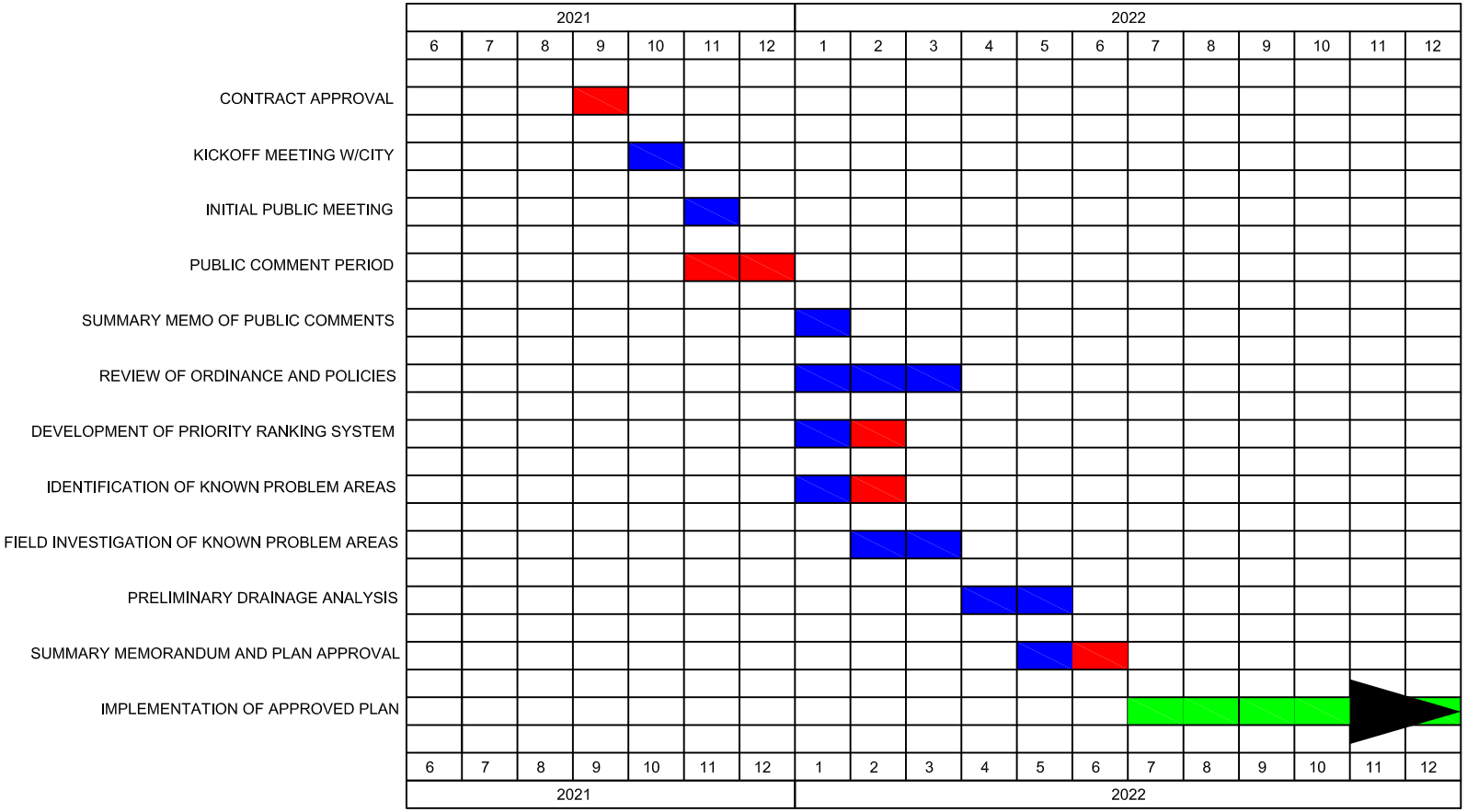
The current comprehensive map was displayed and it was agreed that:

- The ward boundaries would be shown.
- No distinction would be made at this time between public and private areas.
- Flood zones would be included on the map for information.
- Color coding of the various storm water issues would be included.
- Push pins or markers to add locations to the map would be made available at the public meeting.

ACTION ITEMS

#	Description	Assigned	Due Date
1	Review Public Meeting Announcement Content	City of Brentwood	10/11/21
2	Updates to Public Meeting Content	Gonzalez	10/12/21
3	Public Meeting Annoucement	City of Brentwood	10/29/21
4	Update Comprehensive Map	Gonzalez	11/9/21
5	Attend Public Meeting	Gonzalez/City	11/16/21

Appendix C



GONZALEZ COMPANIES, LLC

REVIEW/APPROVAL OF WORK BY BRENTWOOD

IMPLEMENTATION

PROJECT SCHEDULE

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

Appendix D

Storm Water Questionnaire

Please complete and return this voluntary survey by December 23, 2021. You may either hand-deliver the completed survey business hours, mail it or email it to:

City of Brentwood
City Engineer
2348 S Brentwood Blvd
Brentwood, MO 63144
stormwater@gocos.net

Your response is greatly appreciated and will help to ensure the success of our current Storm Water Drainage Study

1. Name:

2. Address:

3. Email or Telephone number (optional):

Background Information:

Storm water is an abnormal quantity of water resulting from heavy falls of rain or snow.

Drainage System is a system of watercourses or drains for carrying off water, including pipes, ditches, and gutters.

Soil Erosion is the washing away of soil by the flow of water.

At this time, it is undetermined if the city will pay for any improvements or whether they will be a shared expense with the property owner.

Please **indicate Yes or No** as applicable to your situation that best answers the following questions:

4. Do you have any flooding or drainage problems in your neighborhood? Yes ☐ No ☐

5. Does storm water typically drain in a low area on your property? Yes ☐ No ☐

a. If yes, does it remain for more than two (2) hours after a storm ends? Yes ☐ No ☐

6. Does storm water that typically rises in ditches or along the roadway in your neighborhood drain away within two hours after the storm ends? Yes ☐ No ☐

7. Does storm water cause flooding in your neighborhood or at your address because the drainage system is inadequate? Yes ☐ No ☐

8. Does storm water cause flooding in your neighborhood or at your address because the existing drainage system is poorly maintained (flow of pipe, ditch, gutter, etc.is restricted due to soil growth, collapse of pipe or structure, etc.)? Yes ☐ No ☐

9. Does storm water flooding occur at your address? Yes ☐ No ☐

If yes, does it:

a. Flood your yard with little or no damage? Yes ☐ No ☐

b. Damage lawn, trees, or shrubs? Yes ☐ No ☐

c. Damage fences or buildings? Yes ☐ No ☐

Enter the main building structure? Yes ☐ No ☐

If water enters the main building structure, does it enter through:

a. Floor? Yes ☐ No ☐
b. Walls? Yes ☐ No ☐
c. Floor drains? Yes ☐ No ☐
d. Bathtub or toilet? Yes ☐ No ☐
e. Windows or walls? Yes ☐ No ☐

10. Is trash and debris in the drainage system a problem? Yes ☐ No ☐

11. Is soil erosion a problem in your neighborhood? Yes ☐ No ☐

If yes:

a. Is the erosion due to construction activities? Yes ☐ No ☐
b. Is mud on the pavement a problem? Yes ☐ No ☐
c. Is erosion occurring in areas not due to construction? Yes ☐ No ☐

12. Is groundwater or sump pumps discharging during dry periods of concern? Yes ☐ No ☐

13. Do downspouts from adjacent properties emptying onto your property a causing issue? Yes ☐ No ☐

14. Is long-term standing water an issue on your property? Yes ☐ No ☐

15. Do you have issues with icing on the roadway during the winter? Yes ☐ No ☐

Please circle/indicate the response as application to your situation which best answers the following two questions:

16. How many times has flooding or one of the other concerns listed above occurred at your address in the last 5 years? (Please choose 0-5) Choose one

17. How many times have you observed flooding or one of the other concerns listed above occurred in your neighborhood in the past 5 years? (Please choose 0-5) Choose one

18. Where does the excess storm water in your neighborhood come from?

    Street name:

    Drainage ditch (describe):

    Creek or Stream (if known):

    Adjacent property (describe):

    Other source(s), list or explain:

19. Any additional comments or description of a situation:

20. Would you like a follow-up E-mail or phone call from someone from the Brentwood Public Works Department or storm water engineering consultant Gonzalez Companies to discuss a particular problem or concern? (If yes, please provide E-mail address or Phone Number at the top of this form)

Results of this survey will be taken into consideration for future storm water projects and planning

Thank you for your time and effort in completing questionnaire. It is greatly appreciated!

SUBMIT

Appendix E

City of Brentwood - Stormwater Management Open House

Tuesday, November 16, 2021, 5pm – 7pm &

Wednesday, November 17, 2021, 5pm – 7pm

Recreation Center, 2505 S. Brentwood Boulevard, Brentwood, MO

NOTICE OF PUBLIC MEETING:

The City of Brentwood has retained the services of Gonzalez Companies to conduct investigations and analysis of numerous stormwater drainage issues brought to the City's attention. This study is being funded through MSD's OMCI (Operation Maintenance and Construction Improvement) program.

As part of the comprehensive Stormwater Management Plan, Gonzalez Companies in conjunction with the City, will be hosting two open house meetings for City residents and property owners on ***Tuesday, November 16, from 5-7 pm at and Wednesday, November 17, from 5-7 pm at the Brentwood Recreation Center, 2505 S. Brentwood Boulevard.***

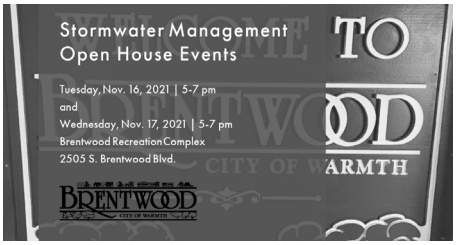
The purpose of the open house is to allow City residents and property owners an opportunity to outline any drainage or stormwater problems they may be experiencing. Gonzalez Companies and City staff will be available to discuss and catalog residents' complaints and/or concerns. Information gathered will allow City staff and Gonzalez Companies to catalog, analyze, and properly identify potential infrastructure improvements to alleviate stormwater issues within the City.

If you cannot attend either open house, Stormwater Questionnaires are available at City Hall and available on the City's website www.brentwoodmo.org. Please direct any questions regarding the open house to Dan Gummersheimer, Director Public Works/City Engineer, (314) 963-8643, or Tony Schenk, Gonzalez Companies Project Manager, (314) 961-1888 ext. 101 or stormwater@gocos.net. Please submit comments prior to December 23, 2021.

THE CITY OF BRENTWOOD WILL PROVIDE REASONABLE ACCOMMODATIONS FOR PEOPLE WITH DISABILITIES TO ENABLE THEIR ATTENDANCE AT CITY MEETINGS. PLEASE CONTACT THE CITY ADMINISTRATOR'S OFFICE AT 314-962-4800 EXTENSION 8608, USE RELAY MISSOURI 1-800-735-2966 TDD OR CONTACT US BY EMAIL AT KSILVEY@BRENTWOODMO.ORG AT LEAST 72 HOURS PRIOR TO THE MEETING YOU WISH TO ATTEND TO MAKE YOUR ACCOMMODATION REQUEST.

Posted on: October 18, 2021

Stormwater Management Open House - November 16 and 17



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Tools

Notify Me

View Archived

Categories

- All Categories
- Home
- Spotlights
- Brentwood Bound
- Brentwood Bound Spotlight
- Brentwood Parks & Rec

MISSOURI 1-800-735-2966 TDD OR CONTACT US BY EMAIL AT KSILVEY@BRENTWOODMO.ORG AT LEAST 72 HOURS PRIOR TO THE MEETING YOU WISH TO ATTEND TO MAKE YOUR ACCOMMODATION REQUEST.

Stormwater Quesionnaire

Next ⇒
Brentwood Bulletin - Fall 2021

Other News in Home

Brentwood Bulletin - Fall 2021

Posted on: October 22, 2020

Rosalie Avenue Construction Project Updates

Posted on: September 21, 2021

2021 Street Asphalt Project

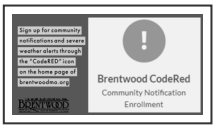
Posted on: August 9, 2021

MSD Project Clear Update – October 21, 2021

Posted on: July 2, 2020

Sign Up for Weather Warning Alerts Through CodeRED

Posted on: March 12, 2021



Seeking Candidates for Architectural Review Board

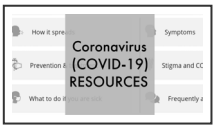
Posted on: July 16, 2021

City of Brentwood COVID-19 Updates

Posted on: September 15, 2020

COVID-19 Resources

Posted on: September 15, 2020



Quick Links

COVID-19 Updates

Brentwood Bound

Municipal Code

Building Code

Newsroom

Transparency Portal

Helpful Links

Fall Leaf Collection

Trash, Recycling and Yard Waste

Holiday Trash Schedule

Recycling and Sustainability Resources

Employment Opportunities

Frequently Asked Questions

What are the local emergency contacts?

How do I contact utility companies?

Where can I find trash pickup information?

What is the holiday trash, recycling and yard waste pickup schedule?

Does the City offer Notary services?

Who do I call to report potholes or other severe road conditions?

Stormwater Management Open House Events

Tuesday, Nov. 16, 2021 | 5-7 pm

and

Wednesday, Nov. 17, 2021 | 5-7 pm

Brentwood Recreation Complex

2505 S. Brentwood Blvd.

BRENTWOOD

CITY OF WARMTH

Brandon Wegge
Broughton Park · 2d

Brentwood Ward 2 Meeting- 11/8/2021

We will be holding a Ward 2 meeting on Monday, November 8th at 6pm. We will be meeting at the Rec Center in Room C.

Preliminary agenda items that we will cover include:

- Brentwood Bound Update
- Stormwater Management Master Plan
- Update on various projects around Ward 2
- Question/answer period

All residents are welcome to attend! If you would prefer to attend virtually, please let me know and I will set up a Zoom meeting.

Hope to see everyone there!

Brandon Wegge
Ward 2 Alder-Man
314-283-9413
bwegge@brentwoodmo.org
Twitter : @Alder_Man2

Like 1 4

Melinda Nicholes

Appendix F

BRENTWOOD
CITY OF WARMTH

Stormwater Management Plan
Master Plan Public Meeting
November 16th from 5:00 – 7:00

SIGN IN SHEET

	Name	Address	Phone No.
1.	Steven Cummings	5 Cricket Lane St Louis MO 63144	314 993 9080
2.	Jane Torres	8710 Rosalie Ave 63144	314 920 0464
3.	Steve Lochmoellen	~~8831~~ Maple Ave 63144	314-963-0565
4.	Nancy Tice	2301 Parkridge Ave 63144	314-322-7450
5.	Barb Hughes	2001 Urban Dr 63144	314-378-7202
6.	Karen Smith	8930 Harrison 63144	314-488-8098
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BRENTWOOD
CITY OF WARMTH

Stormwater Management Plan
Master Plan Public Meeting
November 17th from 5:00 – 7:00

SIGN IN SHEET

	Name	Address	Phone No.
1.	Gail Schamel	18 York Drive	314-603-1298
2.	Irene Leland	9312 White Ave.	314-299-1980
3.	Karen McMahon	2238 Laverne Ct	314-313-7984
4.	Tom Cole	2311 St. Clair Ave	314-494-8024
5.	Donna Boudendistel	2015 Urban Dr.	314-952-5318
6.	Suzanne Hunter	50 Whitehall	314 953 3419
7.	Nikki Zavradinos	2441 Lois Ave	314-420-4084
8.	Jim Hobelman	27 Middlesex Dr. 63144	314 997-3735
9.	BOB SHELTON	24 YORK DR 63144	314 450-6001
10.	Rich Hoyer	2449 Lois 63144	314-524-3636
11.	Tricia Graves	2236 Helen Ave	618-975-0854
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Appendix G

Site Address	Name of Business / Contact / Resident	Commercial (C) Residential ®	Email/Phone #	Storm Date	Follow Up (YorN)	Flooding/ Drainage Problems (YorN)	SW drain in low area on property (YorN)	Does it remain for 2+ hours after storm)YorN)	Ditches drain w/in 2 hrs of storm (YorN)	Water flood n'hood / property bc bad drainage system (YorN)	Water flood bc poorly maintained system (YorN)	Does Storm water flooding occur at address (YorN)	Yard w/little to no damage (YorN)	Damage lawn, trees, or shrubs (YorN)	Damage fences or buildings(YorN)	Enter main building structure (YorN) How?	Trash / debris in drainage system (YorN)	Is soil erosion a problem (YorN)	Due to current const. activities (YorN)	Is mud on pavement a problem (YorN)	Occuring in areas Not due to const. (YorN)	Are sump pumps discharging during dry periods (YorN)	Do downspouts adj. to you empty onto your property (YorN)	Is long-term standing water an issue (YorN)	Do you have issues with icing on roadway (YorN)	How many times has flooding occurred at your address in Last 5 Years?	How many times has flooding occurred in your neighborhood in last 5 years?	Where does excess storm water in your neighborhood come from?	Any additional comments or description of situation:
2330 Annalee																													
2839 Brazeau Ave.																													
2925 Brazeau Ave.	Andrew P. Johnson	R	[redacted]		Y	Y	Y	Y	Y	Y	Y	N/A					N	Y	Y	N	Y	N	N	Y	N	5+	5+	Alley & Adj. Property	Excess water comes from Brazeau Ave. alley, new house to the north & recent concrete work done across the road. Since the new house was built a few years ago, the constrction business across the alley moved in, & road resurfacing, property owner's garage floods every moderate rain or heavier, as well as eroding driveway & eroding space between the road & garage.
2726 S. Brentwood Blvd.	Mike Hanley																												Runoff is the issue. There does not seem to be adequate storm sewers in the alley behind the businesses that front Brentwood Blvd. Floods w/ very little rain. This location is south of Manchester Rd. closer to E. Pendleton Ave. Pictures located: Complaint Emails_Standing Water
8737 Brentwood Pl.	Alex Fortmann	R	314-348-5386		Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	Y	N	N	N	N	Y	Y	5+	5+	Drainage Ditch	The drainage ditch at the end of Garden Ct. is right at the corner of backyard & water gets trapped in yard & will not drain into the drain.
8710 Bridgeport Ave.	Jeanne & Mark Suntrup	R	mijes@yahoo.com		Y	Y	Y	Y		Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	N	Y	5	5	Rain/Storm	Street slab needs to be raised to flow even with the slab that connects to the sewer
8812 Bridgeport Ave.																													
8821 Bridgeport Ave.	Patrick King	R	314-323-7330		Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y-floor, walls	N	Y	N	Y	N	N	Y	Y	N	5+	5+	Bridgeport Ave. / Adjacent property	Retinal Institute parking lot adjacent to back yard on Moritz, west of Brentwood. Retinal Institute parking lot sits > 10 ft. above property owner's backyard. 4" drain tile in bottom of gravel (4 ft. wide, 10 ft. tall) behind the wall drains to property owner's yard which causes concern about water that will collect in the extensive gravel behind the parking lot wall & drain.
8830 Bridgeport Ave.	Flora Wilsker	R	317-809-3831		Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y-garage floor	N	Y	N	N	Y	N	Y	N	Y	5+	5+	Bridgeport Ave.	Water flows down driveway into garage. Area aroung garage floods & has crumbled garage concrete floor.
8908 Bridgeport Ave.	Michael Williams	R	[redacted]		Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y-floor drains	N	N	N	N		N	N	N	N	5+	5+	Unsure	Flooding happened several times, the worst time being 2 feet of water in basement from wall to wall, ruining the furnace, water heater, washer/dryer and all contents of basement.
8910 Bridgeport Ave.																													The lowest part down from High School-Concern is about backed up drains as well as construction runoff. (No specific address given but 8910, 8913, & 8914 are at the lowest spot of the road per Jake)
8913 Bridgeport Ave.																													The lowest part down from High School-Concern is about backed up drains as well as construction runoff. (No specific address given but 8910, 8913, & 8914 are at the lowest spot of the road per Jake)
8914 Bridgeport Ave.																													The lowest part down from High School-Concern is about backed up drains as well as construction runoff. (No specific address given but 8910, 8913, & 8914 are at the lowest spot of the road per Jake)
9000 Bridgeport Ave.	Peter Zekert	R	[redacted]		Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y-floor drain	N	Y	Y	Y	N	N		N	N	5+	5+	Bridgeport Ave.	No additional comments
9004 Bridgeport Ave.	Laura Rick	R																											Property owner concerned about construction debris going into drains & water rushing down the street & into her yard/basement.
9031 Cardinal Terrace	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N	N	Y	N	N	Y	Y	4	5+	West Side Bldg	Excess water comes from west side of 9031 Cardinal. There is standing water next to building & it runs down parking lot eroding gravel & steps.
2506 Cecelia																													
8730 Covington Ct.																													
8733 Covington Ct.	Sophie Beckmann	R			N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y-floor drain	Y	Y	Y	N	N	N	N	N	N	2	2	Covington Ct.	Property owner (8733 Covington) yard drains into the yard of the house to the north on Radley Court. Water has pooled in the southern portion of that yard at the fence line for several days. The sewer line that runs under Covington Ct. backs up. There have been 3 backups in the last month. Property owner's storm sewer in driveway backed up and basement backed up also. Covington Ct. seems to have issues with storm runoff & raw sewage from homes draining into the same sewer line. That line doesn't seem to be adequate.
5 Cricket Lane	Steven & Carolyn Cummings																												
6 Cricket Lane	Thomas & Alice Obrien																												
8512 Douglas																													
8528 Douglas																													
9212 Eager Rd.	Cecelie Nangle	R	314-918-9059			Y	Y	Y	N	Y	Y	Y	Y	N	N	N	y	y	N	N	N	N	Y	N	Y	0	0	End of Eager	
8543 Eulalie Ave.	Brandon Wegge	R	bwegge#brentwoodmo.org		Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	1	4	Rosalie & Helen Intersection	Drainage occurs behind the 85XX homes on Eulalie; Submitting on behalf of eulalie residents. Storm water flows down Eastern half of Rosalie. Storm drian at Helen intersection is too small & frequently clogged so water continues South on Helen. Due to shape of road, it does not make it to large drains at low point of Helen (before Eulalie), but enters the backyards of Eulalie. There is a natural drainage ditch but during heavy storms, multibple feet of water sits in backyards.
8547 Eulalie Ave.																													See 8543 Eulalie Ave.
8624 Eulalie Ave.	Scott Stinson	R	314-550-6561		Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y-floors / floor drains / windows / walls										5	5	Street / Drainage Ditch	Excess water comes from Litzinger / Eulalie and water from the drainage ditch runs between backyards in Litzinger / Eulalie to storm drain. There is a drainage ditch at rear of property which was designed to empty into a strom drain in neighboring property. It appears to not be working & result is significant underground water pressure for days after big storms. Basement has flooded numerous times. It appears the property owner is referencing an MSD inlet located in the backyard of 8620 Eulalie Ave. and 8616 Eulalie Ave. (Our map shows an inlet there)

8639 Eulalie Ave.																											
8651 Eulalie Ave.																											
8655 Eulalie Ave.																											
8703 Eulalie Ave.	David Gwynn	R	908-451-9404			Y	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	N	N	Y	N	Y	Y	Y	5	5	Mary Ave.	Water originating from the backyards east of Broughton Park flows east to west, then flows east to west across Broughton Park to Mary Ave. to my property. The water overflows curb and floods yard, floods garage, and has resulted in large holes in the back of property at 8703 Eulalie and neighbor's property at 8702 Rosalie. Detail on this issue is attached.
8745 Eulalie Ave.																											
8112 Florence																											
8601 Florence																											
8611 Florence																											
155 Hanley Ind. Ct.	Little Fishes Swim School	C		8/9/2020																								$7,900 estimated loss-Water damage to doors, retail products, office equipment, pool operations, utility equipment. Loss of revenue & increased payroll expenses incurred.
421 Hanley Ind. Ct.	Stricker Auo Center	C		8/12/2020																								$150,000 estimated loss-20 automobiles ruined; auto repair equipment ruined; massive building damage.
423 Hanley Ind. Ct.	Adgraphix, LLC	C		8/9/2020																								$7,471.52 estimated loss-Water damage on reflective & non-reflective print & adhesive materials.
425 Hanley Ind. Ct.	K. Hall, Aspen, Engraphix, Adgraphix, Meridian, ITC	C		8/9/2020																								$30,000 estimated loss-Flood water into building from creek overflow.
8930 Harrison	Karen Smith	R	314-963-9651			Y	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	Y	5	5		Many questions answered "no" were a significant problem before MSD did some mitigation. 30 years ago there was significant flooding into the basement & a very wet yard. Raw sewage backed up into the basement. Owner efforts include new roof & gutters, sealing basement, fencing & stone work in the yard, installing drain tile & sump pump & disconnected downspouts. MSD installed box culvert under street. Neighborhood yards are not graded for good water control & downspouts are connected to sewers. This property sits at low point.
8936 Harrison																											
9000 Harrison																											
9004 Harrison																											
9012 Harrison																											
9014 Harrison																											
8506 Henrietta																											
8601 Henrietta																											
8637 Henrietta Ave.	Beth Erman	R	[redacted]		N	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y-walls / floor drains	N	Y	N	N	Y	N	N	N	Y	5+	5+	Henrietta & Adj. Property	This property is at the corner of Henrietta, which is a downhill street, so all water flows to this address. There are several places outside where water seeps in the house during heavy rain or standing water. There is also a storm drain at side driveway that is sloped downward to the house. That drain has been overwhelmed more than once which led to water in the basement.
2555 Hermelin Dr.	Meridian Medical Technologies / Pfizer	C		8/9/2020																								$30,000 estimated loss-Heavy mud & water inside building required clean-up. Flood impact was to 2555 Hermelin Dr. and to 8030 Litzsinger Rd. & 8053 Litzsinger Rd. which are MMT owned
2434 High School Dr.	Chris Miranti	R	pokikki2@gmail.com		Y	Y	Y	Y	N	Y	?	Y	N	Y	N	Y-floor / floor drains	?	N	N	N	N	Y	N	Y	Y	5+	5+	Street	Excess water comes from south of 2434 High School but not sure where it starts and drainage creates its own path across several properties. As impervious surface has increased over last 15 years, problem has worsened. Wet area (standing water, wet "sponge") has gotten larger, lasts longer into summer. 2021 never got & stayed dry all summer. Read water in structure questions-rare; soil either saturated, or sewers had construction debris in them.
2505 High School Dr.																											
2509 High School Dr.																											
2525 High School Dr.																											
2529 High School Dr.																											Stormwater runoff has caused several car accidents when it ices over the the winter
2331 Hilton																											
Intersection (Salem Rd. & Barnstable Ct.	Alicia Kueper	R	618-830-6427		N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	1	5+	Intersection & 9 Barnstable Ct.	The intersection of Salem & Barnstable has a constant pool of shallow water on the road. Seems to seep up from the ground. It freezes in winter and has been this way for over a year.
8505 Joseph																											
8506 Joseph																											
8511 Joseph																											
8514 Joseph																											
8602 Joseph																											
8606 Joseph																											
8608 Joseph																											
8614 Joseph																											
8616 Joseph																											
8624 Joseph																											
8627 Joseph																											
8730 Keystone																											
2238 Laverne Ct.	Karen McMahon	R	kmac1984@att.net / 314-313-7984		Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y-floor,floor drains	?	N	N/A	N/A	N/A	N/A	Y	N	Y	5+	5+	Laverne Ct. / White Ave.	MSD has checked pipes multiple times & no problems. Plumber assessed property & no problems. Floor drain in basement floods during heavy rains & results in damage.
2239 Laverne Ct.																											
8780 Lawn Ave.																											
8782 Lawn Ave.																											
8835 Lawn Ave.																											
8908 Lawn Ave.																											
8917 Lawn Ave.																											

8922 Lawn Ave.	Wes Berg & Katie Berg	R		8/10/2020	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	N	N	Y	Y	5	5	Lawn Ave. - We are at a low spot (middle of Lawn Ave. east of High School	$5,000 estimated loss-Saturated wall in basement requires removal & demolition; carpet ruined too. Storm water drainage flowing up through basement drain. MSD inspected & will have a contractor install a "flap valve" to prevent stormwater backup in their home. Homes on Lawn still have sanitary & stormwater drainage combined. Our yard slopes, south is much lower than north.
8934 Lawn Ave.																													
9006 Lawn Ave.																													
9010 Lawn Ave.																													
9015 Lawn Ave.																													
8037 Litzsinger Rd.	Post Holdings, Inc.	C		8/9/2020 8/10/20 8/12/2020																									$140,000 estimated loss-Garage door forced inward due to rising water causing building interior flooding of up to 3' in depth at 8037 Litzsinger Rd. & flooding occurred at 8047 Litzsinger Rd.
8047 Litzsinger Rd.	Post Holdings, Inc.	C		8/9/2020 8/10/20 8/12/2020																									$85,000 estimated loss-Flooding caused mold issues. Costs for mold remediation were not included. Stored furniture & fixtures damaged.
8755 Litzsinger Rd.																													
2440 Louis Ave.																													
2441 Louis Ave.	Nikki Zavradinos	R	314-420-4884		Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	Y	N	N	5+	5+	Salem Ave. & Marblehead Ct.	A large hill drains toward yard and carport & causes significant water issues. The drain in front of yard does not have adequate flow. Mud collects at end of street.
2449 Louis Ave.																													
8416 Manchester Rd.	K. Hall Design	C		8/9/2020																									$100,000 estimated loss-Interior damages to floors & walls-approximately 30" of water inside building
8600 Manchester Rd.	T+C Properties, LLC	C		8/9/2020																									$500,000 estimated loss-Flood water into building
2429 Mari Kay																													
2443 Mary Ave.	Jeff Gould	R			N	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	5+	5+	Mary Ave. / Drainage Ditch	Excess water comes from Mary Ave. & the drainage ditch on Rogers Parkway. Improper fall on street to drain water, leaving large puddle for days. This often ices during winter.
2521 Melvin																													
9 Middlesex Drive	Richard & Kathleen Gregory																												
23 Middlesex Drive	Scott & Eileen Reese																												
26 Middlesex Drive	Caron Bourke																												
31 Middlesex Drive		R																											Standing water between yards 31 Middlesex Dr. & 69 York Dr.
42 Middlesex Drive	Jose & Stephanie Martin																												
8817 Moritz Ave.																													
8821 Moritz Ave.																													
8901 Moritz Ave.																													
9004 Moritz Ave.	Christina Ahlers	R	christinaahlers@yahoo.com																										Home was built in 2019. The builder was told by the City that the runoff had to be in front yard, not under the sidewalk. The sidewalk in front of house is now wet 24/7. The runoff goes directly into the sidewalk. In the winter, it becomes a sheet of ice. The sidewalk is an eyesore with cracks, mold & wetness. Grass will not grow due to excess water.
9007 Moritz Ave.																													
9109 Moritz Ave.	Max Breitmayer	R	267-421-3432		Y	Y	N	N	N	N	Y	Y	N	N	N	Y-floor/walls	Y	Y	Y	Y	Y	Y	Y	N	Y	4	5+	9105 Moritz & Ave.	Adjacent home at 9105 Moritz has sump pump that discharges directly onto driveway (up to 20 feet from property line) - During winter, the driveway of 9109 Moritz is very icy & dangerous. In addition to overloaded storm system there is strong sewage smell at corner of Moritz & High School, as well as St. Clair & Moritz corner. The system seems to be blocked or not pumping sewage in a timely manner.
34 Northcote Road	Ryan & Julie McDonald																												
1923 Parkridge Ave.																													
1930 Parkridge Ave.																													
2309 Parkridge Ave.																													
2217 Parkridge Ave.	Ann Doyle					Y	Y	Y				Y				Y													There is an MSD drainage area behind the house, but the area is constantly overgrown & there are sinkholes which are a breeding ground for mosquitoes, etc. in Spring/Summer. Water rushes into the basement when there are big storms.
2222 Parkridge Ave.																													There is water drainage on sidewalk in the middle of the block between Parkridge & St. Clair at White-behind 2222 Parkridge & 2237 St. Clair. It seems that many of the homes on the block north of this point drain water to the back & it eventually reaches the sidewalk. It gets icy during winter months.
2317 Parkridge Ave.																													
2301 Parkridge Ave.	Nancy Parker Tice	R	314-322-7450																										Resident reports that there is water that flows from up White Ave. & combines with the water discharged from sump pump to create an icy mess on the south side of White next to driveway & going to intersection at Parkridge/White. This may be a nuisance issue rather than a spot to be studied but since similar situations have been reported, resident feels this should also be reported. The cold weather was a reminder.
2323 Parkridge Ave.	Thomas Anderson	R	tja4020@gmail.com		Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y-Walls / Windows	N	N				N	N	N	Y	5	5	From yard drain that runs across sidewalk in freezing weather	There is a yard drain system (see picture) installed years ago to pickup water from the downspouts, neighbors and church property. It all drains from pipe & runs down short hill go sidewalk. The City put a drainage cut & grate across the sidewalk to mitigate the water flushing across the sidewalk. In cold weather, it freezes over & the sidewalk can have feet of ice across it. **(Waiting for Questionnaire mailed per Property Owner)**
2351 Parkridge																													

9333 Parkside	Michael Leahy	R	mdleahy@att.net		N	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	Y	Y	N	Y	N	N	N	Y	5+	5+	Adjacent Property	Excess storm water comes from Mounty Calvary Church parking lot run off directly & from neighbor's yard. Property owner has downspouts & hard surfaces with nowhere to drain due to the church situation. The new Litzsinger sidewalk & curbs dam the water until it rises high enough to flow over property owner's driveway approach. 1) Lawn erosion is occurring along Litzsinger sidewalk due to poor backfilling, grading, sod installation back in 2015/2016. 2) Water pools on Parkside Dr. at Litzsinger & freezes in winter.
9357 Parkside																												
9361 Parkside																												
9411 Parkside																												
9424 Parkside																												
2301 Patton Ave.																												
2307 Patton Ave.	Jacqueline Winkler	R	314-267-5276		Y	Y	N		N	N	N	N/A	N/A	N/A	N/A	N/A	N/A	Y	N	Y	N	Y	N	N	Y	5+	5+	2301 Patton Ave.	Excess storm water is in front of sidewalk coming from a pipe that is buried. The pipe is located in front of 2301 Patton Ave. There is standing water & drainage continuously. This was not a problem before home was remodeled & sold. As part of remodel, standing water issues in the back side yard were re-routed to tie into the pipe that now leads to the street. Currently, there is constant water on the street draining from the pipe. The pipe sits too high & gets clogged. Neighbors are concerned when winter comes and cold weather, there will be resulting ice issues.
2311 Patton Ave.																												
2311 Patton Ave.	Nancy Swanson	R		8/9/2020																								Approximately 14" of water in basement & 12" of water in backyard due to rain. No loss of property was listed, but hours of cleanup.
2324 Patton Ave.																												
2326 Patton Ave.																												
8914 Pine Ave.	Jonathan Schmid	R	[redacted]		Y	Y	Y	N	Y	Y	N	Y	Y	N	Y	N	N	Y	N	N	Y	N	N	N	N	4	4	Pine Ave.	Water enters backyard from the street down the driveway. Flooding enters the garage. There is an MSD storm drain inlet in property's backyard but it gets overwhelmed with the amount of water entering backyard from the street.
9002 Pine Ave.																												
9135 Pine Ave.																												
9144 Pine Ave.																												
9327 Pine Ave.																												
9400 Pine Ave.																												
9409 Pine Ave.																												
9429 Pine Ave.																												9429 Pine-Email from homeowner of 9429 Pine: Hi Nancy, during last nights storm, I walked out to McKnight to observe all of the water coming down McKnight past Whitehall Lane towards Pine Ave. There is a curbside storm drain on McKnight between the first house on Whitehall (2 Whitehall Ct.) & the fist house on Pine Avenue (9433 Pine) Unfortunately, the drain seems to have been placed on the wrong side of the Whitehall House's driveway. Most of the water coming down McKnight enters that person's driveway instead of flowing into the storm basin and instead enters a culvert in the backyard of 9433 Pine. The first three or four houses on Pine Ave. have water that drains to the west and ultimately enters the same culvert. The culvert ends up hitting a water pipe that goes under McKnight & Tilles Park. That culvert & pipe never seem to be able to handle large rains & it seems apparent that with the additional stress of the McKnight water not being routed properly creates an issue for all of us on Pine Ave. as all of our water has nowhere to go. I need help with 2 things: 1. Can something be done about the water coming down McKnight that isn't making its way into the storm basin and is instead flowing into the driveway of 2 Whitehall Court, & subsequently into the local culvert? 2. Whose responsibility would it be to put in a larger pipe from the neighborhood culvert under McKnight Rd. into Tilles? Is this MSD?
9433 Pine Ave.																												9433 Pine - See 9429 Comments
8734 Pine Ave.																												
8744 Pine Ave.																												
8748 Pine Ave.																												
8754 Pine Ave.																												
8758 Pine Ave.																												
9425 Pine Ave.																												
8828 Powell Ave.																												
8837 Powell Ave.	Kelly Reece	R	kelly.ann.reece@gmail.com		Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y-floor	N	N	N	N	N	Y	N	N	N	4	5+	8835 Powell	The adjacent property-8835 Powell, is a rental & gutters are clogged. They pour over the sides when it rains & pool in small side yard between houses. This causes excess water in the soil which causes water in basement of 8837 Powell Ave. due to hydrostatic pressure. Basement would flood following every big rain without sump pump.
8726 Radley																												
8729 Radley																												
8736 Radley																												
8741 Radley																												
1723 Redbird Cv.	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N	N	Y	N	N	Y	N	3	4	Adjacent Bldg	Standing water does not drain from side of 1723 Redbird.
8312 Rosalie Ave.	Michael Gleason	R	michaelpgleason@hotmail.com		Y	Y	Y	N	Y	N	N	Y	Y	N	N	N	N	N/A	N/A	N/A	N/A	N	Y	N	N	5+	5+	Mari Kay Ct. & Eulalie Ave.	2408 Mari Kay Ct. has 5" drain at NE corner of wall (2 ft. from property line) & 2 places under wall. Heavy rain causes water to fill pipe & also come out under the 10 ft. wall at 2 places. Water drain directly into 8312 Rosalie.
8650 Rosalie Ave.																												
8658 Rosalie Ave.																												

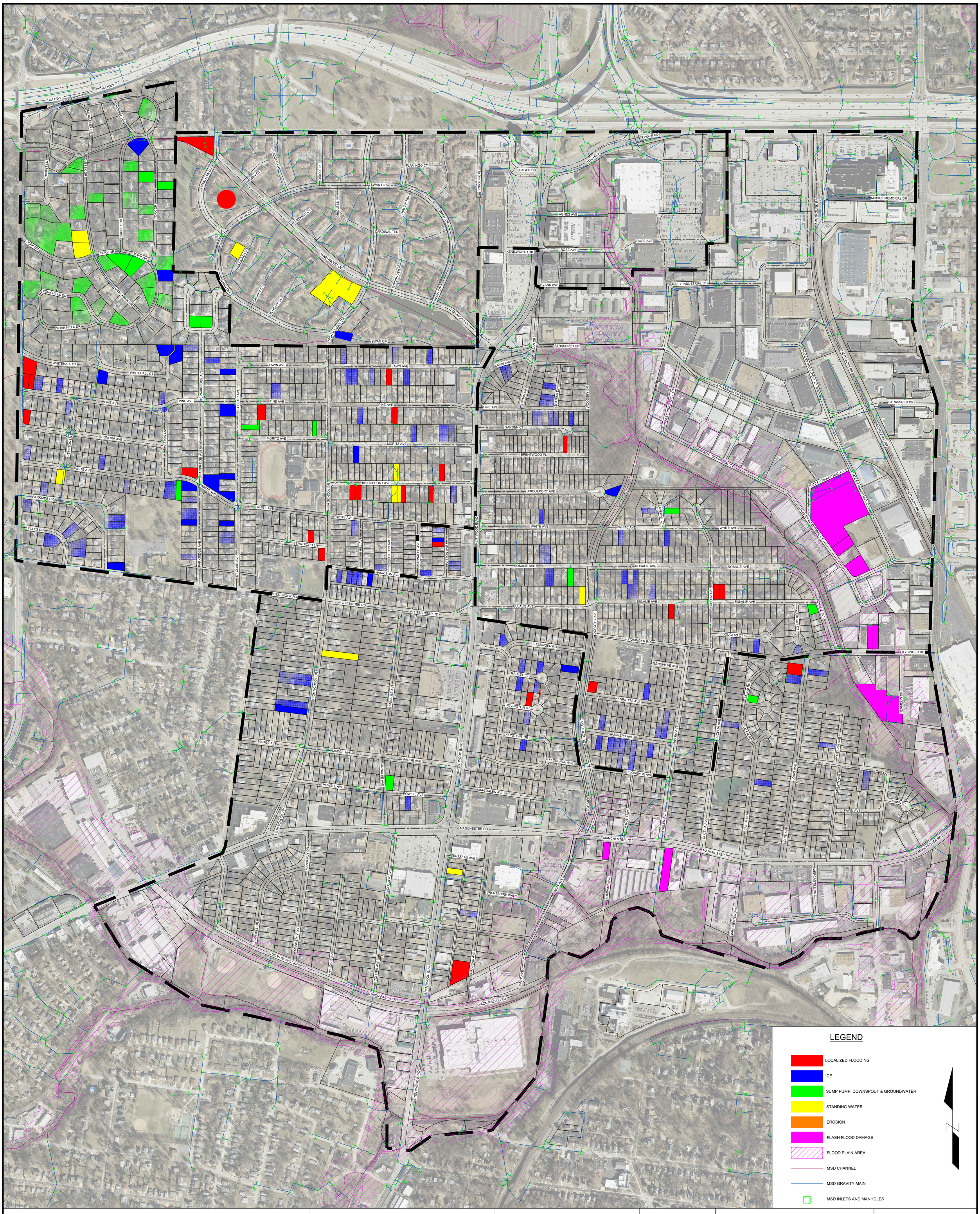
8710 Rosalie Ave.	Jane Torres	R	314-920-0464			Y	Y	Y	N	Y	Y	Y	Y	Y	Y/N	N		Y	Y	Y	Y	Y	Y	Y	Y	Y	5+	5+	Rosalie Ave.	Water comes down the hill; along sidewalk & newly constructed drive. Construction site run-off from the North side of Rosalie. Older properties have natrual springs in the back; they are not being capped or closed when new homes are constructed.
8724 Rosalie Ave.																													
8727 Rosalie Ave.																													
8731 Rosalie Ave.																													
2468 Salem Rd.	Beth Ford	R	314-968-0298		Y	Y	N	N	N	Y	N	Y	N	N	N	Y-Walls	N	N	N	N	N	Y	N	Y	Y	5+	5+	Barnstable & Adj. Property	Excess water comes from Barnstable, adjacent property at Salem & Barnstable with standing water on Barnstable side. There were caves & springs in this area many years ago. Per Dan Gummersheimer-There appears to be a downspout connection on the east of the home that runs underground to a pipe on the road's edge. Since there has been no rain event, this pipe might have a sump pump connection into the same pipe.
2618 Salem Rd.																													
9429 Sonora Ave.	Nikki Glines	R	314-620-0558 nikki saintlouis@yahoo.com		Y	Y	Y	Y		Y	Y	Y	Y							Y			N		Y	5+	5+		There is water pooling at sidewalk/driveway. We've had complaints & have consulted numerous concrete companies. Cannot build up sidewalk as it would cause water to pool toward home & may cause flooding to our home. We've been advised the best remedy is for the City to put in a drain/grates system that ties into the sewer system to handle the water issue.
South Swan Circle	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	Y	N	Y	N	N	N	Y	Y	5+	5+	Adjacent Property	There is constant water trickle onto street from adjacent neighborhood. All seasons - Ices in Winter.
6 Southcote Road	James & Maureen Onder																												
9 Southcote Road	James Rhodes & Mary Schmidtlein																												
11 Southcote Road	Michael Corrigan & Melanie Orear																												
18 Southcoate Road	Ryan & Holly Schuler																												
2015 Spanish																													
2023 Spanish																													
2027 Spanish																													
2101 St. Clair Ave.																													
2116 St. Clair Ave.	Susan Bullington	R	susan.bullington@yahoo.com		Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	Y	N	Y	N	N	Y	Y	N	5+	5+	Pine & Adj. Properties	Excess water comes from Pine, runoff from higher built houses, house that borders this property. It seems that this property is the runoff for all neighboring houses.
2223 St. Clair Ave.		R																											See 2225 St. Clair Ave. Per Dan Gummersheimer - It appears that 2223 and 2225 St. Clair Ave. have downspouts that run underground and a drain pipe that daylights at the curb allowing water to run along the curb & possible freeze.
2225 S. Clair Ave.	Jennifer Sweeney	R																											This property was recently purchased and new property owner has moved-in. There seems to be a constant small drainage of water coming out near the sidewalk which is leading to constant large patches of ice on the sidewalk. Since this property is close to McGrath, there are many children that walk in front of the property. Resident really hopes for resolution. Dan Gummersheimer adds that it appears that 2223 & 2225 St. Clair have downspouts that run underground & a drain pipe that daylights at the curb allowing water to run along the curb & possilbly freeze. This property has the newer home and likely does not have any stormwater BMPs & is much larger in area than the surrounding original homes. Perhaps there is a sump pump that is contributing to the issue too.
2237 St. Clair Ave.		R																											There is water drainage on sidewalk in the middle of the block between Parkridge & St. Clair at White-behind 2222 Parkridge & 2237 St. Clair. It seems that many of the homes on the block north of this point drain water to the back & it eventually reaches the sidewalk. It gets icy during winter months.
2311 St. Clair Ave.	John Cole	R	314-494-8024			Y	Y	Y	Y	N	N	Y		Y	N	N	N	Y	N	Y	Y	Y	N	N	Y	5	5	St. Clair Ave.	A sump pump discharges onto street & every winter it creates a significant ice patch down half of St. Clair. A sidewalk would be great if that discharge could go into a storm drain to prevent the ice. There is low spot on sidewak that collects water from storms (3" deep) lasts for hours & leaves mud patch afterword from run-off.
2319 St. Clair Ave.	Annalise Regan	R	914-806-6734		N	Y	N	N	Y	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	Y	5+	5+	St. Clair Ave.	The water is moving from Litzinger to White & runs down the sidewalk & street up past the curb. The water moving from Litzinger direction is damaging driveway concrete. Property owner hopes for change of path of water to the sewer at White before owner replaces driveway.
2323 St. Clair Ave.																													
16 Stratford Ln.	Suzanne Riordan	R	[redacted]		N	Y	Y	N	Y	Y	Y	Y	N	N	N	Y-floor / floor drains	N	Y	Y	N	N	N	N	N	Y	5+	5+	High School Dr. & Litzsinger Rd.	No add'l comments
24 Stratford Ln.	Laura McAllister	R	314-255-3586		Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y-Floor / Windows / Walls	N	Y	Y	Y	Y	N	Y	Y	Y	5+	5+	Stratford & Adj. Property	Excess water comes from Statford and also from the adjacent property which is 3 yards higher elevation and paved over. All runoff drains onto this property; The adjacent property has a basement garage which limits where runoff can go. This property owner cannot fully utilize basement or backyard due to runoff, flooding and drainage issues from neighboring homes which is the primary concern.
12 Sussex Drive	Lisa Knight (Revocable Trust)																												
26 Sussex Drive	Kevin & Mary Machon																												
1501 to 1507 Swallow Dr.	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	2	4	Adjacent Bldg	Excess water drains from back of building to lower building running off of hill. Note: Drainage ditch on property drains into lake.

1502 to 1504 Swallow Dr.	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N	Y	N	N	N	Y	Y	2	4		Water & mud drain down to back of building causing patios to flood and have mud.
9375 Tilles																													
9379 Tilles																													
9387 Tilles																													
9400 Tilles																													
8622 White Ave.																													
8656 White Ave.																													
8731 White Ave.																													
9000 White Ave.																													
9312 White Ave.	Irene Leland	R	ireneleland@gmail.com		Y	Y	Y	?	?	Y	Y	Y	N	N	N	Y-floor / walls floor drains	?	?								3	3	Possibly White Ave./ Church property behind house	Owner concerned that there is an underground stream at her house. It could be a high water table or underground formation. This area was dotted with caverns & karst since there was a quarry near Manchester & Brentwood 100+ years ago. Six months ago, a worker sprayed a "dry block" along bottom of south wall after water remained sitting in that area. Per Dan Gummersheimer-It appears to be a sanitary sewer issue, possibly failing cast iron in the basement floor. The floor slabs are cracked in many locations and walls covered in mold. We can investigate this concern with the others, but it doesn't appear that storm water is the major issue here.
9320 White Ave.																													
9348 White Ave.																													
9365 White Ave.																													
9402 White Ave.																													Storm water gathered extremely high at the intersection of White & Kempton. Homeowner of 9402 White wondered if the recent MDS work on Sonora has partially clogged the MDS pipes that flow to the west of her home (looks like open lot).
9425 White Ave.																													
2 Whitehall Court																													See Email from Homeowner (9429 / 9433 Pine)
50 Whitehall Court	Suzanne Hyntoriah	R	hyntsm@yahoo.com										N									Y							There is a walkway between Whitehall & Parkridge. It is slippery & always wet from drainage from other subdivision. The neighbors placed drainage to help alleviate it. Neighbors use sump pumps when it rains on walkway.
98 Whitehall Court		R																											The walkway between 99 & 98 Whitehall becomes icy due to water runoff during the winter.
99 Whitehall Court	Krausz family	R																											Significant water from other homes runs into backyard/basement(?)/& through to the front yard. The walkway between 99 & 98 Whitehall Ct gets icy with water runoff during the winter.
9000 Wrenwood Ln	Brentwood Forest Condominium Association	Condos	314-961-3066		Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A	N/A	N	Y	N	N	Y	N	N	Y	Y	2	4	Pool Area	Excess water comes from pool area behind 9000 Wrenwood. There is standing water & earth moving.
18 York Drive	Kurt & Gail Schamel	R	314-315-0202		Y	Y	Y	N	Y					N	N	N	Y	Y	N		N	Y		Y	Y	2			Downpours cause flooding of the storm creek occasionally. Major concern is water draining from properties throughout the neighborhood through curb cuts all seasons & west end creek (near corner of Sussex) is usually wet causing an erosion problem.
27 York Drive		R																											The problem seems to be the elevation & lack of stormwater at the low elevations.
28 York Drive	Bob Shelton	R	sheltonb@town-and-country.org		Y	Y	Y	Y	Y	N	N	Y		Y	Y	N	N	N	N	N	y	N	Y	Y	N	5+	5+	Adjacent property to the south	
31 York Drive		R																											The problem seems to be the elevation & lack of stormwater at the low elevations.
39 York Drive	Joan Guyol (Trustee)																												
47 York Drive	John Kretchmar & Amy Wellington																												
56 York Drive		R																											Drain Pipe seems to be the problem between 62 York Dr. and 56 York Dr.
62 York Drive		R																											Drain Pipe seems to be the problem between 62 York Dr. and 56 York Dr.
69 York Drive		R																											Standing Water Between yards of 69 York Dr. & Middlesex Dr.
79 York Drive	Lawrence & Karen Lavin																												
12 York Hills Drive	Hannah Thielemier																												
14 York Hills Drive	George & Barbara Clements																												
20 York Hills Drive	Thomas & Donna Kniest																												
21 York Hills Drive	Stevan Stauffacher & Kathleen Ryan																												
24 York Hills Drive	Mary Grace Guyol																												
26 York Hills Drive	Mary Gunther (Rev. Trust)																												
27 York Hills Drive	Peat Easterling Family Trust																												
6611 Yorkshire Ln																													
56 Yorkshire Ln Ct		R																											Note: 56 & 66 Yorkshire Ln. Ct. are the same building/property. Dan Gummersheimer notes that it is probably a downspout issue at the sidewak between the houses.
66 Yorkshire Ln Ct		R																											Note: 56 & 66 Yorkshire Ln. Ct. are the same building/property. Dan Gummersheimer notes that it is probably a downspout issue at the sidewak between the houses.

Appendix H

City of Brentwood - Storm Water management Plan						
Stormwater Ranking System - Severity Multipliers						
Multiplier	***Erosion***	***No. of Structures Flooding***	***Property Structure Damage***	***Obstruction of Traffic***	***Property Ponding/Nuisance***	***Location Factor***
1	Localized	1 Buildings	Water on property, not near home	Stays within infrastructure (gutters, pipes, inlets) and drains as designed	Water stays confined to drainage ways	Flow origin - Confined to property in question
2	Loss of Yard	2 Buildings	Near home, no entry	Localized ponding around drainage structures, during storm event	Creates standing water > than 2 Hours	Flow origin - Adjacent properties
3	Damage to property	3 Buildings	Water in home, through walls, etc. (walkout basement)	Overtopping roadway pavement, residents have secondary access to property	Creates standing water > than 1/2 Day	Flow origin - ROW and private infrastructure
4	Structural Stability	>4 Buildings	Water in home, through doors, windows, etc. (non-walkouts)	Overtopping roadway pavement, residents have NO secondary access to property	Creates standing water > than 1 Day	Flow origin - City infrastructure and/or ROW

Appendix I



LEGEND

- LOCALIZED FLOODING
- ICE
- SUMP PUMP, DOWNSPOUT & GROUNDWATER
- STANDING WATER
- EROSION
- FLASH FLOOD DAMAGE
- FLOOD PLAIN AREA
- MSD CHANNEL
- MSD GRAVITY MAIN
- MSD INLETS AND MANHOLES

AERIAL MAP EXHIBIT

CITY OF BRENTWOOD STORMWATER MANAGEMENT PLAN

ST. LOUIS COUNTY, MO

CITY OF BRENTWOOD
2438 BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144
PHONE: (314) 962-4800
WWW.BRENTWOODMO.ORG

GONZALEZ COMPANIES, LLC
1750 BRENTWOOD BOULEVARD
SUITE 700
ST. LOUIS, MISSOURI 63144
PHONE: (314) 961-1888
WWW.GONZALEZCOS.COM
MISSOURI STATE CERTIFICATE OF AUTHORITY #2005038353

gonzalez

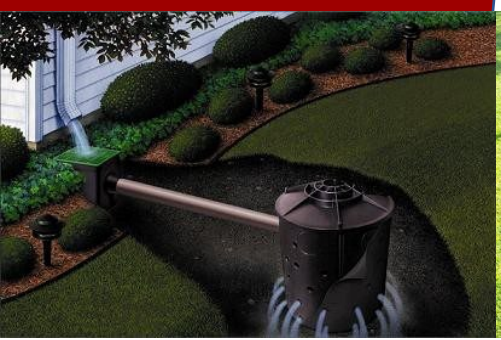
1750 S. Brentwood Blvd, Suite 700, St. Louis, MO 63144
Phone: 314-961-1888 | Fax: 314-961-1814 | Website: www.gonzalezcos.com

APPENDIX F

Stormwater Best Management Practices Guide

BEST MANAGEMENT PRACTICES FOR STORMWATER CONTROL

BRENTWOOD
CITY OF WARMTH




BEST MANAGEMENT PRACTICES

FOR STORMWATER CONTROL

CITY OF BRENTWOOD, MISSOURI

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TABLE OF CONTENTS

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BACKGROUND AND PURPOSE

The City of Brentwood is located within the Deer Creek Watershed. Deer Creek is an 11-mile stream that flows throughout 22 municipalities of St. Louis County before discharging to the River Des Peres in Maplewood. The creek is listed on the Missouri Department of Natural Resources Section 303(d) impaired waterbodies list due to urban runoff and storm sewer discharges. Several factors contribute to the loss of water quality in an urban area including runoff from impervious surfaces, trash, land development, and more. The Missouri Department of Natural Resources and the Metropolitan St. Louis Sewer District (MSD) requires the control of stormwater quality and quantity through land disturbance permits for projects that disturb a total of one or more acres.

The City of Brentwood has developed the *Infill Development Stormwater Management Ordinance* to help protect the water quality of Deer Creek and its tributaries, the City's stormwater infrastructure, and private property from damage resulting from stormwater runoff. The purpose of the *Best Management Practices for Stormwater Control, City of Brentwood* is to serve as a supplement to the City Code and assist property owners in the selection and installation of appropriate stormwater management measures. The City acknowledges these alternatives are not all-encompassing solutions to stormwater related issues within the City. Additionally, alternative technologies outside of those presented in this document may be used subsequent to the approval of the City Engineer.

This guide and the Infill Development Stormwater Management Ordinance are not meant to substitute for the Metropolitan St. Louis Sewer District (MSD) Rules and Regulations and Engineering Design Requirements for Sanitary Sewer and Stormwater Drainage Facilities, February 2018, or most current version, which must be used for sites that propose more than one (1) acre of land disturbance.

The Infill Development Stormwater Management Ordinance and this Best Management Practices for Stormwater Control apply to property improvements of less than one acre (not regulated by MSD), but which create a net additional impervious area of 200 square feet or greater on commercial, industrial, or residential real property through new development, redevelopment, or rehabilitation of existing lots. Lots consisting of residential real property are regulated by this ordinance if there is creation of net additional impervious area of 200 square feet or greater, **AND** the change or improvement requires review by the City's Architectural Review Board in accordance with Section 400.920 of the City Code.

REQUIREMENTS FOR STORMWATER MANAGEMENT

Land development permanently alters the way in which stormwater flows across a site due to grading, compaction and the installation of impervious cover. The keys to managing stormwater runoff are proper grading and erosion control techniques during construction, reliance on infiltration where conditions are suitable, proper installation and maintenance of sources of concentrated flow, and runoff reduction. The property owners of the City of Brentwood can meet runoff reduction requirements through the implementation of best management practices (BMPs) for the control of stormwater.

The volume of stormwater that must be reduced is directly related to the drainage area contributing to the treatment technology. The City of Brentwood requires that the first **1.14 inches** of rainfall over the BMP contributing drainage area be captured and temporarily stored before allowing it to infiltrate into the soil over a continuous period and/or evaporate, evapo-transpire, or be reused.

SUBMITTAL INFORMATION

In addition to the Infill Development permit application and the associated requirements, the following information must be submitted to the City of Brentwood for review and approval for any proposed BMP technology, including those not discussed in this document:

- ✓ Description of existing conditions and vegetation where BMP(s) is proposed.
- ✓ Determination and calculation of BMP contributing drainage area (A).
- ✓ Calculation of required water quality volume (WQ_V) as discussed in the attached "How to Determine the Water Quality Volume of Your Proposed BMP".

$$WQ_V = \frac{(1.14)(R_V)(A)}{12}$$

- ✓ Site infiltration rate in inches/hour as outlined in the attached "How to Perform a Soil Infiltration Test". ***If you choose not to perform a soil infiltration test an infiltration rate of 0.05 inches per hour will be assigned to your site***.
- ✓ Completed "Brentwood Stormwater Technology Sizing Calculations Guidance" document attached.
- ✓ Plan and elevation sketch of proposed BMP location(s) that shows delineated area to be directed to BMP, dimensions between proposed BMP and existing buildings, concentrated stormwater discharges, surrounding impervious areas, overflow pipe(s) and property lines.
- ✓ Details and/or product information on proposed BMP(s) and installation methods/instructions if available.

In addition to the information listed above, any required submittals outlined at the end of each BMP technology evaluation must be submitted prior to the construction and/or installation of any stormwater management technology.

The City of Brentwood reserves the right to:

- Require a Professional Engineer (PE) seal on the drawings, and/or
- Require MSD review and approval of certain projects that are less than one (1) acre of land disturbance.

MAINTENANCE AND INSPECTIONS

Regular inspection and maintenance of stormwater management technologies is imperative to ensure proper operation. Each BMP evaluated in this document includes discussion on maintenance and inspections that property owners are expected to perform following the installation of the selected technology. Additionally, inspections will be conducted by the City at the following intervals:

- During construction
- One-year after construction of the BMP is completed, and
- Three-year intervals after the one-year inspection.
- Reinspection of the review and approval of a Certificate of occupancy in accordance with Section 400.1240 of City Code

Prior to plan approval, the property owner(s) of the stormwater management site(s) shall execute a Maintenance Agreement for the urban BMPs to ensure the treatment unit will be kept in working order to the satisfaction of the City. The City will **not** be responsible for maintenance of BMPs.

STORMWATER MANAGEMENT TECHNOLOGY ALTERNATIVES

The following stormwater management technologies were developed for consideration in urban development applications. The technologies identified are not intended be to all-encompassing solutions to stormwater management. Additionally, stormwater management technologies not included in this document may be utilized subsequent to approval by the Director of Planning and Development, with approval from the Public Works Director.

DRY WELLS

A dry well is an excavated pit, perforated pipe, or tank that is set in the ground and designed to intercept and temporarily store stormwater runoff until it infiltrates into the soil. This guidance document discusses two design options for a dry well: with and without fill. A dry well with fill is filled with stone or gravel, typically 1.5 to 3-inches in diameter, while a dry well without fill is an empty perforated pipe or prefabricated tank. Dry wells are well-suited to receive runoff from rooftops, or other impervious areas, with runoff entering the tank via an inlet grate or a direct downspout connection and allowing to collected water to infiltrate over time. However, special consideration must be taken in the location of the dry well so as to not negatively impact existing structures.

A dry well with or without fill should be sized to capture the runoff produced from the design storm over the connected impervious area. The gravel or fill material used in a dry well with fill must be considered in design to ensure the capture and infiltration of the design storm volume. When properly sized and laid out, dry wells can provide significant reductions in stormwater runoff and pollutant loads.

LOCATION

- Dry wells must be located at least 10 feet from building foundations, 5 feet from property lines, and 3 feet from any public right of way.
- To reduce the chance of clogging, dry wells should drain only impervious areas, and runoff should be pretreated to remove leaves, debris, and other large particles.
- The height of the tank should not exceed 72 inches unless infiltration testing has been done to ensure a drain time of 72 hours or less.
- Dry wells should be located in a lawn or other pervious (unpaved) area and should be designed so that the top of the dry well is located as close to the surface as possible.
- NOTE: Dry wells should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; or (3) over other utility lines;

CONSTRUCTION

- Ensure outlet daylights or is discharged through a popup emitter at least ten feet from property line. Always call Missouri One Call to locate utility lines before you dig.
- Determine the required water quality volume.
- Perform an infiltration test.
    - **If the measured infiltration rate is less than 0.25 in/hr, a dry well is not suitable for your site.**
    - If the measured infiltration is higher than 0.50 in/hr, the size of the dry well can be reduced. For every 0.5 in/hr increase in measured infiltration rate above 0.50 in/hr, subtract ten percent of the required dry well size as measured in square feet captured.
- Determine the required size of your dry well. Take any gravel fill materials that are used into account by dividing the water quality runoff volume by the 40% void space to ensure the capture and infiltration of the design storm volume.

    Dry Well Volume without Fill: _____ gal.÷ 7.48 = _____ cubic feet
    Water Quality Volume

    Dry Well Volume with Fill: _____ gal.÷ 0.40÷ 7.48 = _____ cubic feet
    Water Quality Volume

- Measure elevations and dig the hole to the following required dimensions.
    - Over-excavate the soil under the dry well at least one foot in depth.
    - The width of the excavation should be two feet larger in diameter than the well to allow for a 12-inch stone fill jacket
    - Scarify the bottom soil surface 3-4 inches.

    Note: The sides of the excavation should be trimmed of all large roots that will hamper the installation of the permeable drainage fabric used to line the sides and top of the dry well.

- Place and tamp 6” to 12” of clean, washed ASTM #57 gravel in bottom (½ inch to 1 ½ inch diameter stone). Pea gravel can be substituted for leveling purposes in the upper three-inch layer below the tank.
- For dry wells with gravel fill, gravel should be a minimum of 2-inches in diameter.
- Place and secure filter cloth down sides of the excavation leaving enough to fold over the top below the soil and turf.
- Place tank and install piping. Bond top of tank in place.
- Cut and route downspouts or other rainwater delivery components. For rooftop runoff install a fine mesh screen in the gutter or downspout, prior to entering the dry well, to prevent leaves and other large debris from clogging the dry well. For non-rooftop runoff precede the dry well with an in-ground sump grate or inlet leaf trap.
- Create a safe overflow, such as vegetated filter area or grass channel, to safely convey the stormwater runoff generated by larger storm events bypassing the dry well. The overflow should be a minimum of 10 feet from your property line.
- Test connections with water flow.
- Fill with gravel jacket around tank and place permeable fabric between gravel and soil.
- Backfill with soil/sod or pea gravel.
- Consider aesthetics as appropriate and erosion control for overflow.

VEGETATION

- If receiving water from surface features other than a pipe, such a sheet-flow runoff from an impervious surface, the landscaped area above the surface of a dry well should be covered with pea. This pea gravel layer provides sediment removal and additional pretreatment upstream of the dry well and can be easily removed and replaced when it becomes clogged.
- Alternatively, a dry well may be covered with an engineered soil mix and planted with a managed turf or other herbaceous vegetation.

MAINTENANCE

Annual maintenance is important for dry wells to ensure they continue to provide measurable stormwater management benefits over time.

- Inspect gutters and downspouts removing accumulated leaves and debris.
- Inspect dry well following large rainfall events to ensure overflow is operating and flow is not causing problems. Standing water should not remain in an exposed dry well for more than three days.
- If applicable, inspect pretreatment devices for sediment accumulation. Remove accumulated trash and debris.
- Inspect top layer of filter fabric for sediment accumulation. Remove and replace if clogged.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction. in addition to the "Submittal Information" previously outlined in this document for review and approval prior to the construction and/or installation of a dry well for stormwater management:

- ✓ Required Water Quality Volume: _____(ft^3)
- ✓ Site infiltration rate: _____ (in/hr)
  - Is BMP suitable for site? YES NO
  - Can BMP size be reduced? YES NO
    - If yes, revised calculation: _____
- ✓ Tank diameter/width: _____ (inches)
  - Tank height: _____ (inches)
  - Gravel bed depth: _____ (6 or 12 inches)

RAIN BARRELS

A rain barrel is a 50 to 200 gallons tank used to collect and store rainwater runoff from roofs. The tank(s) are placed under a gutter downspout and fitted with a screen or filter to keep debris and insects out of the barrel. Tanks are equipped with an upper overflow spigot and a lower spigot that allows for the connection of a hose to be used for watering vegetation. Multiple rain barrels can be used at a gutter downspout by connecting the tanks at the overflow spigot.

LOCATION

- Rain barrels should be placed under gutter downspouts on a level, firm surface that is within 25- feet of vegetated landscape.
- It is recommended that rain barrels be elevated off of the ground since the output for watering is gravity flow.
- Rain barrels should not be located near retaining walls.

CONSTRUCTION

- Locate potential rain barrel location(s) at level, firm surfaces near downspouts and within 25-feet of vegetated landscape located down-slope of the rain barrel.
- Determine the required tank sizing. See the submittals section of this technology evaluation for guidance on BMP sizing.
- Purchase rain barrel that provides required volume.
    - Rain barrel should be opaque and dark in color to prevent UV light penetration and discourage algae growth.
- Install rain barrel on stable elevated surface to allow for gravity drainage of the tank to provide irrigation to surrounding vegetation.
    - Rain barrels may be anchored or strapped to the exterior wall or foundation to prevent tank from tipping over.
    - If installed on a sloped surface, the base where the tank is installed should be leveled using appropriate construction materials prior to installation.
- Configure downspout to drain and fill rain barrel. Install screens on tank to remove debris and large particles. Removable child-resistant covers and mosquito screens are recommended.
- Install overflow spigot to drain away from foundation, but not within 10-feet of property line.

MAINTENANCE

- Perform regular cleaning and maintenance of rain gutters to prevent clogging of rain barrel filters.
- Inspect rain barrel regularly following major storm events. Replace or repair screens, spigots, and downspouts as necessary.
- If adequate mosquito control is not in place and well-maintained, rain barrels will need to be regularly emptied to prevent vector breeding.
- During dry periods, when the rain barrels are not in use, leave spigot drains open to completely drain tank.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of rain barrel(s) for stormwater management:

- ✓ Plan and elevation sketch of proposed rain barrel that shows delineated area to be directed to treatment technology and dimensions to down-slope vegetated area that the rain barrel will irrigate.
- ✓ Determine required water quality volume:

$$\text{Contributing Drainage Area } (ft^2) \times 1.14 \text{ in} \times \frac{1 \text{ foot}}{12 \text{ in}} = \_\_\_\_\_ (ft^3)$$

$$\_\_\_\_\_ (ft^3) \times 7.48 = \_\_\_\_\_ (gal)$$

MODIFIED FRENCH DRAINS

Modified French Drains (MFD) are open or covered trenches containing a perforated pipe to intercept and temporarily store stormwater runoff until it infiltrates into the soil or is redirected to an area designed to allow water to soak into the soil. MFDs are particularly well suited for wet problem areas, such as next to downspouts or other small impervious areas. In Brentwood, only the daylighted French Drain version is permitted. The perforated pipe is daylighted at its end to allow for overflow of larger storm events as a failsafe mechanism if infiltration is less than anticipated.

LOCATION

- MFD trenches should be located at least 5 feet from building foundations and 10 feet from buildings with basements and property lines. The top end of the MFD can be adjacent to the building to connect downspouts but should be directed away from the structure.
- MFD's should slope away from existing structures between 0.5% and 6%. The MFD can be serpentine or multipronged in construction if sufficient slope is available.
- To reduce the chance of clogging, MFD's should drain only impervious areas equipped with a pretreatment technology to remove leaves, particulates, and other larger debris.
- MFD gravel depths should be at least 18 inches and no more than 36 inches.
- MFD's should be located in a lawn or other pervious (unpaved) area and designed so that the top of the MFD is located as close as possible to the soil surface to reduce digging.
- NOTE: MFD's should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; or (3) over other utility lines. Always call Missouri One Call to locate utility lines before you dig.
- The downstream end of the pipe must daylight or be discharged with a pop-up emitter for overflows at least ten feet from the property line.

CONSTRUCTION

- Review potential MFD areas and layout.
- Measure the contributing drainage area.
- Determine required MFD sizing to contain the water quality volume. See submittals section of this technology evaluation for guidance on determining required BMP sizing.
    - As a rule of thumb, there should be about 23 cubic feet of stone for every 100 square feet of rooftop. Recommended design trench width ranges from 18 to 32 inches.
- Perform an infiltration test.
    - **This technology is only suitable where infiltration rates equal or exceed 0.25 in/hr**.
    - If the infiltration rate is more than 0.50 in/hr, the length of the ditch may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
- Measure elevations and lay out the MFD to the required dimensions marking the route and required excavation depths. Often a level line (torpedo level) is used.

- Remove sod and excavate ditch to the depth of the gravel plus six inches for topsoil/pea gravel and three additional inches to accommodate half the pipe depth. Be careful not to compact soils in the bottom. Level the bottom laterally as much as possible to maximize the infiltration area.
    - The sides of the excavation should be trimmed of all large roots that will hamper the installation of the permeable drainage fabric to be placed part way down the sides and above the gravel layer on top of the MFD.
    - Scarify or till the native soils along the bottom of the MFD to a depth of 3-4 inches.
- A vegetated filter strip area must be designed to safely convey stormwater runoff generated by larger storm events out of the downstream end of the MFD. The perforated pipe must daylight at the downstream end of the trench.
- Place and tamp clean, washed ASTM No. 57 stone to planned depth. Then place and embed a six-inch diameter perforated pipe. The pipe should have 3/8-inch perforations, spaced 6 inches on center, and have a minimum slope of 0.5% and a maximum slope of 6%.
- Place and gently tamp No. 57 stone until it covers the top of the pipe an average of ½ inch to 1 ½ inches.
- Place permeable landscape fabric over soil/pea gravel to prevent it from migrating into the stone and clogging the pore spaces; leave a four to six-inch space above the pipe to the ground surface.
- Cover the topsoil and sod or with pea gravel.
- For rooftop runoff, install one or more leaf screen options upstream from/ahead of the MFD to prevent leaves and other large debris from clogging the MFD. For driveway or parking runoff a screened inlet grate over a sump or pea gravel pit can be used to settle out material prior to entering the pipe.
- Create a safe overflow at least 10 feet from your property edge and ensure it is protected from erosion.

VEGETATION

- MFD's are normally covered with topsoil and managed turf or other herbaceous vegetation.
- As an alternative, the area above the surface of an MFD may be covered with pea gravel (or larger depending on the inflow rates) to allow for incidental lateral inflow along the edge of ground level impervious surfaces.
- The downstream end of the pipe must be stabilized and can be landscaped for aesthetics.

MAINTENANCE

Annual maintenance is important for MFD's.

- Inspect gutters and downspouts removing accumulated leaves and debris and cleaning leaf removal system(s).
- Inspect any pretreatment devices for sediment accumulation. Remove accumulated trash and debris.
  Inspect MFD's following a large rainfall event to ensure overflow is operating and flow is not causing problems.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of MFP(s) for stormwater management:

- ✓ Required Water Quality Volume: _____(ft^3)
- ✓ Site infiltration rate: _____inches/hour
  - Is the BMP suitable? YES NO
  - Can the size of the BMP be reduced? YES NO
    - If yes, revised required volume: _____(ft^3)
- ✓ Sizing of Modified French Drain.
  - Required storage volume: _____(ft^3)
  - Depth of stone media: _____(ft) [minimum of 8-inches]
  - Length of MFD: _____(ft)

PERMEABLE PAVEMENT

Permeable pavement is any surface that allows water to infiltrate the surface rather than run off, thereby reducing the quantity of rainwater runoff. Common permeable pavements include pervious/permeable concrete, porous asphalt, modular pavers, flagstones, and cobblestones. A layer of crushed rock, called the reservoir, is installed below the pervious pavement to hold the water until it has time to soak into the soil below.

Permeable pavement is well suited for use in the construction of sidewalks, parking areas, patios, and driveways. When installed properly, permeable pavement can provide significant reductions in stormwater runoff and pollutant loads.

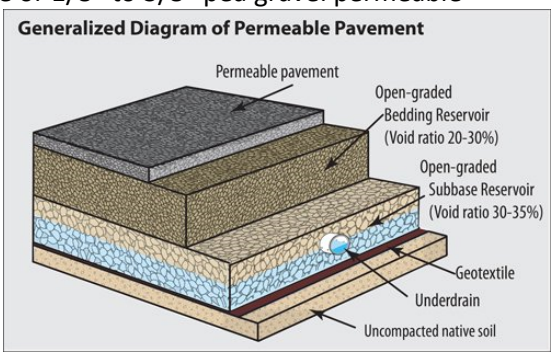
LOCATION

- Maximum contributing drainage area ratio to surface area is 4:1.
- Permeable paver systems should be located at least 5 feet from building foundations, 10 feet from buildings and basements, and be located downhill and/or sloped away from buildings and other structures.
- NOTE: Permeable paver systems should not be located: (1) above an area with a water table or bedrock less than two feet below the gravel bottom or (2) over other utility lines. Always call Missouri One Call to locate utility lines before you dig.
- Permeable pavers should drain only impervious areas. Drainage from other areas onto the pavers will eventually clog them.
- Permeable paver systems should be installed on slopes less than 6% to help ensure even distribution of runoff over the infiltration surface
- Pavers should slope away from structures.

CONSTRUCTION

- Review potential paver areas and layout.
- Measure the contribution drainage area.
- Perform an infiltration test.
    - **If the rate is less than 0.25 in/hr this method can only be used with an underdrain**.
    - If the rate is more than 0.50 in/hr the paver area may be decreased 10% for every 0.50 in/hr of infiltration rate increase above 0.50 in/hr.
- Determine the required water quality volume. The permeable paver system must be designed to capture 100% of the water quality volume. See the submittals section of this technology evaluation for guidance on BMP sizing calculations.
- Determine the required paver area based upon the depth of the lower stone storage layer, which has a minimum design depth of 4-inches.
- Select and design the permeable paver system, which is made up of multiple layers that consist of the following:

- The top course consists of the pavers and a crushed aggregate material swept between the paver joints, such as ASTM No. 8 stone or 1/8" to 3/8" pea gravel permeable asphalt, or permeable concrete.
- The bedding course consists of 2 to 3 inches of No. 8 stone, or 1/8" to 3/8" pea gravel. The bedding course provides a level bed for setting the pavers evenly.
- The aggregate base course consists of a minimum of 4-inches of No. 57 stone. **The aggregate base course acts as a reservoir to provide stormwater storage capacity** discussed in the previous step.



- A permeable drainage fabric must be used to separate the aggregate base course from the subgrade. This fabric must be a needle-punched nonwoven polypropylene geotextile with Grab Tensile Strength greater than or equal to 120 lbs (MSD Type 4 or equivalent).
- Manufacturer's instructions, if available, should be followed in lieu of these guidelines.

- Once the pavement surface is ready to be installed, excavate to final subgrade elevation and scarify soil 3-4 inches.
  - Even though the permeable pavement surface is sloped, the subgrade of the treatment measure should be flat and, in some cases, terraced where the driveway has a steep slope, in order to promote infiltration. Additionally, this will prevent the stormwater from running along the bottom of the subgrade and discharging at the bottom of the slope.
  - Care should be taken to avoid compaction of the soil in the location planned for the permeable pavement surface during construction.
- Place and tamp stones of permeable pavement underlayers to planned depth in no more than 6" lifts. Place and tamp into joints until filled and even.
- Lay paving stone one at a time or using mechanical placement as applicable. Cut stone at edges to fit.
- Install edge restraints per manufacturer's specifications.
- Sweep No. 8 stone or pea gravel into stone joints until filled and even.
- Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure). Strat and support as needed.

MAINTENANCE

Maintenance is very important for permeable pavers systems, particularly in terms of ensuring that they continue to provide measurable stormwater management benefits over time.

- Remove accumulated sediment and debris from joint spaces monthly.
- Monitor the permeable paver system for excessive ponding during storm events and repair as needed. Surface clogging or movement of modular pavers can inhibit drainage and pavement function.
- Vacuum, sweep or blow permeable paver surfaces quarterly to keep the surface free of sediment

- Sweep new No. 8 stone into the spaces between stones as needed. Inspect permeable paver, asphalt , or concrete surface for deterioration annually. Repair or replace any damaged areas as needed.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of permeable pavement for stormwater management:

- ✓ Required Water Quality Volume: _____(ft^3)
- ✓ Site infiltration rate: _____inches/hour
  - Is underdrain required? YES NO
  - Can BMP size be reduced? YES NO
    - If yes, revised required volume: _____(ft^3)
- ✓ Sizing calculations.
  - Depth of stone media: _____(ft) [4-inches to 2-feet]
  - Paver Area:
    Required Water Quality Volume (ft^3) ÷ Depth of Stone Media (ft) = _____ (ft^2)
- ✓ Manufacturer's specifications.

BIOSWALES

A bioswale is a long, shallow depression that is strategically placed to collect stormwater runoff from a rooftop or other impervious channel. They can be vegetated, such as with native perennials, grasses, and shrubs, or filled with rocks and gravel where volume and velocity of stormwater is high. As water flows through the bioswale, stormwater is filtered and soaks in along the channel. If properly installed, bioswales can remove up to 70 percent of nutrients and chemicals from stormwater runoff during a typical rain event. Bioswales are dry most of the time and only hold water during large rain events.

LOCATION

- Bioswales should be installed downhill from buildings and other structures on steeper slopes that are more prone to soil erosion.
- Bioswales must be at least 10 feet away from building foundations, although 20 feet is recommended.
- Bioswales shall not be in the public right-of-way or directly above buried utilities.
- Bioswales should not be located where water tends to pool or where the water table is high.
- Bioswales should not be located where the slope of surrounding areas exceeds 5% unless check dams area used to slow velocity and control flow.
- The bioswale outlet should be at least 10 feet away from any property lines.

CONSTRUCTION

- Determine the location of the proposed bioswale.
- Identify and calculate the BMP contributing drainage area.
- Determine the required water quality volume (WQ_V).
- Determine the required bioswale size. A bioswale must be designed to contain 100% of the WQ_V within its banks with a minimum depth of 0.5 feet.
    - Divide your required volume by your design depth to determine the required surface area to construct your bioswale.
- Perform an infiltration test. **Overall, the infiltration rate of the bioswale must be greater than 0.5 inches per hour.** If necessary, deep aeration and soil amendments may be used to increase infiltration rate.
    - An underdrain system, complete with clean-out pipe(s), may also be used to increase the infiltration rate. Underdrains should be encased in 8 to 12-inches of #2 (2 ½ inch) crushed stone, with a 2-inch layer of #8 (3/8 inch) crushed stone on top (see diagram). Filer socks or geotextile fabric should not be used.
- If check dams are needed or desired, they should be designed to resist washout and scouring.

MAINTENANCE

- Consider plant selection when developing the bioswale for the specific application and location requirements, ease of maintenance, and overall design aesthetics
- Inspect regularly for sediment accumulation and remove any accumulated trash and debris.
- Water as needed to promote plant growth and survival especially in the first two seasons.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of a bioswale for stormwater management:

- ✓ Required Water Quality Volume: _____(ft^3)
- ✓ Site infiltration rate in inches/hour.
  - Is BMP suitable for site? YES NO
- ✓ Determine required bioswale surface area
  - Bioswale Depth: _____(ft) [minimum of 0.5 feet]
  - Bioswale Surface Area: _____(ft^2) [Required Volume (ft^3) ÷ Depth (ft)]
- ✓ A Landscape plan must be submitted to the City for review and approval in conjunction with the Stormwater Infill Development Permit application

VEGETATED FILTER STRIP

A vegetated filter strip is a uniformly graded, vegetated area installed along the perimeter of impervious areas to receive rainwater as sheet flow. The filter strips are designed to slow and filter stormwater runoff to reduce the effects of erosion and pollutant loads.

Conventional vegetated filter strip areas are uniformly graded BMP's that use an area of densely planted vegetation (typically grass) and a flat cross slope to maintain sheet flow and promote infiltration.

LOCATION

- An ideal location for a vegetated filter strip is where there is a gentle slope away from the structure or paved area, the area is relatively flat, and where flow can be evenly distributed along the top of the filter area.
- The ideal slope of the vegetated filter strip area should be between 1% and 5%. Terracing is recommended for areas with greater slopes with level spreaders between each terrace.
- A filter strip area may be placed over utilities except when using amended soils. In that case, ensure utility locations are noted and care is taken to avoid them in soil amendment actions.
- The length of the vegetated filter strip area should be no less than 25 feet. If there is a permeable berm at the lower end, the length of the vegetated filter strip area should be no less than 15 feet. Natural forested areas on site can be counted in the total length of the filter area.
- The area of impervious surface draining to any one discharge location cannot exceed 5,000 square feet.

CONSTRUCTION

- Observe the drainage patterns to determine the best location for a vegetated filter strip area. Assess the drainage area flows on your property, and the slope of the drainage area.
- Perform an infiltration test.
    - **This method is best suited for soils with an infiltration rate greater than 0.50 inches per hour**.
    - If the rate is between 0.25 and 0.50 in/hr, this technology can only be used in combination with the use of amended soil.
    - If the infiltration rate is less than 0.25 in/hr, this method can only be used with an underdrain.
- Measure the area draining to the filter strip and determine required surface area and minimum length based upon the equations presented in the submittals section of this technology evaluation.
    - Conventional vegetated filter strips have a minimum length of 25-feet
    - Vegetated filter strips with a berm have a minimum length of 15-feet
        - The use of a permeable berm at the end of the filter strip increases the infiltration and reduces the required width of the filter area to meet the required treatment volume.
        - Permeable berms should be constructed of well-drained soils (sand, gravels and sandy loams) that support plant growth, and should be no more than 12" high.
        - Appropriately sized outlets should be provided within permeable berms to ensure that vegetated filter areas will drain within 24 hours following the end of a rainfall event.

        - A stone-protected overflow area cut through the berm may be used to manage the stormwater runoff generated by large storm events. The overflow point must be at least ten feet from the property line if flow is directed onto an adjoining property. Erosion protection is critical.
- Lay out and mark the filter strip area, flow spreader line, and inlets.
- Construct a level spreader upstream of the filter area to evenly distribute stormwater runoff. A level spreader is a be 12" to 18" wide and 6" to 12" deep trench filled with pea gravel or ASTM No. 8 stone along a level contour.
    - Depending on the amount of expected flow, larger diameter stone may be required to stabilize entry points for larger contributing impervious areas.
    - To help ensure more even distribution of flow into the filter area, notches can be cut in the level spreader at intervals allowing overflowing water to enter at several locations ahead of general overflow.
    - The level spreader can be connected to the downspout via a T-connection to the perforated pipes embedded in the level spreader trench.
    - Ensure the overflow points are protected from erosion and not blocked by vegetation.
- Prepare soils if necessary and construct the vegetated filter strip by planting dense vegetation, sod, or seed in accordance with the approved plan. Irrigation and erosion control plans should be in place until the vegetation is well established.

VEGETATION

- Vegetation commonly planted on vegetated filter strip area includes turf, shrubs, trees and other herbaceous vegetation.
- Choose grasses and other vegetation that will be able to tolerate the stormwater runoff rates and volumes that will pass through the vegetated filter strip area.
- Vegetation used in filter strip areas should be able to tolerate both wet and dry conditions.
- Consider plant selection when designing the filter strip for the specific application and location requirements, ease of maintenance, and overall design aesthetics
- Refer to "Recommended Plants" attached to this document for more guidance.

MAINTENANCE

Maintain the vegetated filter strip area so that it will continue to provide measurable stormwater management benefits over time.

- Water as needed to promote plant growth and survival, especially in the first two seasons.
- Provide normal turf or garden maintenance – mow, prune and trim needed.
- Inspect the vegetated filter strip area following rainfall events. Correct erosion issues immediately.
- Remove accumulated trash, sediment and debris.
- Ensure the overflow points are protected from erosion and not blocked by vegetation.

REQUIRED SUBMITTALS

The following information is required for submittal to the with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of a vegetated filter strip for stormwater management:

- ✓ Required Water Quality Volume: _____(ft^3)
- ✓ Site infiltration rate: _____inches/hour
  - Are soil amendments required? YES NO
  - Is an underdrain system required? YES NO
- ✓ Which technology option is suitable for the site? CONVENTIONAL BERM
- ✓ A Landscape plan must be submitted to the City for review and approval in conjunction with the Stormwater Infill Development Permit application
- ✓ Sizing calculations based upon ***selected*** design option:

Contributing Drainage Area (square feet)	Filter Strip Type		
	Conventional	Amended Soil	Berm
	Filter Strip Area (square feet)		
100	200	100	75
500	1000	500	350
1000	2000	1000	700
2000	4000	2000	1500
3000	6000	3000	2000
4000	8000	4000	3000
5000	10000	5000	3500

RAIN GARDENS

Rain gardens are small, landscaped depressions designed to collect and detail stormwater from pervious and impervious areas. The gardens allow the absorption of the stormwater by the soil and plants to filter the stormwater. Plants within the rain garden are typically trees, shrubs, and other garden-like vegetation that can sustain periods of draught followed by an inundation of water. If there is not sufficient space for an optimum sized rain garden you may elect to construct a bioswale in conjunction with the rain garden, a series of small rain gardens connected by bioswales, or dig a deeper rain garden.

LOCATION

- Rain gardens should be located in an aera where it will receive the maximum amount of storm water runoff from imperious surfaces and downspouts or driveway runoff. Swales, berms or downspout extensions may be helpful to route runoff to the rain garden.
- Rain gardens shall be located a minimum of 10 feet from foundations, not within the public right of way, away from utility lines, and not near a steep bluff edge. Call Missouri One Call before your dig to locate the utility lines on your property.
- Rain gardens on steep slopes (<10%) may require an alternative design with terracing.

DESIGN

- Locate potential rain garden location(s) where downspouts or driveway runoff flowing away from the home can enter garden.
- Calculate the contributing drainage area, including the square footage of any portions of a roof that drains to downspouts that point to the garden.
- Determine the required size of your rain garden. Use a 5:1 ratio of drainage area to rain garden area, which translates into a rain garden that is approximately twenty percent of the area that drains toward it.
- Perform an infiltration test.
    - **If the soil infiltration rate is less than 0.25 in/hr, an underdrain will be necessary.**
    - If the soil infiltration rate is greater than 0.50 in/hr, the size of the garden may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
- Measure elevations and stake out the garden to the required dimensions.
    - The garden should be a minimum of 8-inches deep to allow for 6-inches of ponding and 2-inches of mulch.
    - A non-eroding overflow should be constructed to allow for a maximum of 6-inches of ponding within the rain garden. The overflow can consist of a small berm or an inlet grate set at the proper elevation in the garden. If an inlet grate is used, it should be set at a slant or be domed to allow clogging debris to fall off.
    - The overflow should be a minimum of 10-feet from your property edge.
    - The perimeter of the garden should be higher than the overflow point.

    - If the garden is on a gentle slope, a berm at least two feet wide can be constructed on the downhill side and/or the garden can be dug into the hillside taking greater care for erosion control at the garden inlet(s).
    - If sides are to be mowed rain gardens should be designed with side slopes of 3:1 (H:V) or flatter.
- Remove turf or other vegetation in the area of the rain garden. Excavate garden being careful not to compact soils in the bottom of the garden. Level bottom of garden as much as possible to maximize infiltration area.
- Mix compost, topsoil and some of the excavated subsoil together to make the "amended soil". The soil mix should be ½ compost and 2/3 native soil (topsoil and subsoil combined). More information on amended soils can be found in the amended soils section of this report.
- Fill rain garden with the amended soil, leaving the surface eight inches below your highest surrounding surface. Eight inches allows for 6 inches ponding and 2" of mulch. The surface of the rain garden should be as close to level as possible.
- Build a berm at the downhill edge and sides of the rain garden with the remaining subsoil. The top of the berm needs to be level and set at the maximum ponding elevation.
- Plant the rain garden using a selection of plants described in the 'vegetation' section of this technology evaluation.
- Build the inlet feature as a pipe directly connected to a downspout or a rock lined swale with a gentle slope. Design the garden entrance to immediately intercept inflow and reduce its velocity with stones, dense hardy vegetation or by other means.
    - Use an impermeable liner under the rocks at the end of the swale to keep water from soaking in near the house. Test the drainage of water from the source to the garden prior to finishing.
- Apply 2 to 3-inches of non-floatable organic mulch (fine shredded hardwood mulch, pine straw or leaf compost) should be included on the surface of the rain garden. Pine bark and wood chips should not be used.
- Water all plants thoroughly as needed to establish plants during the first growing season.

VEGETATION

- Vegetation commonly planted in rain gardens includes native trees, shrubs and other herbaceous vegetation. When developing a landscaping plan, you should choose vegetation that will be able to stabilize soils and tolerate the storm water runoff rates and volumes that will pass through the rain garden.
- Vegetation used in rain gardens should also be able to tolerate both wet and dry conditions. Please refer to the attached "Recommended Plants" for additional information on plants appropriate for rain gardens.
- As with any garden, in the first season the vegetation may require irrigation to become well established.
  It may be appropriate to plant more densely than normal garden to obtain the benefit of plant soil stabilization and evapotranspiration as soon as possible.
- Plant selection when designing the rain garden should consider the specific application and location requirements, ease of maintenance, and overall design aesthetics.

MAINTAINENANCE

- Routine garden maintenance should include weeding, deadheading, replacing dead plants, and replenishing mulch when depleted.
- Inspect after large rain events to ensure proper drainage and operation. If standing water is a persistent problem within the rain garden, it may be necessary to install an underdrain in the rain garden.
- Repair any damage or erosion around the rain garden as soon as possible.
- Often rain gardens have a better appearance and can be more easily maintained if they have defined edges similar to a normal garden.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval prior to construction and/or installation of rain garden(s) for stormwater management:

- ✓ Square footage of contributing drainage area: _____ (ft^2)
- ✓ Sizing calculations.
  Contributing Drainage Area (ft^2) x0.2 = _____(ft^2)
- ✓ Site infiltration rate: _____inches/hour
  - Is underdrain required? YES NO
  - Can BMP size be reduced? YES NO
    - If yes, revised required surface area: _____(ft^2)
- ✓ Design overflow structure to allow for maximum ponding depth of 6-inches.
- ✓ A Landscape Plan must be submitted to the City for review and approval in conjunction with the Stormwater Infill Development Permit application

AMENDED SOILS

Amended soils are to only be used in conjunction with other BMP technologies, as specified in this document. Compacted soils cause stormwater runoff due to the fact that very little water can be absorbed. According to the Missouri Botanical Gardens, the majority of the soil in the St. Louis region is a compacted silt topsoil or exposed clay subsoil that may need amending and aeration to optimize its ability to retain, drain, and clean stormwater runoff. The incorporation of compost amended topsoil, well-aged compost, calcined clay, and/or expanded shale are recommended strategies for improving soil infiltration rates. Additionally, the annual application of organic mulch on gardens is recommended to reduce compaction and improve soil quality and infiltration capacity. Over time, these practices will improve plant growth and root systems, further increasing the ability of the soil to absorb water over time. The addition of sand as a soil amendment is not recommended.

LOCATION

- Amended soils should be located a minimum of 10 feet away from footings, pavement, or any buildings, including those on neighboring properties. A minimum distance of 20 feet is recommended.
- Soils should not be amended within 5 feet of property lines.
- In any areas that can be converted from turf to planting of trees, shrubs, and other low-maintenance ground covers to absorb water.

CONSTRUCTION

- Review potential amended soils area(s).
- Perform an infiltration test.
    - **The soil infiltration rate suitable for the Amended Soil Design Option is 0.25 in/hr or greater.**
    - **If the results of the soil infiltration test is less than 0.25 in/hr, provide an underdrain leading to daylight or discharged with a popup emitter.**
- Top-dress planting beds with 1 to 3-inches of well-aged compost to improve lightly to moderately compacted soils. Earthworms and other soil organisms will gradually move it down into the soil, which will loosen the soil and make it more absorbent.
- Increased infiltration can be achieved by amending the soil within the filter area by tilling the existing soil to a depth of 12” and mixing in 4” of compost.
- Consider hiring a professional landscaper to do vertical mulching to repair highly compacted soils. Vertical mulching is the process of drilling deep holes in planting beds or around trees and backfilling them with compost.
- Purchase commercially available topsoil and apply it to the surface of your soil.
- Incorporate inorganic amendments such as calcined clay and/or expanded gypsum to help restore the capacity of the soil to infiltrate water. Note that the incorporation of sand is not recommended as it can reduce the permeability of soil.
- Replace turf grass with native plants and trees that have robust root structures to physically break up the soil and allow oxygen, earthworms, and other soil organisms to follow and de-compact the soil.
- Add an organic shredded leaf or hardwood mulch when establishing new plants and each year to further de-compact the soil.

CREDIT FOR EXISTING TREES

Trees can provide some benefit to storm water runoff reduction and can be used for credit in reducing the total net impervious area on infill sites. Trees reduce runoff through rainfall interception by the tree canopy, by releasing water into the atmosphere through evapotranspiration and by promoting infiltration and storage of water in the soil.

CRITERIA

Each tree with an adjusted Diameter Breast Height (DBH) of 8 inches or greater can reduce the impervious area by 50 square feet if certain conditions are met:

- No more than 20% of the net added impervious area (IA) can be mitigated with the credit.
- The location, species and size of each tree being counted for credit is shown on the plan of record. A picture of the tree should be included with the application.
- The tree is protected during construction.
- Bradford Pears, Tree of Heaven, Mulberry, Black Locust, and Ash will not be counted for credit.
- With the exception of the Vegetated Filter Strip Green Infrastructure Control, trees that are located within the boundaries of the constructed stormwater infrastructure features cannot be counted for Infill Stormwater Credit.
- Any removal of trees used in the credit calculation must be coordinated with the City prior to removal.

If the protected tree(s) dies or is removed, the property owner may be subject to enforcement and will be responsible for providing impervious area treatment. This may include planting and maintaining additional trees or installing Green Infrastructure Controls.

MEASURING DBH

DBH refers to the tree diameter measured at 4.5 feet above the ground. To properly determine the diameter, measure the length around the trunk and divide by 3.14.

ADJUSTED DIAMETER

To calculate the tree's Adjusted Diameter, the DBH is multiplied by the tree's condition rating.

- The condition Rating is the numerical expression of a tree's condition expressed as a percentage from zero (a dead tree) to 100 (a perfectly healthy tree as described in the manual Guide for Plant Appraisal published by the International Society of Arboriculture).
- For example, if a tree has a DBH of 32 inches in diameter and is in relatively poor health with a condition rating of 40%, its adjusted diameter is 12.8 inches. (32" x 0.40 = 12.8")

MAINTENANCE

- Mulch tree with a 2 to 4-inch layer of mulch in a doughnut-shaped ring. The ring should extend 2 to 4-feet beyond the trunk.
- Do not pile mulch against the tree trunk. Pull mulch back several inches from the trunk so the base of the root crown is exposed. Avoid a "mulch volcano".
- Avoid over-pruning of tree by only removing a small percentage of the live tree at one time to a max of 25% in one year.
- Heavy pruning should be performed in the winter months.
- Avoid light pruning early spring.

REQUIRED SUBMITTALS

The following information is required for submittal with a Stormwater Infill Development Permit to the Director of Planning and Development for review and approval of credit for existing trees:

- ✓ Plan and elevation sketch of existing trees that shows delineated area to be directed to treatment technology and dimensions to house.
- ✓ DBH Calculation:

$$\frac{Circumference\ of\ Tree\ 4.5\ feet\ from\ Ground\ (in)}{3.14} = \_\_\_\_\_(in)$$

- ✓ Adjusted Diameter Calculation:

  Condition Rating: _____%

  $Adjusted\ Diameter\ Calculation = Condition\ Rating\ (\%)\ \times DBH\ (in) = \_\_\_\_\_(in)$

- ✓ Tree Species: _____
- ✓ Determination of Amended IA.

  Existing Differential IA on Site: _____(ft^2)

  $Amended\ IA = Existing\ Differential\ IA - \ (50\ ft^2 \times \#of\ trees) = \_\_\_\_\_(ft^2)$

  $$Total\ Percentage = \frac{Differential\ IA}{Amended\ IA} = 1$$

  $Percentage = \_\_\_\_\_\%$

HOW TO PERFORM A SOIL INFILTRATION TEST

A soil infiltration test determines how quickly water moves through saturated soil. The results of an infiltration test will determine the suitability of your yard for stormwater treatment technologies.

1. Select a location for your infiltration test. The testing location should be in the center of the proposed stormwater treatment technology.
2. Dig a hole(s) in the soil 6-inches deep and about 6-inches in diameter.
3. When digging a hole, did you:
    a. Encounter rock larger than gravel? YES NO
    b. Encounter standing water or seepage into the hole? YES NO
4. If you answered "yes" to 3a or 3b, the site is not feasible for a stormwater BMP. No further testing is required.
5. The infiltration test should be performed when the surrounding soil is saturated, such as the day after a rain. Alternatively, you can fill the hole(s) with water and thoroughly saturate the surrounding soil with a hose.
6. Fill the hole(s) with water.
7. Wait for the hole(s) to drain and fill the hole(s) to the top a second time.
8. Wait for the hole(s) to drain and fill the hole(s) with water up to a depth of six inches.
9. Record the exact time you stop filling the hole and the height of the water as follows:
    a. Every 10 minutes for fast draining soils
    b. Every 30 minutes to one hour for slow draining soil. Measurements should be recorded for a minimum of two hours.
10. Record results in the appropriate table below and calculate infiltration rates. **The lowest recorded infiltration rate is the infiltration rate of your site.**

$$Infiltration\ Rate = \frac{Depth\ of\ Water\ (in)}{Time\ Interval\ (min)} \times \frac{60\ min}{1\ hr} = \_\_\_\_\_ \frac{in}{hr}$$

Fast Draining Soil (10 minute Intervals)						
Time	Depth of Water (in)	Infiltration Rate (in/hr)	Depth of Water (in)	Infiltration Rate (in/hr)	Depth of Water (in)	Infiltration Rate (in/hr)
10						
20						
30						
40						
50						
60						

Fast Draining Soil (30 minute Intervals)						
Time	Depth of Water (in)	Infiltration Rate (in/hr)	Depth of Water (in)	Infiltration Rate (in/hr)	Depth of Water (in)	Infiltration Rate (in/hr)
30						
60						
90						
120						

HOW TO DETERMINE THE WATER QUALITY VOLUME OF YOUR PROPOSED BMP

According to MSD's guidance document, the water quality volume (WQ_V) is the storage needed to capture and treat the runoff from 90% of the recorded daily rainfall events, which MSD has determined is equivalent to 1.14 inches of rainfall multiplied by the volumetric runoff coefficient (RV) and BMP tributary area. The following equations are used to determine the required storage volume:

$$WQ_V = \frac{(1.14)(R_V)(A)}{12}$$

R_V = Volumetric Runoff Coefficient = 0.05 + 0.009 (I)

I = Percent Impervious Cover

Note: The measured area of a site plan that does not have vegetative or permeable cover shall be considered total impervious area. This area is to include roofs of dwellings and garages, driveways, streets, and paved areas including public and private sidewalks.

A = Contributing Drainage Area (ft^2)

MSD outlines minimum impervious percentages to be used for single family areas:

X ≤ 0.25 acres	50%
0.25 < X < 0.5 acres	40%
0.5 ≤ X < 1 acre	35%
X ≤ 1 acre	Calculated per MSD Guidance

BRENTWOOD STORMWATER TECHNOLOGY SIZING CALCULATIONS GUIDANCE

Complete this form for each proposed BMP installation.

Selected BMP Technology: _____

Contributing Drainage Area: _____ft^2

Percent Impervious Cover: _____[0 – 100%]
Volumetric Runoff Coefficient = 0.05 + 0.009 (I) = _____

Water Quality Volume (WQ_V): _____ ft^3

Site Infiltration Rate: _____in/hr

Is BMP Suitable for Site? (See table below) YES NO

Soil Infiltration (in/hr)							
	0.05	**0.1**	**0.25**	**0.3**	**0.4**	**0.5**	**1.0**
Dry Well	Not Suitable		Suitable*				
Bioswale	Not Suitable					Suitable	
Amended Soils	Underdrain Required		Suitable				
Vegetated Filter Strip	Underdrain Required		Amended Soils Required			Suitable	
Modified French Drain	Not Suitable		Suitable*				
Permeable Pavement	Underdrain Required		Suitable*				
Rain Garden	Underdrain Required		Suitable*				

*For every 0.50 in/hr above 0.50 in/hr, subtract 10% of required BMP size

Can BMP Size be Reduced? YES NO
If yes, Revised Water Quality Volume: _____ft^3

Dimensions of Proposed BMP: _____ft^3

_____(ft^3) x 7.48 = _____(gal)

RECOMMENDED PLANTS

This section is a summary of guidance information available from the Missouri Botanical Garden.

You should plan to preserve as many existing native plant species as possible in your BMP design as regionally-native plant species are adapted to the climate, soils, and rainfall fluctuations of the area. Additionally, retaining mature vegetation contributes to rainwater management by intercepting rainfall, improving soil permeability, and allowing water to naturally infiltrate into the soil. The deep root systems of mature plants increases the permeability of the soil and aids in soil stabilization. However, where the preservation of mature, native plants is not feasible for the design of your BMP, consideration of other native plants is recommended. Native plant species are preferred over non-native species, but some ornamental species may be used for landscaping effect if they are not aggressive or invasive.

In the selection of plants, it is important to consider light and moisture requirements for your stormwater BMP and surrounding landscape. The list of plants included in this section provides suggestions for plants in and around rain gardens, bioswales, low wet areas, ponds, woodlands, and landscaping alternatives.

Planting the garden with containerized plants is recommended to ensure the desired design. However, the garden can also be planted with seeds to reduce project costs. The table below provides recommended plant spacing to optimize your BMP.

BMP Area (ft^2)	**Spacing in Inches**				
	8"	**12"**	**18"**	**24"**	**36"**
50	100	50	22	12	5
100	225	100	45	25	11
150	350	150	67	37	16
200	450	200	90	50	22
250	550	250	112	62	28
300	675	300	135	75	33
400	900	400	180	100	44
500	1,100	500	225	125	55
600	1,350	600	270	150	66
700	1,550	700	315	175	77
800	1,800	800	360	200	88
900	2,000	900	405	225	99
1,000	2,250	1,000	450	250	110

Plants for Dry to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Suitable for Ground Cover
PERRENIALS								
Achillea spp. and cultivars*	Yarrow	X	X	X		2-4	summer	X
Amsonia hubrichtii	Arkansas Blue star		X	X		3-4	spring	
Anemone hupensis and cultivars	Anemone		X	X		2-4	summer-fall	
Anemone sylvestris	Woodland anemone		X		X	1-1.5	spring-summer	X
Asarum canadense	Wild ginger	X			X	<1	spring	X
Asclepias tuberosa	Butterfly milkweed	X		X		1-2	summer	
Aster oblongifolius	Aromatic aster	X		X		2-3	fall	X
Baptisia australis and cultivars	Blue False indigo	X		X		2-3	spring	
Brunnera macrophylla	Siberian bugloss		X		X	1-2	spring	X
Callirhoe involucrata	Purple poppy mallow	X		X		1-2	summer	
Carex albicans	Oak sedge	X		X	X	1	spring	X
Carex eburnea	Cedar sedge	X			X	<1	spring	X
Carex pennsylvanica	Pennsylvania sedge	X		X	X	1-2	spring	X
Ceratostigma plumbaginoides	Leadwort		X	X	X	1	summer-fall	X
Coreopsis spp. and cultivars*	Coreopsis	X	X	X		1-5	spring-summer	
Dianthus spp. and cultivars	Pinks		X	X		1-2	spring	X
Diarrhena obovata	Beak grass	X			X	3	fall	X
Echinacea pallida	Pale purple coneflower	X		X		3-4	summer	
Epimedium spp. and cultivars	Barrenwort		X		X	1	spring	X
Fragraria virginiana	Wild strawberry	X		X	X	1	spring	X
Geranium macrorhizum	Bigfoot geranium		X		X	1	spring	X
Geranium maculatum	Wild Geranium	X			X	2-2.5	spring	
Geranium spp. and cultivars	Perennial geranium		X	X	X	1-3	spring-summer	X
Helleborus orientalis	Lenten rose		X		X	1-2	winter-spring	X
Heuchera richardsonii	Prairie alum root	X		X	X	1-2	spring	X
Heuchera parviflora	Little flower alum root	X			X	1-2	summer	X
Heuchera and cultivars	Coral bells		X		X	1-2	spring-summer	X
Iberis sempervirens	Candytuft		X	X		1	spring	X
Iris cristata	Crested iris	X			X	<1	spring	X
Liriope and cultivars	Liriope		X		X	1-2	fall	X
Nepeta and cultivars	Catmint		X	X		1-3	spring	X
Oenothera macrocarpa	Missouri evening primrose	X		X				
Parthenium hispidum	Wild quinine	X		X		3	summer	X

*This genus includes both native and non-native species. For further clarification, please consult http://www.mobot.org/plantfinder. For the purposes of the RainScape Rebates Program, all cultivars of a native species are also considered native.

Plants for Dry to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Suitable for Ground Cover
Pennisetum and cultivars	Fountain grass		X	X		1-4	fall	X
Perovskia and cultivars	Russian sage		X	X		3-5	summer-fall	
Phlox bifida	Sand phlox	X		X		1	spting	X
Phlox subulata	Creeping phlox		X	X		1	spring	X
Polygonatum biflorum	Solomon's seal	X			X	3-5	spring	
Polygonatum 'Variegatum'	Variegated solomon's seal		X		X	3-5	spring	
Pycnanthemum tenuifolium	Slender mountain mint	X		X		3	summer	
Salvia superba and cultivars	Perennial sage		X	X		1-3	spring-summer	X
Sedum spp. and cultivars	Stonecrop		X	X		<1	summer	X
Senecio obovatus	Round-leaf groundsel	X			X	<1	spring	X
Schizachyrium scoparium and cultivars	Little bluestem	X		X		3-4	fall	X
Solidago flexicaulis	Broad-leaved goldenrod	X			X	1-2	fall	X
Solidago speciosa	Showy goldenrod	X		X		3-5	fall	
Spigelia marilandica	Indian pink	X			X	2-3	spring-summer	
Sporobolis heterolepis	Prairie dropseed	X		X		2-3	fall	X
Veronica and cultivars	Speedwell		X	X		2-4	summer	
SHRUBS								
Callicarpa americana	American beautyberry	X		X	X	3-5	summer	X
Cornus racemosa	Gray dogwood	X		X	X	10-15	spring	
Cornus sanguinea and cultivars	Red twig dogwood		X	X		3-8	spring	X
Corylus americana	American hazelnut	X		X	X	8-10	spring	
Corylus spp. and cultivars	Hazel		X	X	X	6-12	spring	
Hydrangea arborescens	Wild Hydrangea	X			X	4-6	summer	X
Hydrangea spp. and cultivars	Hydrangea		X		X	4-12	summer	
Hypericum spp. and cultivars*	St John's wort	X	X	X		1-6	summer	X
Juniperus shrub and prostrate cultivars	Juniper	X	X	X		1-8	n.a.	X
Kerria japonica	Kerria		X		X	4-6	spring	X
Myrica pennsylvanica	Bayberry		X	X		5-10	spring-summer	
Rhus aromatica	Fragrant sumac	X		X	X	2-5	spring	X
Ribes odoratum	Clove currant	X		X		6-12	spring	
Spirea spp. and cultivars	Spirea		X	X		2-6	spring-summer	X
Viburnum spp. and cultivars*	Viburnum	X	X	X	X	5-15	summer	
Weigelia and cultivars	Weigelia		X	X		2-6	spring	

*This genus includes both native and non-native species. For further clarification, please consult http://www.mobot.org/plantfinder. For the purposes of the RainScape Rebates Program, all cultivars of a native species are also considered native.

Plants for Dry to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Suitable for Ground Cover
TREES								
Acer saccharum	Sugar maple	X		X		50-80	spring	
Acer griseum	Lacebark maple		X	X		20-30	spring	
Amelanchier arborea	Serviceberry	X		X	X	15-25	spring	
Cercis canadensis	Redbud	X		X	X	20-30	spring	
Cornus alternifolia	Pagoda dogwood	X		X		20-30	spring	
Cornus florida	Flowering dogwood	X		X	X	20-30	spring	
Diospyros virginiana	Persimmon	X		X	X	20-30	spring	
Ginkgo biloba	Ginkgo (plant male only)		X	X		50-80	summer	
Hamamelus virginiana	Eastern witchazel	X		X	X	10-15	fall	
Ilex opaca and cultivars*	American holly	X	X	X	X	10-40	summer	
Magnolia virginiana	Sweet bay magnolia		X	X		30-40	spring-summer	
Magnolia spp. and cultivars	Magnolia		X	X		20-40	spring-summer	
Malus spp. and cultivars	Crabapple		X	X		15-30	spring	
Prunus americana	Wild plum	X		X		15-25	spring	
Prunus spp.	Various cherries/plums		X	X		15-25	spring	
Quercus accutissima	Sawtooth oak		X	X		40-60	spring	
Quercus alba	White oak	X		X		40-60	spring	
Quercus imbricaria	Shingle oak	X		X		40-60	spring	
Quercus macrocarpa	Bur oak	X		X		60-80	spring	
Quercus muehlenbergii	Chinkapin oak	X		X	X	50-60		
Quercus robur	English oak		X	X		40-70	spring	
Quercus rubra	Red oak	X		X		50-70	spring	
Quercus shumardii	Shumard oak	X		X		40-60	spring	

*This genus includes both native and non-native species. For further clarification, please consult http://www.mobot.org/plantfinder. For the purposes of the RainScape Rebates Program, all cultivars of a native species are also considered native.

Plants for Moist to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Basin	Rain Garden Slopes	Bio-swale	Perma-nent Pond	Ground Cover	Screen and Hedges
PERRENIALS													
Acorus calamus	Variegated sweet flag	X		X	X	3-4	spring	X		X	X		
Acorus gramineus	Sweet flag		X			2-3	spring	X		X	X		
Amsonia illustris	Shining blue star	X		X		4-5	spring	X	X	X			
Amsonia montana 'Short Stack'	Dwarf blue star		X	X		1-2	spring		X	X			
Amsonia	Blue star	X		X	X	3-4	spring		X				
Arum italicum	Italian arum		X		X	1.5-2			X				
Aruncus dioicus	Goat's beard	X			X	3-5	summer		X				
Asclepias incarnata	Marsh/swamp milkweed	X		X		4-5	summer-fall	X	X	X			
Aster novae-angliae	New England aster	X		X		4-6	fall	X	X	X			
Astilbe spp. and cultivars	Chinese astilbe		X		X	1-3	spring	X	X				
Calamagrostis × acutiflora	Feather reed grass		X	X		3-4	summer		X				
Carex spp.	Sedge—many species/cultivars are useful in and around rain gardens												
Carex albicans	Oak sedge	X		X	X	1-1.5	spring		X	X		X	
Carex annectans	Yellow fruited sedge	X		X		2-2.5	spring	X	X	X		X	
Carex elata 'Bowles Golden'	Gold sedge		X	X	X	2-3	spring	X	X	X		X	
Carex grayii	Bur sedge	X			X	2-3	spring	X	X	X		X	
Carex hachijoensis 'Evergold'	Variegated Japanese sedge		X	X	X	1-1.5	spring		X	X		X	
Carex morrowii 'Ice Dance'	Variegated sedge		X	X	X	1.5-2	spring		X	X		X	
Carex muskingumensis	Palm sedge	X		X	X	2-2.5	spring	X	X	X		X	
Carex muskingumensis 'Oehme'	Variegated palm sedge	X		X	X	2-2.5	spring	X	X	X		X	
Chasmanthium latifolium	River oats	X			X	3-4	fall	X	X	X		X	
Chelone glabra	Turtlehead	X		X	X	2.5-3	summer-fall		X	X			
Chelone obliqua	Rose turtlehead	X		X	X	2.5-3	summer-fall		X	X			
Echinacea purpurea	Purple coneflower	X		X		2-3	summer		X	X			
Eupatorium dubium 'Little Joe'	Dwarf Joe Pye		X	X		3-4	summer	X	X				
Eupatorium maculatum 'Gateway'	Joe Pye	X		X		5-6	summer	X	X				
Eupatorium purpureum	Joe Pye	X		X	X	5-6	summer	X	X	X			
Filipendula rubra	Queen of the prairie	X		X		3-5	spring-summer	X	X	X			
Geranium maculatum	Wild Geranium	X			X	2-2.5	spring		X	X			
Helenium autumnale	Helen's flower	X		X		4-5	summer-fall	X	X				
Hibiscus coccineus	Red rose mallow		X	X		4-6	summer-fall	X	X	X	X		
Hibiscus lasiocarpus	Rose mallow	X		X		4-6	summer-fall	X	X	X	X		
Hibiscus spp. and cultivars	Rose mallow		X	X		4-6	summer-fall	X	X	X	X		
Hosta cultivars	Hosta		X		X	1-4	summer-fall		X	X		X	
Iris ensata	Japanese iris		X	X		2-4	spring-summer	X	X		X		
Iris fulva	Copper iris	X		X		2.5-3	spring	X	X	X	X		
Iris sibirica	Siberian iris		X	X		2.5-3.5	spring	X	X	X	X		
Iris virginica var. *shrevei*	Southern blue flag	X		X		3-4	spring	X	X	X	X		

Plants for Moist to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Basin	Rain Garden Slopes	Bio-swale	Perma-nent Pond	Ground Cover	Screen and Hedges
Juncus effusus	Soft rush	X		X		3-4	summer	X	X	X	X		
Juncus inflexus	Rush					3-4	summer	X	X	X	X		
Liatris spicata	Spike blazing star	X		X		2-3	summer	X	X	X			
Ligularia dentata	Bigleaf ligularia		X		X	3-5	summer	X	X				
Liriope cultivars	Liriope		X		X	1-2	fall		X	X		X	
Lobelia cardinalis	Cardinal flower	X		X	X	3-4	summer-fall	X	X	X			
Lobelia siphilitica	Great blue lobelia	X		X	X	3-4	summer-fall	X	X	X			
Ludwigia alternifolia	Seedbox	X		X		2-3	summer	X	X	X			
Matteuccia struthiopteris	Ostrich fern	X			X	4-5	fall	X	X	X		X	
Mazus reptans	Creeping mazus		X	X	X	<1	spring-summer		X	X		X	
Mimulus ringens	Monkey flower	X		X		2-4	summer	X	X	X	X		
Monarda bradburiana	Bee balm, Horsemint	X		X		2.5-3.5	summer		X	X			
Monarda fistulosa	Wild bergamot	X		X		3-4	summer		X	X			
Myosotis sylvatica	Forget-me-not		X	X	X	<1	spring-summer	X	X	X			
Nepeta subsessilis	Showy catmint		X	X		2-3	spring		X				
Nymphaea spp. and cultivars	Waterlily	X	X			na	summer				X		
Onoclea sensibilis	Sensitive fern	X			X	3-4	na	X	X	X	X	X	
Osmunda regalis	Royal fern	X			X	3-5	na	X	X	X	X		
Packera aurea (Senecio)	Golden groundsel	X				<1	spring	X	X	X		X	
Panicum spp. and cultivars	Switch grass	X	X	X		3-6	fall	X	X	X			
Penstemon digitalis	Foxglove beard tongue	X		X	X	2	spring-summer		X	X			
Petasites japonicus	Butterbur		X			3-4	spring	X	X	X			
Phlox maculata	Meadow phlox	X		X	X	3	summer		X	X			
Phlox paniculata	Tall phlox	X		X	X	2-4	summer		X	X			
Physostegia virginiana	False dragonhead	X		X		3	summer-fall	X	X	X			
Polemonium reptans	Jacob's ladder	X			X	1-1.5	spring	X	X	X		X	
Polygonatum biflorum	Solomon's seal	X			X	3-4	spring		X	X			
Pontedaria cordata	Pickeral plant	X		X		3-4	summer-fall	X			X		
Pycnanthemum tenuifolium	Slender mountain mint	X		X		3	summer		X				
Rudbeckia fulgida var. *umbrosa*	Orange coneflower	X		X	X	1-3	summer		X	X		X	
Rudbeckia subtomentosa	Sweet coneflower	X		X	X	3-5	summer-fall	X	X	X			
Sagittaria latifolia	Arrowleaf	X		X		3-4	summer	X			X		
Schizachrium scoparium and cultivars	Little bluestem	X		X		3	fall		X			X	
Thalia dealbata	Wild canna	X		X		5-8	summer-fall	X			X		
Vernonia arkansana	Curlytop ironweed	X		X		3-4	summer	X	X				
Veronicastrum virginicum	Culver's root	X		X		3-5	summer	X	X				
Zizia aurea	Golden Alexander	X		X		2-3	spring	X	X	X			
SHRUBS													
Aronia melanocarpa	Black choke cherry	X		X		5-7	spring-summer	X	X				X
Callicarpa americana	Beautyberry	X		X	X	4-5	summer		X			X	
Cephalanthus occidentalis	Buttonbush	X		X		8-12	summer	X	X	X	X		

Plants for Moist to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Basin	Rain Garden Slopes	Bio-swale	Perma-nent Pond	Ground Cover	Screen and Hedges
Chamaecyparis thyoides and cultivars	White cypress		X	X	X	5-8	n.a.		X	X			
Clethra alnifolia and cultivars	Sweet pepperbush		X	X	X	3-8	summer	X	X	X			
Cornus alternifolia	Pagoda dogwood	X		X	X	12-20	spring						X
Cornus drummondii	Rough leaf dogwood	X		X	X	10-15	spring						X
Cornus racemosa	Gray dogwood	X		X	X	10-15	spring		X	X			X
Cornus sanguinea and cultivars	Red twig dogwood		X	X		3-8	spring	X	X	X	X	X	
Corylus americana	American hazelnut	X			X	8-12	spring						X
Dirca palustris	Leatherwood	X			X	4-5	spring		X				
Hydrangea arborescens	Wild Hydrangea					4-6	summer		X			X	
Ilex glabra	Inkberry		X	X		3-6	summer	X	X				
Ilex verticillata and cultivars	Winterberry holly	X		X	X	5-10	summer	X	X			X	
Kerria japonica	Kerria		X		X	4-6	spring	X					
Myrica pennsylvanica	Bayberry		X	X		5-10	spring-summer		X	X		X	
Neviusia alabamense	Alabama snowreath					8-10	spring-summer		X			X	
Physocarpus opulifolius	Ninebark (and cultivars)	X		X	X	3-12	spring-summer		X				
Ribes odoratum	Clove currant	X		X		6-12	spring		X				
Salix spp. and cultivars	Willow	X	X	X		1-12	spring	X	X	X	X		
Sambucus canadensis	Elderberry	X		X		8-12	summer	X	X				
Viburnum spp. and cultivars	Viburnum	X	X	X	X	4-15	spring-summer		X				
TREES													
Acer rubrum and cultivars	Red maple	X				60-70	spring						
Aesculus × carnea	Red horsechestnut		X	X		30-40	spring						
Aesculus glabra	Ohio buckeye	X		X	X	30-50	spring						
Aesculus hippocastanum	Horsechestnut	X		X		30-50	spring						
Aesculus pavia	Red buckeye	X				10-20	spring						
Alnus glutinosa	Black alder		X	X		40-60	spring						
Asimina triloba	Pawpaw	X			X	20-30	spring						
Betula nigra	River birch	X				30-40	spring						
Carpinus caroliniana	Musclewood/hornbeam	X				20-30	spring						
Celtis occidentalis	Hackberry	X					spring						
Chionanthus virginicus	Fringetree	X				10-15	spring-summer						
Cledastris kentuckea	Yellow wood	X				40-60	spring-summer						
Crataegis viridis	Green hawthorn	X				15-20	spring-summer						
Fagus grandifolia	American beech	X				50-80	spring						
Ginkgo biloba	Ginkgo (plant male only)		X			50-80	winter						
Gymnocladus dioica	Kentucky coffee tree	X				60-100	spring						
Hamamelus vernalis	Vernal witchazel	X				10-15	winter						
Hamamelus virginiana	Eastern witchazel	X				10-15	fall						
Lindera benzoin	spice bush	X			X	10-12	spring		X				

Plants for Moist to Average Soils

Botanical name	Common name	Native	Non-native	Sun-part sun	Shade-part shade	Height in feet	Bloom time	Basin	Rain Garden Slopes	Bio-swale	Perma-nent Pond	Ground Cover	Screen and Hedges
Liriodendron tulipifera	Tulip tree	X				75-125	spring-summer						
Magnolia virginiana	Sweet bay magnolia		X			30-40	spring-summer						
Metasequoia glyptostroboides	Dawn redwood		X	X		70-100							
Nyssa sylvatica	Black gum	X				40-50	spring						
Ostrya virginiana	American hophornbeam	X				25-30	spring						
Quercus bicolor	Swamp white oak	X				40-50	spring						
Quercus macrocarpa	Bur oak	X				60-80	spring						
Quercus palustris	Pin oak	X				50-70	spring						
Quercus phellos	Willow oak	X				40-50	spring						
Quercus robur	English oak		X	X		40-70	spring						
Quercus shumardii	Shumard oak	X		X		40-60	spring						
Salix spp. and cultivars	Willow	X	X			15-30	spring						
Sophora japonica	Pagoda tree		X	X		40-60	summer-fall						
Thuja plicata and cultivars	Arborvitae		X	X	X	2-60	n.a.						
Tilia americana	American basswood	X		X		50-80	summer						
Tilia cordata	Little-leaf linden		X	X		40-60	summer						
Taxodium disticum and cultivars	Bald cypress	X				40-60	spring						
Zelkova serrata	Japanese zelkova		X			50-80	spring						

CITY OF BRENTWOOD

STORMWATER PLAN REVIEW CHECKLIST

Use this checklist to prepare the required Development Plan Review submittals. Please note that the following checklist is not all-inclusive. This checklist is intended to guide the preparation of the construction plans and calculations and is subject to change as necessary for clarification and updated according to current code and agency requirements.

REQUIREMENTS	Yes	No	N/A
PROFESSIONAL SEAL AND SIGNATURE required on final and complete approved plans, drawings, calculations and/or reports.	☐	☐	☐
DESIGNER INFORMATION - The engineer, surveyor, and/or landscape architect's name, address, telephone number, and e-mail address.	☐	☐	☐
APPLICANT INFORMATION - The owner's and/or developers name, address, telephone number, and e-mail address.	☐	☐	☐
PLAN DATE and all revision dates with a brief description of the items revised	☐	☐	☐
TITLES AND NUMBERING for all plan sheets	☐	☐	☐
VICINITY MAP with street names and the site location	☐	☐	☐
SCALE at 1" = 20' minimum - Provide a graphic scale	☐	☐	☐
NORTH ARROW	☐	☐	☐
PLAN LEGEND with line types and symbols	☐	☐	☐
TOPOGRAPHY of the site and surrounding vicinity, showing existing and proposed contours with intervals of two (2) foot (max) and spot elevations as necessary. Reference source and date of all topography.	☐	☐	☐
EXISTING AND PROPOSED SITE FEATURES - buildings, parking lots, patios, pools, water bodies, driveways, sidewalks, etc.	☐	☐	☐
FINISH FLOOR ELEVATIONS of all buildings	☐	☐	☐
EXISTING AND PROPOSED UTILITIES - Show and label all existing and proposed utilities (above ground and underground).	☐	☐	☐
EXISTING AND PROPOSED DRAINAGE STRUCTURES AND BMP'S – Location of natural and manmade drainage infrastructure including pipes, swales, ditches, channels, curb and gutter, roof drains and BMP's.	☐	☐	☐
DRAINAGE PATTERNS with flow direction arrows	☐	☐	☐
AREA OF DISTURBANCE – Tabulation of disturbed area and limits of disturbance delineated on plans. Includes area required for implementation of erosion and sediment controls, stockpile areas and utilities.	☐	☐	☐
IMPERVIOUS SURFACE COVERAGE - Tabulation of impervious cover (IA).	☐	☐	☐
SUMP PUMP AND DOWNSPOUTS - Locations of discharge locations per Section 500.1770	☐	☐	☐
BMP(s) PLAN AND ELEVATION sketch of proposed BMP location(s) that shows delineated area to be directed to BMP, dimensions between proposed BMP and existing buildings, concentrated stormwater discharges, surrounding impervious areas, overflow pipe(s) and property lines	☐	☐	☐
BMP DETAIL(s) and/or product information on proposed BMP(s) and installation methods/instructions if available.	☐	☐	☐
STORMWATER CALCULATION of required water quality volume (WQ_V) as discussed in the "Brentwood Stormwater Technology Sizing Calculations Guidance" document, including soils conditions, as necessary.	☐	☐	☐

CITY OF BRENTWOOD
STORMWATER PLAN REVIEW CHECKLIST

Use this checklist to prepare the required Development Plan Review submittals. Please note that the following checklist is not all-inclusive. This checklist is intended to guide the preparation of the construction plans and calculations and is subject to change as necessary for clarification and updated according to current code and agency requirements.

REQUIREMENTS	Yes	No	N/A
EROSION CONTROL - Have potential areas for erosion at storm sewer outfalls and been properly protected during construction and are permanent erosion control methods being implemented?	☐	☐	☐
SUITABILITY OF LOCATION - Have storm sewer pipes, inlet and other BMP's been properly located to avoid conflicts with other facilities and future maintenance may be conducted?	☐	☐	☐
INLET SPACING - Have inlet spacing and stormwater pipe calculations been provided, which clearly indicate the proposed design will allow for public roadways to be properly drained in accordance with City standards and recognized standards of the industry?	☐	☐	☐
ENTRANCE SLOPES - Are entrances onto public roadways sloped to assure that drainage directed onto public roadways is minimized?	☐	☐	☐
OVERLAND FLOW ROUTES - Have the effects of stormwater flow during times when the design storm is exceeded been analyzed to determine overland flow routes when underground conveyances are at capacity. In particular, have inlets in sump location been examined to assure that there is an overland flow outlet to prevent stormwater from rising and backing up into buildings?	☐	☐	☐
LOCATION OF DETENTION BASINS AND BMP(S) - Have detention basin and BMP location(s) been examined to ensure their suitability to allow for site drainage to be directed through them?	☐	☐	☐
EMERGENCY SPILLWAY - Has an emergency spillway been identified in detention basin(s) and BMP(s) in the event that the design storm is exceeded and the basin is over capacity?	☐	☐	☐
OPEN DETENTION - Have embankment slopes been provide, which will allow for ease of future maintenance? Has the detention basin bottom been sloped for proper drainage to support the proposed ground cover?	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

APPENDIX G

Letters to Recommending

Private or Maintenance Improvement

City of Brentwood - Storm Water Management
31 Middlesex Drive / 69 York Drive

Dear Property Owner,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Standing water after rain events have ended.

We believe this issue is due to improper road slope. Unfortunately, the City of Brentwood does not have jurisdiction over the roadways within York Village. It is recommended to bring your issues to the HOA, who own and maintain these roadways to determine if resurfacing of the roadway to provide proper transverse slope is worth looking into.

Thank you.

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
66 Yorkshire Ln Ct

Dear Property Owner,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Downspouts contributing to icy or wet conditions on sidewalks after rain events have ended.

While the City is sympathetic to your situation, we have determined that your storm water issues are not caused by insufficient infrastructure but rather an issue between you and your neighbors. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

If you are unable to come to a resolution with your neighbor and you believe that your issue is a City of Brentwood code violation, please follow up with the City's Planning and Zoning department and they will determine whether or not additional enforcement is possible.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
69 York Drive

Dear Property Owner,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- The property at 31 Middlesex Drive floods due to stormwater drains from 69 York Drive

After conducting a full investigation, it has been determined that the problem is not a City storm water infrastructure problem but a regulatory issue. The City of Brentwood's code of ordinances Section 500.1770 requires, "Stormwater discharges from downspouts or sump pumps shall be located at least 10 feet from the property line whenever possible and shall in every case be located no less than 4 feet from the property line and shall discharging to a pervious surface or stormwater BMP."

The property owner at 31 Middlesex Drive has received a grant for a rain garden that may fix the issue. With that said, the City's Public Works staff and consulting Engineers Gonzalez Companies can provide additional information on appropriate storm water BMP's to help mitigate the issues caused by this problem. Additional information is available in the City's Stormwater BMP Document available at:

Stormwater-Control-Best-Management-Practices (brentwoodmo.org)

Thank you.

City of Brentwood – Public Works Department.

City of Brentwood - Storm Water Management
Jennifer Sweeney, 2225 St. Clair Ave

Dear Ms. Sweeney,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Downspouts contributing to icy or wet conditions after rain events have ended.

While the City is sympathetic to your situation, we have determined that your storm water issues are not caused by insufficient infrastructure but rather an issue between you and your neighbor. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

If you are unable to come to a resolution with your neighbor and you believe that your issue is a City of Brentwood code violation, please follow up with the City's Planning and Zoning department and they will determine whether or not additional enforcement is possible.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Michael Gleason, 8312 Rosalie Ave

Dear Mr. Gleason,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Neighbor's French drain causes yard to flood after rain events

While the City is sympathetic to your situation, we have determined that your storm water issues are not caused by insufficient infrastructure but rather an issue between you and your neighbor. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

If you are unable to come to a resolution with your neighbor and you believe that your issue is a City of Brentwood code violation, please follow up with the City's Planning and Zoning department and they will determine whether or not additional enforcement is possible.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Jeanne & Mark Suntrup, 8710 Bridgeport Ave

Dear Suntrup's,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Water pools in street and resident's yard after storm events due to a settled concrete slab.

After conducting a full investigation, it has been determined that the problem is not a City stormwater infrastructure problem but a City roadway maintenance issue. This issue has been added to the maintenance list to be fixed when funds are available.

Thank you.

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Jane Torres, 8710 Rosalie Ave

Dear Ms. Torres,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Water enters the property from the driveway via the sidewalk and runoff from nearby construction
- Neighbor's downspout and French drain discharge into the property

It was noted during site visits that improvements to the sidewalk and curb have been made since your survey response. However, if your problem still exists we have found that the problem is not a City stormwater infrastructure problem but a regulatory issue. The City of Brentwood's code of ordinances Section 500.1770 requires, "Stormwater discharges from downspouts or sump pumps shall be located at least 10 feet from the property line whenever possible and shall in every case be located no less than 4 feet from the property line and shall discharging to a pervious surface or stormwater BMP."

While the City is sympathetic to your situation, we have determined that your storm water issues are not caused by insufficient infrastructure but rather an issue between you and your neighbor. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Sophie Beckmann, 8733 Covington Ct

Dear Ms. Beckmann,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Basement and driveway flooding due to sewer backups

We are very sorry for the sewer backups you are experiencing, and the city is sympathetic to your situation. The Metropolitan St. Louis Sewer District is currently developing the "MSD CSO Mary Ave Sewer Separation Project" to mitigate issues like this throughout Brentwood. This project involves disconnecting combined sewer systems (including Covington Ct.) to eliminate wastewater backups. We are not currently sure what the timeline is on this project, but if you have more questions or concerns please feel free to contact the Metropolitan Sewer District.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Alex Fortmann, 8737 Brentwood Plaza

Dear Mr. Fortmann,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Stormwater runoff in backyard gets trapped before it deposits into the outlet

After conducting a full investigation, it has been determined that the problem is not a City stormwater infrastructure problem, but likely a grading issue in the yard. This can likely be resolved by regrading the area around the inlet and through your yard to the existing inlet. A private contractor would be able to help with this if needed.

If you believe this area to be within an existing easement that should be maintained to by the Metropolitan St. Louis Sewer District (MSD), they should be contacted for corrective action.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Kelly Reece, 8837 Powell Ave

Dear Ms. Reece,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Flooding in resident's yard due to stormwater BMP issues at 8835 Powell Ave

While the City is sympathetic to your situation, we have determined that your storm water issues are not caused by insufficient infrastructure but rather an issue between you and your neighbor. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

If you are unable to come to a resolution with your neighbor and you believe that your issue is a City of Brentwood code violation, please follow up with the City's Planning and Zoning department and they will determine, whether or not additional enforcement is possible.

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management

Brentwood Forest Condominium Association, 9031 Cardinal Terrace

Dear Property Owner,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Stormwater pooling near stairs and causing erosion around walkway

After conducting a full investigation, it has been determined that the problem is not a City stormwater infrastructure. It is likely that the issue could be resolved by using stormwater BMP's to direct water away from the walkway.

If needed, the City's Public Works staff and consulting Engineers Gonzalez Companies can provide additional information on appropriate storm water BMP's to help mitigate the issues caused by this problem. Additional information is available in the City's Stormwater BMP Document available at:

Stormwater-Control-Best-Management-Practices (brentwoodmo.org)

Thank you

City of Brentwood – Public Works Department

City of Brentwood - Storm Water Management
Max Breitmayer, 9109 Moriz Ave

Dear Max Breitmayer,

The City of Brentwood would like to thank you for your participation in the Storm Water Management project which started in the fall of 2021. As you may know the City retained the services of Gonzalez Companies to conduct site investigations and analysis of numerous storm water drainage issues brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies reviewed submitted stormwater questionnaires, conducted public meeting interviews, reviewed recorded legal plats of the project sites, and conducted individual site investigations. The end goal was to ascertain the source of the storm water, condition of the existing infrastructure, location of dedicated drainage easements and allow project engineers to propose corrective recommendations to address the storm water concerns.

There was a survey completed, which listed your address and outlined a potential storm water concern. The submitted questionnaire for the location listed above outlined the following main problem:

- Water pooling and freezing in driveway due to sump pump discharge

While the City is sympathetic to your situation, we have determined that your stormwater issues are not caused by insufficient infrastructure but rather an issue between you and your neighbor. It is the policy of the City of Brentwood to not complete corrective actions to privately owned storm drains or to get involved in disputes between neighbors. However, we would recommend that you discuss the issue directly with your neighbor to see if a mutually beneficial solution can be developed. We also would recommend consulting the City of Brentwood of Brentwood's Stormwater Best Management Practice guide document, which may offer a number of solutions to your issue. This document can be found by visiting the website at: Stormwater-Control-Best-Management-Practices (brentwoodmo.org).

If you are unable to come to a resolution with your neighbor and you believe that your issue is a City of Brentwood code violation, please follow up with the City's Planning and Zoning department and they will determine, whether or not additional enforcement is possible.

Thank you

City of Brentwood – Public Works Department

APPENDIX H

Comprehensive List of Preliminary Investigation

COMPREHENSIVE LIST OF PRELIMINARY INVESTIGATION

Solution	Problem #	Site Address
Further Hydraulic Investigation	1	8 Southcote Road
Further Hydraulic Investigation	2	28 York Drive
Further Hydraulic Investigation	3	5 Cricket Lane
Further Hydraulic Investigation	4	12 York Hills Drive
Further Hydraulic Investigation	5	9429 Pine Ave.
Further Hydraulic Investigation	6	50 Whitehall Court
Further Hydraulic Investigation	7	99 Whitehall Court
Further Hydraulic Investigation	8	9402 White Ave.
Further Hydraulic Investigation	9	2222 Parkridge Ave.
Further Hydraulic Investigation	10	2237 St. Clair Ave.
Further Hydraulic Investigation	11	1501 to 1507 Swallow Dr.
Further Hydraulic Investigation	12	1723 Redbird Cv.
Further Hydraulic Investigation	13	9000 Wrenwood Ln
Further Hydraulic Investigation	14	8922 Lawn Ave.
Further Hydraulic Investigation	15	8782 Lawn Ave.
Further Hydraulic Investigation	16	9002 Pine Ave.
Further Hydraulic Investigation	17	9000 Bridgeport Ave.
Further Hydraulic Investigation	18	8910 Bridgeport Ave.
Further Hydraulic Investigation	19	8830 Bridgeport Ave.
Further Hydraulic Investigation	20	16 Stratford Ln.
Further Hydraulic Investigation	21	24 Stratford Ln.
Further Hydraulic Investigation	22	2434 High School Dr.
Further Hydraulic Investigation	23	2509 High School Dr.
Further Hydraulic Investigation	24	2726 S. Brentwood Blvd.
Further Hydraulic Investigation	25	2925 Brazeau Ave.
Further Hydraulic Investigation	26	9333 Parkside Dr.
Further Hydraulic Investigation	27	8703 Eulalie Ave.
Further Hydraulic Investigation	28	2238 Laverne Ct.
Further Hydraulic Investigation	29	8543 Eulalie Ave.
Further Hydraulic Investigation	30	8624 Eulalie Ave.
Further Hydraulic Investigation	31	Salem Rd. & Barnstable Ct.
Further Hydraulic Investigation	32	8637 Henrietta Ave.
Further Hydraulic Investigation	33	2443 Mary Ave.
Further Hydraulic Investigation	34	9212 Eager Rd.
Further Hydraulic Investigation	35	2217 Parkridge Ave.
Further Hydraulic Investigation	36	2441 Louis Ave.
Further Hydraulic Investigation	37	8930 Harrison
Further Hydraulic Investigation	38	9429 Sonora Ave.
Further Hydraulic Investigation	39	9327 Pine Ave.
Further Hydraulic Investigation	40	9109 Moritz Ave.
Further Hydraulic Investigation	41	9144 Pine Ave.
Further Hydraulic Investigation	42	8837 White Ave
Grading		8737 Brentwood Pl.
Grading		2116 St. Clair Ave.
Curbing		8812 Bridgeport Ave.
Curbing		9031 Cardinal Terrace
Included in nearby investigation	1	11 Southcote Road
Included in nearby investigation	1	18 Southcoate Road
Included in nearby investigation	1	39 York Drive

Solution	Problem #	Site Address
Included in nearby investigation	1	47 York Drive
Included in nearby investigation	1	50 York Drive
Included in nearby investigation	1	56 York Drive
Included in nearby investigation	1	6 Southcote Road
Included in nearby investigation	1	62 York Drive
Included in nearby investigation	1	69 York Drive
Included in nearby investigation	1	9 Southcote Road
Included in nearby investigation	2	12 Sussex Drive
Included in nearby investigation	2	18 York Drive
Included in nearby investigation	2	26 Sussex Drive
Included in nearby investigation	2	27 York Drive
Included in nearby investigation	2	31 York Drive
Included in nearby investigation	2	34 Northcote Road
Included in nearby investigation	3	6 Cricket Lane
Included in nearby investigation	3	79 York Drive
Included in nearby investigation	4	14 York Hills Drive
Included in nearby investigation	4	20 York Hills Drive
Included in nearby investigation	4	21 York Hills Drive
Included in nearby investigation	4	23 Middlesex Drive
Included in nearby investigation	4	24 York Hills Drive
Included in nearby investigation	4	26 Middlesex Drive
Included in nearby investigation	4	26 York Hills Drive
Included in nearby investigation	4	27 York Hills Drive
Included in nearby investigation	4	31 Middlesex Drive
Included in nearby investigation	4	42 Middlesex Drive
Included in nearby investigation	4	9 Middlesex Drive
Included in nearby investigation	5	2 Whitehall Court
Included in nearby investigation	5	9400 Pine Ave.
Included in nearby investigation	5	9409 Pine Ave.
Included in nearby investigation	5	9425 Pine Ave.
Included in nearby investigation	5	9433 Pine Ave.
Included in nearby investigation	7	98 Whitehall Court
Included in nearby investigation	9	2301 Parkridge Ave.
Included in nearby investigation	9	2309 Parkridge Ave.
Included in nearby investigation	9	2317 Parkridge Ave.
Included in nearby investigation	9	2323 Parkridge Ave.
Included in nearby investigation	9	2351 Parkridge
Included in nearby investigation	9	9312 White Ave.
Included in nearby investigation	10	2225 S. Clair Ave.
Included in nearby investigation	10	2311 St. Clair Ave.
Included in nearby investigation	10	2319 St. Clair Ave.
Included in nearby investigation	10	2323 St. Clair Ave.
Included in nearby investigation	11	1502 to 1504 Swallow Dr.
Included in nearby investigation	14	8780 Lawn Ave.
Included in nearby investigation	14	8835 Lawn Ave.
Included in nearby investigation	14	8934 Lawn Ave.
Included in nearby investigation	14	9006 Lawn Ave.
Included in nearby investigation	15	8908 Lawn Ave.
Included in nearby investigation	15	8917 Lawn Ave.
Included in nearby investigation	15	9010 Lawn Ave.
Included in nearby investigation	15	9015 Lawn Ave.
Included in nearby investigation	16	8914 Pine Ave.

Solution	Problem #	Site Address
Included in nearby investigation	18	9004 Bridgeport Ave.
Included in nearby investigation	19	8908 Bridgeport Ave.
Included in nearby investigation	19	8913 Bridgeport Ave.
Included in nearby investigation	19	8914 Bridgeport Ave.
Included in nearby investigation	27	2505 High School Dr.
Included in nearby investigation	27	2525 High School Dr.
Included in nearby investigation	27	2529 High School Dr.
Included in nearby investigation	31	8730 Covington Ct.
Included in nearby investigation	34	2239 Laverne Ct.
Included in nearby investigation	35	8547 Eulalie Ave.
Included in nearby investigation	37	2468 Salem Rd.
Included in nearby investigation	38	2015 Spanish Dr.
Included in nearby investigation	38	2027 Spanish Dr.
Included in nearby investigation	38	8734 Pine Ave.
Included in nearby investigation	38	8744 Pine Ave.
Included in nearby investigation	38	8748 Pine Ave.
Included in nearby investigation	38	8754 Pine Ave.
Included in nearby investigation	38	8758 Pine Ave.
Included in nearby investigation	43	2440 Louis Ave.
Included in nearby investigation	43	2449 Louis Ave.
Included in nearby investigation	44	8936 Harrison Ave.
Included in nearby investigation	44	9000 Harrison Ave.
Included in nearby investigation	44	9004 Harrison Ave.
Included in nearby investigation	44	9012 Harrison Ave.
Included in nearby investigation	44	9016 Harrison Ave.
Included in nearby investigation	47	8817 Moritz Ave.
Included in nearby investigation	47	8821 Moritz Ave.
Included in nearby investigation	47	8901 Moritz Ave.
Included in nearby investigation	47	9004 Moritz Ave.
Included in nearby investigation	48	9135 Pine Ave.
Included in nearby investigation		8821 Bridgeport Ave.
Private Issue		2311 Patton Ave.
Investigated, issue not found		8733 Covington Ct.
Investigated, issue not found		2023 Spanish
Investigated, issue not found		South Swan Circle
Investigated, issue not found		8601 Henrietta Ave.
Investigated, issue not found		8505 Joseph Ave.
Investigated, issue not found		8506 Joseph Ave.
Investigated, issue not found		8511 Joseph Ave.
Investigated, issue not found		8514 Joseph Ave.
Investigated, issue not found		8602 Joseph Ave.
Investigated, issue not found		8606 Joseph Ave.
Investigated, issue not found		8608 Joseph Ave.
Investigated, issue not found		8614 Joseph Ave.
Investigated, issue not found		8616 Joseph Ave.
Investigated, issue not found		8624 Joseph Ave.
Investigated, issue not found		8627 Joseph Ave.
Investigated, issue not found		8730 Keystone Dr.
Investigated, issue not found		9424 Parkside Dr.
Investigated, issue not found		8726 Radley Ct.
Investigated, issue not found		8724 Rosalie Ave.

Solution	Problem #	Site Address
Investigated, issue not found		9400 Tilles Dr.
Investigated, issue not found		8622 White Ave.
Neighbor disputes		8837 Powell Ave.
Neighbor disputes		8312 Rosalie Ave.
Pavement Repairs		8710 Bridgeport Ave.
Stormwater BMP		8710 Rosalie Ave.
Stormwater BMP		2330 Annalee Ave.
Stormwater BMP		2839 Brazeau Ave.
Stormwater BMP		2506 Cecelia Ave.
Stormwater BMP		8512 Douglas Ct.
Stormwater BMP		8528 Douglas Ct.
Stormwater BMP		8639 Eulalie Ave.
Stormwater BMP		8651 Eulalie Ave.
Stormwater BMP		8655 Eulalie Ave.
Stormwater BMP		8112 Florence Ave.
Stormwater BMP		8601 Florence Ave.
Stormwater BMP		8611 Florence Ave.
Stormwater BMP		8506 Henrietta Ave.
Stormwater BMP		2331 Hilton Ave.
Stormwater BMP		8755 Litzsinger Rd.
Stormwater BMP		2429 Mari Kay Ct.
Stormwater BMP		2521 Melvin Ave.
Stormwater BMP		1923 Parkridge Ave.
Stormwater BMP		1930 Parkridge Ave.
Stormwater BMP		9357 Parkside Dr.
Stormwater BMP		9361 Parkside Dr.
Stormwater BMP		9411 Parkside Dr.
Stormwater BMP		2301 Patton Ave.
Stormwater BMP		2307 Patton Ave.
Stormwater BMP		2324 Patton Ave.
Stormwater BMP		2326 Patton Ave.
Stormwater BMP		8729 Radley Ct.
Stormwater BMP		8736 Radley Ct.
Stormwater BMP		8650 Rosalie Ave.
Stormwater BMP		8658 Rosalie Ave.
Stormwater BMP		8727 Rosalie Ave.
Stormwater BMP		8731 Rosalie Ave.
Stormwater BMP		2618 Salem Rd.
Stormwater BMP		2101 St. Clair Ave.
Stormwater BMP		9375 Tilles Dr.
Stormwater BMP		9379 Tilles Dr.
Stormwater BMP		9387 Tilles Dr.
Stormwater BMP		8656 White Ave.
Stormwater BMP		8731 White Ave.
Stormwater BMP		9000 White Ave.
Stormwater BMP		9320 White Ave.
Stormwater BMP		9348 White Ave.
Stormwater BMP		9365 White Ave.
Stormwater BMP		9425 White Ave.
Stormwater BMP		56 Yorkshire Ln Ct
Stormwater BMP		66 Yorkshire Ln Ct

Solution	Problem #	Site Address
Within Code		8828 Powell Ave.
Within Code		8741 Radley Ct.

	Solution
Further Hydraulic Investigation	43
Grading	3
Curbing	3
Included in nearby investigation	87
Investigated, issue not found	22
Neighbor disputes	3
Pavement Repairs	2
Stormwater BMP	47
Within Code	3
Total	213

APPENDIX I

Letters to Residents for Unidentified Areas of Concern

List of Recipients

- 34 Northcote Road
- 9 Middlesex Drive
- 23 Middlesex Drive
- 26 Middlesex Drive
- 42 Middlesex Drive
- 79 York Drive
- 12 Sussex Drive
- 25 Sussex Drive
- 39 York Drive
- 47 York Drive
- 50 York Drive
- 6 Southcote Road
- 9 Southcote Road
- 11 Southcote Road
- 18 Southcote Road
- 12 York Hills Drive
- 14 York Hills Drive
- 20 York Hills Drive
- 21 York Hills Drive
- 24 York Hills Drive
- 26 York Hills Drive
- 27 York Hills Drive
- 9327 Pine Avenue
- 9400 Pine Avenue
- 9413 Pine Avenue
- 9425 Pine Avenue
- 8622 White Avenue
- 8656 White Avenue
- 8731 White Avenue
- 9000 White Avenue
- 9320 White Avenue
- 9348 White Avenue
- 9365 White Avenue
- 9426 White Avenue
- 9357 Parkside Drive
- 9361 Parkside Drive
- 9411 Parkside Drive
- 9424 Parkside Drive
- 9375 Tilles Drive
- 9379 Tilles Drive
- 9387 Tilles Drive
- 9400 Tilles Drive
- 9424 Tilles Drive
- 1923 Parkridge Drive
- 1930 Parkridge Drive
- 2309 Parkridge Drive
- 2317 Parkridge Drive
- 2351 Parkridge Drive
- 2319 St. Clair Avenue
- 2323 St. Clair Avenue
- 8780 Lawn Avenue
- 8782 Lawn Avenue
- 8835 Lawn Avenue
- 8908 Lawn Avenue
- 8917 Lawn Avenue
- 8934 Lawn Avenue
- 9006 Lawn Avenue
- 9010 Lawn Avenue
- 9015 Lawn Avenue
- 8734 Pine Avenue
- 8744 Pine Avenue
- 8748 Pine Avenue
- 8754 Pine Avenue
- 8758 Pine Avenue
- 9002 Pine Avenue
- 9135 Pine Avenue
- 8817 Moritz Avenue
- 8821 Moritz Avenue
- 8901 Moritz Avenue
- 8812 Bridgeport Avenue
- 2301 Patton Avenue
- 2324 Patton Avenue
- 2326 Patton Avenue
- 2330 Patton Avenue
- 2331 Hilton Avenue
- 8936 Harrison Avenue
- 9000 Harrison Avenue
- 9004 Harrison Avenue

- 9012 Harrison Avenue
- 2505 High School Drive
- 2509 High School Drive
- 2525 High School Drive
- 2015 Spanish Drive
- 2023 Spanish Drive
- 2027 Spanish Drive
- 2239 Laverne Court
- 8650 Rosalie Avenue
- 8658 Rosalie Avenue
- 8724 Rosalie Avenue
- 8727 Rosalie Avenue
- 8731 Rosalie Avenue
- 8639 Eulalie Avenue
- 8651 Eulalie Avenue
- 8655 Eulalie Avenue
- 2429 Mari Kay Court
- 8508 Douglas Court
- 8528 Douglas Court
- 2440 Louis Avenue
- 2449 Louis Avenue
- 8112 Florence Avenue
- 2521 Melvin Avenue
- 2616 Salem Road
- 2506 Cecelia Avenue
- 8506 Henrietta Avenue
- 8601 Henrietta Avenue
- 8505 Joseph Avenue
- 8511 Joseph Avenue
- 8514 Joseph Avenue
- 8606 Joseph Avenue
- 8608 Joseph Avenue
- 8610 Joseph Avenue
- 8614 Joseph Avenue
- 8616 Joseph Avenue
- 8624 Joseph Avenue
- 8627 Joseph Avenue
- 8607 Florence Avenue
- 8611 Florence Avenue
- 8755 Litzsinger Road
- 8726 Radley Court
- 8729 Radley Court
- 8736 Radley Court
- 8741 Radley Court
- 8730 Covington Court
- 8730 Keystone Drive
- 8828 Powell Avenue
- 2839 Brazeau Avenue

Letter to Residents

Dear Property Owner,

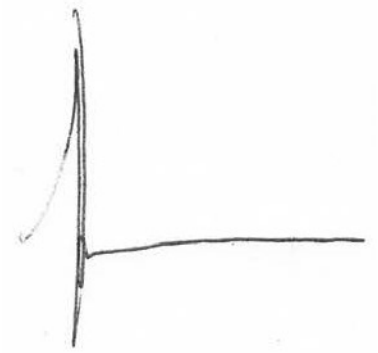
The City of Brentwood has retained the services of Gonzalez Companies to investigate and analyze numerous stormwater drainage issues that were brought to City's attention.

As part of the comprehensive project approach, Gonzalez Companies are reviewing a list of stormwater issues that were brought to the City's attention with the intent to ascertain the source of those issues, condition of the existing infrastructure, location of dedicated drainage easements, which will allow our project engineers to propose corrective recommendations to address the storm water concerns in the City Brentwood.

During our review of the stormwater complaints, it was noticed that the stormwater complaint associated with your property, when submitted to the City of Brentwood, contained no details concerning the specific nature of the stormwater issues experienced at your property.

It would be very helpful to our project if you could email a description concerning the nature of the stormwater issues that were experienced at your property to stormwater@gocos.net on or before June 3, 2022. Please include your address in the subject line of the email. Your assistance on this matter is greatly appreciated.

Thanks,



Frank Bauer, P.E.

gonzalez

www.gonzalezcos.com