

**City of Ladue, Missouri  
Storm Water Management Program**

**2024**

**Five-Year Implementation Program**

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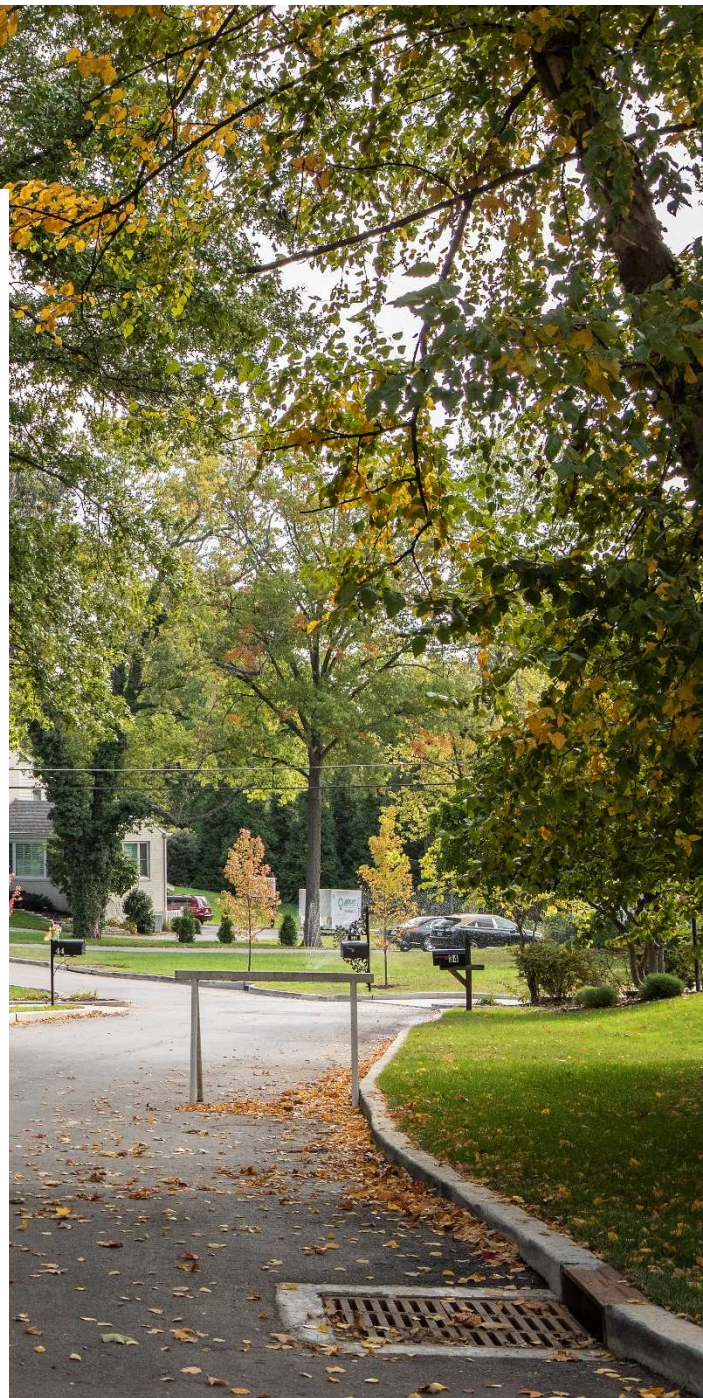
**Final Report to Ladue City Council  
and Ladue Storm Water Advisory Committee**

**Revision 1**

**JANUARY 16, 2025**

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**City of Ladue  
Public Works Stormwater Engineering Staff**



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# Introduction

## Stormwater Management Program

This report is authorized under Ladue Code Chapter 2 Article X. – STORM WATER CONTROL PROGRAM Sec. 2-328 – Five-Year Implementation Program.

“It is the intention of the City to address, within the constraints of the storm water fund budget, storm water concerns for affected City infrastructure as well as private properties where surface drainage conditions have created a negative impact. This Program is currently funded from portions of the sales tax of one-half-cent (\$0.005) collected for the payment of storm water improvements and remediation within the City (the “Storm Water Fund”). Notwithstanding anything to the contrary, the City shall not be obligated to undertake any storm water project, nor is the City committing to address all storm water concerns within the City boundaries.”

It is not the intention of the City to construct infrastructure for the purpose of removing properties from dedicated floodplains, nor to reduce dedicated floodplain boundaries, as mapped by the Federal Emergency Management Agency (FEMA).

## Background

In recent years Saint Louis County, particularly the municipalities located within the interstate I-270 belt, have been subjected to a steady increase in the amount of stormwater runoff that must be collected and conveyed. The result has been an increase in yard and street flooding. Ancillary impacts associated with surface flooding are erosion, structure damage, and the flooding of basements and garages. The increase in runoff has been generally attributed to an increase in watershed imperviousness associated with “in-fill” construction and the re-development of the urbanized area. This problem is not unique to the City of Ladue but is being experienced throughout the well-established areas of Saint Louis County.

The existing conveyance system that serves the City of Ladue is largely made up of open channels, roadway culverts and some intermittent reaches of storm sewers. The total length of the conveyance systems in the City is approximately 30-miles. Stormwater runoff is generally collected in streets, roadside ditches, backyard swales, sinkholes, and in an intermittent system of piped inlets discharging to drainage channels.

Associated with the increase in runoff volume is the loss of water quality in the urban area. Factors contributing to the loss of water quality include pollutants deposited on impervious surface areas

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that run-off during storm events, yard waste placed in stream channels, pet manure, invasive species, trash, and road salt.

In response to these problems the City of Ladue established the Stormwater Management Program (SMP). The SMP is a comprehensive, three-phased initiative to alleviate various stormwater concerns in the community. The program started with problem identification city-wide then proceeded through master planning in 2016 with a re-evaluation of the master planning process in 2019 and again in 2024. The three core phases of the SMP are: Phase I: Needs Assessment; Phase II: Master Plan; and Phase III: Projects. The projects phase focuses on design and construction of projects over a period of several years.

After development of the Storm Water Needs Assessment, which identified stormwater problem locations Citywide, Ladue's Storm Water Advisory Committee (SWAC) was formed. The SWAC reviewed the results of the Storm Water Needs Assessment that was completed in November 2015, and by the end of summer 2016 developed Ordinance No. 2137 establishing a Stormwater Control Program for the City. That ordinance provides the roadmap for stormwater master and implementation plan development.

Subsequently in late 2016 and early 2017 identified projects were conceptually engineered. A draft 2016 Stormwater Master Plan was presented to SWAC on April 13, 2017. The stormwater ordinance identifies tasks for SWAC that include the initial (and periodic) review of the stormwater master plan as well as the development of the stormwater implementation plan that ultimately is sent to the City Council for approval and funding. The ordinance provides guidance on the master planning process requiring that the public be notified about the projects and that the committee solicit public input. Three Public Open House meetings were held on April 25th, May 2nd and May 4th, 2017. Approximately 100 individuals in total attended. Proposed project information was made available at the meetings. City and Consultant staff were available to answer questions, and to obtain feedback from the participants. The participants were encouraged to provide written comments. The feedback was compiled followed by meetings and field reconnaissance regarding specifics from the information received. Subsequently the 2016 Master Plan was revised and finalized.

On July 10th, 2017 SWAC submitted the 2017 Five-Year Implementation Program Final Report to the Ladue City Council. Subsequently on July 17th, 2017, the Council accepted the program and included it in its annual budgeting process. Authorization was given to begin work on the top five-ranked projects. The Master Plan was revisited, revised, and finalized again in 2019 and 2024.

For detailed information on progress to-date, see the "Progress Report" section of this report.

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## 2024 Master Plan Update

Beginning in Summer 2023, Public Works Engineering staff and the Stormwater Advisory Committee reviewed the Stormwater Control Program ordinance which was established in August 2016. This review was driven by the Stormwater Master Plan update which is scheduled for Calendar Year 2024 and occurs every five years. The Master Plan was previously updated in 2019 and the next Stormwater Master Plan update is scheduled for 2029. The timing for the ordinance review coincided with the completion of the implementation plan that was adopted in 2017 and has been implemented over the course of the last six years resulting in the completion of three projects identified in the Master Plan and the placement of two projects on inactive status. Nine small stormwater grant projects have been completed since the inception of the program. Additionally, stormwater funds have been utilized to fund the stormwater components of other infrastructure projects such as Deer Creek Preserve Improvements and the Dielman Road sidewalk and storm sewer improvements.

The review allowed for the ordinance to be updated to match the actual practices and incorporate lessons learned from the Project Implementation Phase. The Stormwater Advisory Committee discussed changes at three regular meetings and held a special work session in November 2023 devoted to this review. Two bills related to the Stormwater Management Program were approved by City Council at the February 20, 2024 City Council meeting: Bill 2360: an ordinance modifying Chapter 110, Article V – Sinkholes and Karst features regulations and Bill 2361: an ordinance modifying Chapter 2, Article X – Stormwater Control Program. The approved bills are included as attachments to this report. Refer to the accompanying staff memos attached to this report for more information on the modifications.

Since then, City staff have followed the Stormwater Control Program's ordinance to reevaluate each project included in the Stormwater Master Plan. Denny Welker, sometimes accompanied by Amanda Griffin, performed field evaluation site visits to every project in the Stormwater Master Plan with a streambank stabilization component. Twenty-six (26) project field evaluation site visits were completed. In general, streambank stabilization projects were originally scoped to involve construction over continuous stretches of creek bank on both sides of the channel. This approach generally results in large amounts of tree loss, costly construction budgets, and in some cases the restoration of streambanks where work was not warranted. After review, staff recognized that through detailed investigation of the condition of each streambank, in many cases the scope could be reduced to address only the areas of significant deterioration in need of stabilization. This reduction in scope, which is more focused than the standard level of care for planning level engineering studies, results in less construction disruption to residents, more preservation of trees and privacy vegetation, less easements, and reduced project cost. Reduction of scope was identified on twelve (12) bank stabilization projects.



*Figure 1: Public Works Stormwater Project Engineer Denny Welker performing a field investigation site visit in February 2024. The streambank behind Mr. Welker is an example of significant deterioration in need of streambank stabilization.*

HR Green was authorized at the April 29, 2024 City Council meeting to proceed with assisting City staff in updating the 2024 Storm Water Master Plan. HR Green updated project exhibits, cost estimates, benefit point calculations, properties benefited, properties impacted, and easement information to reflect modifications made to the Ladue Score Sheet Methodology, scope reductions, and general administrative revisions to reflect the 2024 Stormwater Master Plan update cycle.

Four new projects were identified as part of the 2024 Master Plan update cycle:

- Project No. 1901: Old Warson #9822 Storm Sewer Project
- Project No. 1902: Old Warson #9650 Storm Sewer Project
- Project No. 2401: Upper Ladue #23 Culvert Improvement Project
- Project No. 2402: Lorenzo Lane Storm Sewer Improvements Project

The Ladue Score Sheet was updated twice to reflect lessons learned in the project implementation phase of the SMP. The two modified versions of the Ladue Score Sheet are included as attachments to this report. HR Green delivered updated project workbooks, exhibits, and an overall ranking table. This table, the 2024 Stormwater Master Plan Project List, is included as an attachment, as well as the 2024 Stormwater Management Program 5-Year Capital Improvement Plan and exhibits for the seven (7) Stormwater Master Plan projects in the 5-Year Capital Improvement Plan.

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City Council approved the 2024 Stormwater Master Plan Project List and 2024 Stormwater Management Program 5-Year Capital Improvement Plan at the August 19, 2024 City Council meeting, per the Storm Water Advisory Committee’s August 6, 2024 recommendation. It should be noted that updates to the project score sheets are addressed under the “Project Ranking Process” section of this report that follows. The new score sheet format was reviewed and approved by the Storm Water Advisory Committee at their January 25, 2024 meeting with a subsequent minor modification approved at the May 23, 2024 meeting. These documents are included as attachments to this report.

## Project Ranking Process

As outlined in the Storm Water Control Program ordinance, the City of Ladue utilizes a benefit to cost ratio ranking system to determine stormwater project priority for implementation. The ranking system is based on Metropolitan St. Louis Sewer District’s (MSD) “project benefit point” methodology weighted by Ladue-specific criteria, which yields an adjusted project benefit points value. An Engineer’s Opinion of Probable Cost (EOPC), or cost estimate, is developed for each project. The EOPC is adjusted for cost sharing opportunities. The adjusted project benefit points are divided by the adjusted EOPC, producing the project’s Benefit to Cost Ratio, or BCR. The BCR calculation is displayed in the city project identification sheet, or the “Ladue Score Sheet.” A Ladue Score Sheet is produced for each project in the Storm Water Master Plan. The projects’ Ladue Score Sheets are sorted from highest to lowest BCR to determine the priority for project implementation.

As discussed in the “2024 Master Plan Update” section of the report above, the Ladue Score Sheet was updated in two iterations to include the following changes:

- The multiplier for public roadway flooding and erosion was increased to 2.0 from 1.15.
- A new “Easement Multiplier” was introduced and is applied based on the number of easements required to construct a project. The following multipliers apply:
  - 0 easements = 2.0
  - 1-2 easements = 1.5
  - 3-5 easements = 1.25
  - 6-15 easements = 1.0
  - 16+ easements = 0.75
- A new “Trust Indenture Multiplier” was introduced to give a boost to the projects which have documentation by subdivision trustees that proves they have the legal authority to authorize necessary project documents, such as Temporary Construction Easements (TCEs), Temporary Construction Licenses (TCLs), easements, restoration agreements, etc. The following multipliers apply:
  - Have provided documentation = 1.2
  - Have not provided documentation = 1.0

- A new “Public Health & Safety Multiplier” was introduced to boost projects which will promote health and safety within the community. The following multipliers apply:
  - High = 2.0
  - Medium = 1.0
  - Low = 0.8
- Assumed cost of easements was added to the adjusted engineer’s opinion of probable cost (EOPC).
- The title of the “Habitable structure flooding & erosion from overland flow (non-floodplain)” problem category was revised to read “Habitable structure flooding (non-floodplain) and erosion”.

For additional background information on how stormwater problems reported by Ladue community members influence the Storm Water Master Plan, refer to the “How does a problem become a project?” diagram, included below and in the attachments.

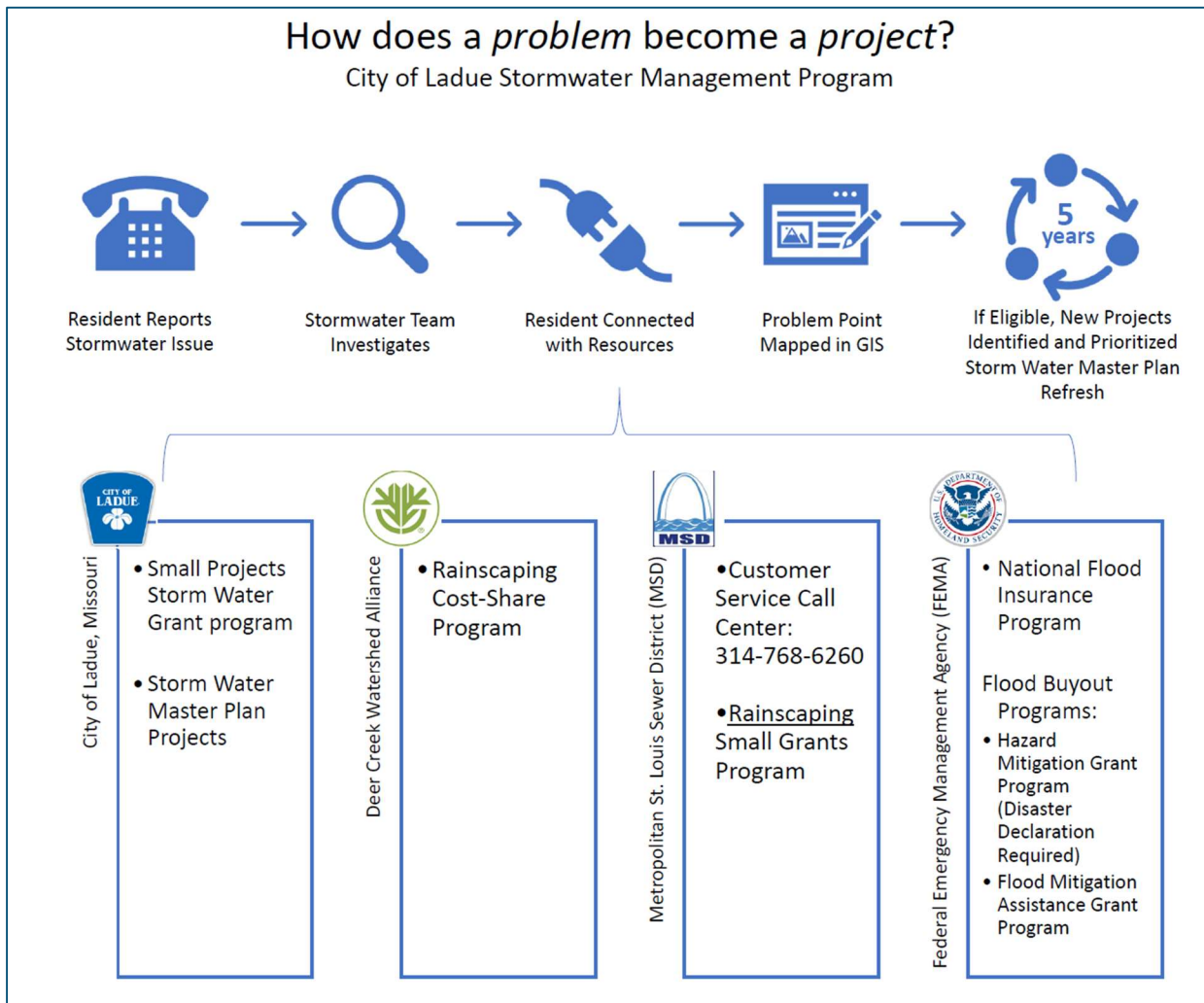


Figure 2: "How does a problem become a project?" diagram

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## 2029 Master Plan Update Considerations

The Stormwater Master Plan will be due for an update cycle in 2029. Public Works Stormwater Engineering Department staff have noted the following considerations for the next update:

- Include the cost of construction phase services on-site observation in the engineer's opinion of probable cost for each project. Project estimates for 2016/2017, 2019, and 2024 master plan update cycles have not included construction phase services on-site observation.
- Staff received feedback from City Council at the August 19, 2024 City Council meeting that emphasized the importance of ensuring that residents understand the project ranking process.
- Review the effectiveness of the various public engagement strategies that are utilized for each project in the current Master Plan and make recommendations for improvement.
- Review the City's stormwater program staffing structure and make adjustments as needed

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# 2024 Stormwater Management Program

## 2024 Stormwater Master Plan Project List

Each of the 52 projects identified in the 2024 Stormwater Master Plan update cycle was ranked and listed in order of priority for implementation. The priority project ranking is shown in the 2024 Stormwater Master Plan Project List and included as an attachment to this report.

Not all 52 projects will be able to be completed immediately. The City plans to implement the top seven Master Plan projects over the next five years (2024 – 2029). In addition to the top Master Plan project, the City will implement FEMA/SEMA flood buyouts, City-owned culvert replacement projects, and City infrastructure projects with stormwater components. These projects encompass the 5-Year Capital Improvement Plan for 2024-2029 and is included as an attachment to this report. City Council approved the 2024 Stormwater Master Plan Project List and 2024 Stormwater Management Program 5-Year Capital Improvement Plan at the August 19, 2024 City Council meeting, per the Storm Water Advisory Committee’s August 6, 2024 recommendation.

In a departure from previous practice, the Letter of Intent (LOI) solicitation process for the Master Plan projects will be conducted on a project-by-project basis, rather than all at one time. This is to reduce the amount of time from initial public outreach through project initiation. The LOI solicitation process must still occur prior to kickoff of the design phase. If the required LOIs are not able to be obtained for a particular project, the project will be cancelled, and the design phase will not be initiated. The planned schedule for LOI solicitation is listed on the 5-Year Capital Improvement Plan attachment.

***“The stormwater project identified for my neighborhood is not ranked for implementation in the current 5-Year Capital Improvement Plan. Is there a way to improve my project’s ranking?”***

Yes! There are two ways that residents or subdivision trustees may improve a project’s ranking: 1) Cost sharing, or 2) Provide trust indenture documentation.

Cost sharing, or supplying a source of private project funding, will improve a project’s ranking by reducing the City’s project cost. Reduction in the City’s cost increases the benefit to cost ratio that is the basis for priority implementation.

Subdivision trustees may provide documentation that proves they have legal authority to authorize necessary project documents, such as Temporary Construction Easements (TCEs), Temporary Construction Licenses (TCLs), easements, restoration agreements, etc. This will activate the “Trust Indenture Multiplier” and increase the benefit to cost ratio that is the basis for priority implementation.

For more information, see the “Project Ranking Process” section of the report above or contact the Public Works Stormwater Engineering Department.

## 5-Year Capital Improvement Plan

### Federal Emergency Management Agency (FEMA) Flood Buyout Programs

July 2022 saw record rainfall amounts that lead to historic flash flooding in the St. Louis metro area, including inside the community of Ladue, Missouri. Devastating flooding occurred along Deer Creek, where low-lying homes were inundated with muddy water. Residents were woken in the middle of the night by first responders, who helped them wade out of their houses to safety in rising flood waters. After the flood, homeowners approached the City of Ladue to request relief.

*“As you have heard today, Ladue residents are in desperate need for your help. Twice in less than two years, and at least three times since 2008, Ladue first responders have put their lives on the line to rescue residents on the southern portion of Foxboro Road. During each evacuation, first responders and residents were required to fight against raging currents and large, dangerous debris to make it out alive. [...] Today we are asking you, our trusted government officials, to apply for a FEMA buyout of our properties.”*

-Excerpt from a first-hand account written by Foxboro residents and presented at the Ladue City Council meeting on August 15, 2022.



Figure 3: Statistics from the July 2022 Historic St. Louis Rainfall produced by the National Weather Service (NWS)

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The City of Ladue applied for federal assistance to purchase eleven (11) at-risk homes for pre-flood, fair-market value, demolish the structures, and return the area to greenspace. The City is over two years into the application process and has been awarded mitigation funding for seven (7) residential properties by the Federal Emergency Management Agency (FEMA) under the Flood Mitigation Assistance (FMA) grant program and Hazard Mitigation Grant Program (HMGP) administered by Missouri State Emergency Management Agency (SEMA). Flood buyout applications for four (4) additional properties are currently under review.

While the flood buyouts were sparked by residents' plea for help to City of Ladue leadership, the groundwork for the program began long before the 2022 flash flooding. St. Louis Metropolitan Sewer District (MSD) prepared a Stormwater System Master Improvement Plan (SSMIP) for the Deer Creek Watershed dated June 8, 1998. In this report, the area along Deer Creek between Clayton Road and Warson Road was identified as a problem due to frequent flooding and emergency response access restrictions. In 2016, HR Green and City staff developed the City of Ladue's Storm Water Master Plan. One of the projects identified involved the buyout of properties as the long-term solution to recurrent flooding of residences located in the floodway and floodplain of Deer Creek. This original project was removed from the 2016 Master Plan after residents of Foxboro petitioned City Council for the removal of the project. The project was reinstated in 2022 after the residents of Foxboro approached City Council to request buyouts.



*Figure 4: Image taken looking into the first flood entry way of 23 Foxboro Road on July 26, 2022 after flood waters receded. “The water had gotten up to 3.5 ft tall throughout my entire home which is a ranch that sits on a concrete slab. All of my furniture was moved around and knocked over from the strength of the flood waters.”*



*Figure 5: Image taken on August 4, 2022 showing #23 Foxboro Road (left) and #14 Foxboro Road (right) after flood waters receded.*

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### **2401 Upper Ladue Road #23 Culvert Improvements Project**

This project is ranked priority #1 in the 2024 Stormwater Master Plan Update. The stormwater problem in this neighborhood is unique, as episodes of road flooding occur in a location of Upper Ladue Road that cuts off access in and out of a large portion of the neighborhood. The undersized storm sewer system currently in place causes roadway and yard flooding in this location. City staff met with neighborhood trustees on September 10, 2024 to discuss the project and letter of intent process. Letters of intent were distributed on September 26, 2024. All five required letters of intent were obtained on October 24, 2024. City Council executed a work order with EDM Incorporated to perform the design services for this project. EDM Incorporated has an active on-call engineering & consulting services contract with the City of Ladue. Design and easement acquisition is planned for 2025 and construction is budgeted for 2026.



*Figure 6: Photo of flooding taken from the front porch of #23 Upper Ladue Road, looking over the motor court of #23 Upper Ladue Road towards Upper Ladue Road.*

### **1642-R24 Tributary 6 Storm Sewer Improvements Project**

This project is ranked priority #2 in the 2024 Stormwater Master Plan. The purpose of this project is to significantly reduce the potential for flooding of the elementary school on the Annunziata Parish property. The school has been flooded several times; including in 2022 when there was 2 to 3 feet of water on the first floor and significant and costly damage occurred. Preliminary engineering investigations indicate that the flooding of the school can be attributed primarily to the existing inadequate storm sewer system on the school property; it appears that the culvert under Clayton

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Road is properly sized. Our preliminary field observations also indicate that flow through the Clayton Road culvert is being restricted by a buildup of sediment, rock and vegetative debris in the roughly 150 foot long reach of channel immediately downstream of the culvert. This section of channel is located in a wooded area on The Bogey Club property. As presently envisioned, the proposed project will replace portions of the inadequate sewer on Annunziata Parish property and construct an improved channel section through the wooded area on The Bogey Club property. To date, City staff have obtained a Letter of Intent from the Annunziata Parish and have met with a representative of the Bogey Club and submitted a Letter of Intent to them for their consideration.

As planned, City staff solicited a proposal from HR Green to prepare the design and final construction documents for the proposed project. In October 2024, City Council approved HR Green’s proposal for the required professional services. The estimated construction cost of the proposed work is approximately \$425,000 and construction is scheduled for the summer or fall of 2025.



***Figure 7: Photo taken of flooding between Church of the Annunziata Elementary School and City of Ladue Police Department. Photo taken on July 16, 2024. The proposed 1642-R24 Tributary 6 Storm Sewer Improvements Project will significantly reduce the potential for flooding of the Elementary School.***

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### **1604.02-R24 Conway Road #10033 Bank Stabilization**

This project is ranked priority #3 in the 2024 Stormwater Master Plan. Pebble Creek is experiencing severe erosion due to high creek velocities and two sharp bends before going through a culvert at Conway Road. The streambank is near vertical in many locations and shows signs of toe scour and side scour throughout the channel. Erosion is threatening structures located on 10033 Conway Road including a detached garage. Buried utilities are beginning to be exposed and may pose a health risk if damaged or severed. Near #10044 and #10046 Conway Road, an old railroad abutment constricts the stream, and likely causes higher water surface elevations upstream. This project proposes to construct approximately 1,100 lineal feet of bank stabilization including biostabilization techniques to reduce erosion and improve the overall health of the creek.

The estimated cost of the proposed work is approximately \$980,000. Letters of intent solicitation is planned for 2025, design is planned for 2025, easement acquisition is planned for 2026, and construction is budgeted for 2027.

### **2402 Lorenzo Lane Storm Sewer Improvements**

This project is ranked priority #4 in the 2024 Stormwater Master Plan. Lorenzo Lane is a private street without a collection system. Runoff from the east side of #2 and #3 Lorenzo Lane flows east towards the road, crosses the road, and floods the side yard of #5 Willow Hill Road. The area south of the house at #5 Willow Hill Road is low-lying. Redevelopment of the residential property at #4 Willow Hill Road cut off the drainage path to the south, so there is no way for the flood water to leave besides infiltration and evaporation. The flooding has caused basement flooding at #5 as well as significant yard flooding. This project proposes to install new storm sewers at #2 Lorenzo Lane and #5 Willow Hill Road to collect the water and convey the runoff south along Lorenzo Lane to an existing MSD storm sewer at the intersection of Lorenzo Lane and Ladue Road.

The estimated cost of the proposed work is approximately \$410,000. Letters of intent solicitation is planned for 2025, design is planned for 2026, easement acquisition is planned for 2027, and construction is budgeted for 2028.



*Figure 8: Yard flooding at #5 Willow Hill Road to be addressed by the 2402 Lorenzo Lane Storm Sewer Improvements project.*

### **1627.01-R24 Tributary 4 Bank Stabilization: South of Conway**

This project is ranked priority #5 in the 2024 Stormwater Master Plan. The project is located on Tributary 4 from Conway Rd to Warson Terrace. The project reach is rated poor, and scored poor in the following categories: average bank slope angle, average bank height, vegetative bank protection, bank cutting, mass wasting, bar development, sinuosity, and ratio of pool-riffle spacing to channel width. The erosion is threatening several non-habitable structures. This project proposes to remove and restore the existing streambank with approximately 1,530 lineal feet of streambank protection including biostabilization.

The estimated cost of the proposed work is approximately \$1,350,000. Letters of intent solicitation is planned for 2025, design is planned for 2026, easement acquisition is planned for 2027, and construction is budgeted for 2028.



*Figure 9: A photo of the pre-project 2024 condition of the stream bank adjacent to Conway Elementary School, to be stabilized as part of the 1627.01-R24 Tributary 4 Bank Stabilization: South of Conway*

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### **1631-R24 Tributary 5 East Bank Stabilization**

This project is ranked priority #6 in the 2024 Stormwater Master Plan. The project is located on Tributary 5 between Barnes Rd and Kent Rd. The channel segment was rated fair and is experiencing some bank cutting and mass wasting. Erosion is threatening Barnes Road. The top of bank comes as close as 4-ft from the edge of pavement. This project proposes to remove and restore the existing streambank with approximately 830 lineal feet of streambank protection including biostabilization.

The estimated cost of the proposed work is approximately \$600,000. Letters of intent solicitation is planned for 2026, design is planned for 2027, easement acquisition is planned for 2028, and construction is budgeted for 2029.

### **1902 Old Warson #9650 Storm Sewer (Pending 3-Way Cost Share)**

This project is ranked priority #7 in the 2024 Stormwater Master Plan. Storm water flows over Old Warson Road into the Rock Hill Quarry. There is no existing storm sewer to collect runoff at the low point near 9650 Old Warson Road. This project proposes to install approximately 1,440 feet of 12-inch to 27-inch diameter storm sewer and appurtenances to route stormwater runoff to Deer Creek.

The work is pending a 3-way cost share between the City of Ladue, Rock Hill Quarry, and the City of Rock Hill. Rock Hill Quarries Co. has submitted written documentation to the City that they will participate in the cost share. City Staff met in-person with the City of Rock Hill Administrator Garrett Schlett on August 15, 2024 to discuss the proposed project and cost share arrangement. As of January 2025, Mr. Schlett was still coordinating with the Rock Hill Board of Alderman to determine if the City of Rock Hill will participate in the cost share. The estimated cost of the proposed work is approximately \$1,500,000. The City of Ladue share for this project would be approximately \$500,000. Should the cost share move forward, letters of intent solicitation is planned for 2026, design is planned for 2027, easement acquisition is planned for 2028, and construction is budgeted for 2029.



*Figure 10: Roadway flooding over Old Warson Road between Stroup Fields and Rock Hill Landfill property. Photo taken July 16, 2024.*

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## **City-Owned Culvert Replacement Projects**

In March and April of 2024, City Staff performed visual inspections of all 61 culverts in the City which convey stormwater flows under a public roadway. The location of the culverts inspected are shown on the City map included as an attachment to this report. The purpose of these inspections was to assess the condition of the culverts and to identify any deficiencies which could negatively impact the function of the culvert either now or in the near future. The size of the culverts inspected ranged from 15" diameter pipes to a 10' x 12' concrete box shaped structure. If the culverts were too small to safely enter (generally those smaller than a 48" diameter pipe), the inspection was limited to what could be observed from the upstream and downstream ends of the structure. Forty-three (43) of the culverts were found to be in fair to good condition. However, it was determined that 18 of the culverts had deficiencies which should be corrected in the near future. Deficient culverts were grouped in the follow categories: minor deficiencies to be addressed by City Public Works crews, significant deficiencies to be addressed by an outside contractor, and major deficiencies that will likely require complete replacement of the structure.

As a result of the culvert inspections and stormwater master planning efforts, four City-owned culverts are scheduled for replacement as part of the 5-Year Capital Improvement Plan: Clayton Road over Glen Creek (Culvert #43 – located about 450 feet east of Conway Road), Ladue Road over Country Club Drainage (Culvert #32 – just east of Graybridge Road), and Conway Road over Two Unnamed Deer Creek Tributaries (Culverts #23 & #24 – one east of Bennington Lane and one east of Fieldstone Trail).

### **Clayton Road over Glen Creek Culvert #43 Replacement Project**

On May 20, 2024 the engineering firm HR Green was given a Work Order under their On-Call Contract to prepare the design and final construction documents for the replacement of the deteriorated Clayton Road culvert at Glen Creek. To date HR Green has completed field surveys and the preparation of right of way plans and legal documents that define the exact easement requirements. Temporary and permanent easements will be required from the following two properties; 1) Ladue School District, which owns the upstream property, and 2) the owner of the residential property on the downstream (south) side of the culvert. Staff has forwarded the easement documents to the two impacted property owners for their execution. The estimated construction cost of the new culvert is approximately \$830,000 and construction is scheduled for summer of 2025.

### **Ladue Road over Country Club Drainage Culvert Replacement Project**

In May 2024 the engineering firm Reitz & Jens was given a Work Order under their On Call Contract to prepare a Preliminary Design Study for the replacement of the deteriorated Ladue Road culvert at Country Club Drainage (located just east of Graybridge Road). The final report was reviewed and accepted by City staff. On October 21, 2024 the engineering firm Reitz & Jens was given a work order under their on-call contract to prepare the design and final construction documents for the

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replacement of the existing deteriorated culvert. To date Reitz & Jens has completed field surveys and are proceeding with the preparation of Preliminary Plans. The estimated construction cost of the new culvert is approximately \$870,000 and construction is scheduled for 2026.

## **Conway Road Over Unnamed Deer Creek Tributary East & West Culverts Replacement Project**

In May 2024 the engineering firm Horner & Shifrin was given a work order under their on call contract to prepare a Preliminary Design Study for the replacement of two deteriorated culverts on Conway Road; one at Denny Creek located just east of Bennington Lane, and one at Pebble Creek located just east of Fieldstone Trail. The final report, which was submitted in November 2024, was reviewed and approved by City staff. The estimated construction cost is \$744,000 for the culvert at Denny Creek and \$1,266,000 for the culvert at Pebble Creek. Design of the two culverts is scheduled for 2025, easement acquisition is scheduled for 2026, and construction is scheduled for 2027.

## **City Infrastructure Projects with Stormwater Components**

Stormwater funds are utilized for the stormwater-related components of other Public Works projects outside of the 5-Year Stormwater Capital Improvements Plan.

City infrastructure projects that included stormwater components and therefore utilized stormwater funding that were completed since the 2019 Master Plan include:

- Deer Creek Preserve improvements including the pedestrian bridge, stormwater Best Management Practices (BMPs) including amended soils, and drainage structures. This project was completed in 2023.
- Dielman Road Improvements including the storm sewer system that was installed on the west side of the roadway and the extension of the existing box culvert. This project was completed in 2024.
- Lay Road Improvements including storm sewer improvements that was installed on the west side of the roadway. This project was completed in 2019.
- Flood Buyouts through the Hazard Mitigation Grant Program and the Flood Mitigation Assistance programs.

City infrastructure projects planned for the 2024 – 2029 timeframe that include stormwater components and therefore will utilize stormwater funding include:

- S. 40 Drive shared-use path project with drainage improvements. Location: Clayton Road to Rolling Rock. Project design begins in the first quarter of calendar year 2025, right-of-way acquisition in calendar year 2026, and construction scheduled for calendar year 2027
- Culvert repairs at various locations throughout the City including the Price Road culvert just south of Ladue Road.

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- Ladue Road sidewalk improvements with stormwater components. Location: Dielman to Price Road. The City plans to apply for Federal Funds in Calendar Year 2028 to begin design in 2029

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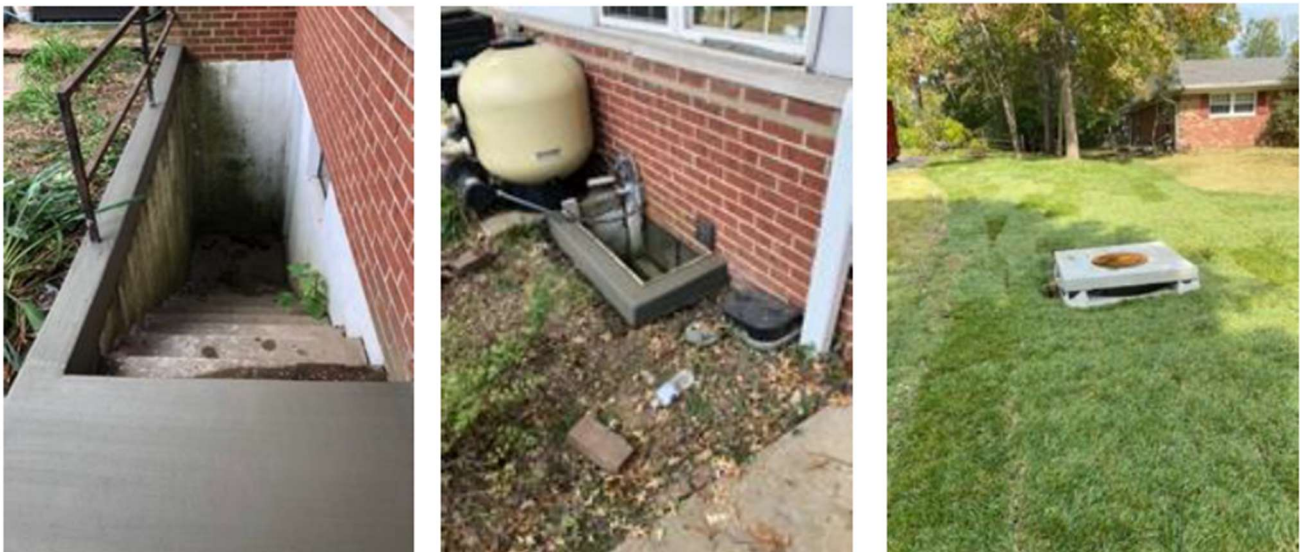
# Progress Report

## Completed Master Plan Projects

### **South Tealbrook Stormwater Infrastructure Project (1605)**

The South Tealbrook Stormwater Infrastructure Project was completed in 2020 and consisted of approximately 500 lineal feet of storm sewer, varying in size from 4" to 12" in diameter and appurtenances; approximately 200 lineal feet of drainage swale; stairwell and window well flood proofing; and landscape restoration constructed in the Tealbrook Estates Subdivision in an area located north of Ladue Road and east of North Lindbergh Boulevard, in the City of Ladue, Missouri. Construction Bids were opened on July 10, 2020. Seven bids were received ranging from \$119,000.00 to \$177,445.34; Engineer's estimate was \$175,194.00. A construction contract was awarded on July 20, 2020 to the low bidder Plattin Creek Excavating, LLC for \$119,000.00. Notice-To-Proceed was issued on July 31, 2020 making the Contract Completion date January 27, 2021. The actual substantial completion date was October 26, 2020. The work was completed in 87 calendar days; 93 calendar days ahead of schedule. There were no change orders.

Prior to the project, the lack of a stormwater collection system on the western side of the neighborhood allowed uncontrolled runoff to concentrate in streets and yards along South Tealbrook Drive, flooding non-habitable structures. Runoff generally flowed northwest to southeast to a stormwater collection system on the eastern side of Tealbrook and ultimately to an open channel between the subdivision and Mary Institute and Saint Louis Country Day School (MICDS). Some ponding and erosion along the road at #5 South Tealbrook was observed.



*Figure 11: Stairwell and window well waterproofing and Area Inlet AI-6BD built as part of the South Tealbrook Stormwater Infrastructure Project (1605).*

## Willow Hill Stormwater Infrastructure Project (1614A)

The Willow Hill Stormwater Infrastructure Project included construction of approximately 3,000 lineal feet of pipe sewers, varying in size from 12" to 42" in diameter and appurtenances that include pipe-in-tunnel, and roadway and landscape restoration to be constructed in the Willow Hill, Lorenzo Lane, and Loren Woods subdivisions in an area located north of Ladue Road and west of I-170, in the City of Ladue, Missouri. This project is one of the largest capital projects constructed by the City of Ladue in the City's history and consisted of \$2.9 Million of infrastructure retrofitted into a nearly ninety-year-old neighborhood to alleviate stormwater concerns.



*Figure 12: Construction of the Willow Hill Stormwater Infrastructure project posed several challenges, including the placement of new stormwater pipe in the vicinity of crisscrossing existing gas and water mains, all while navigating poor soil condition*

Prior to the project, uncontrolled runoff from University City, Lorenzo Lane, and Loren Woods Drive entered the Willow Hill neighborhood near #11 Willow Hill Road. The Willow Hill neighborhood had some limited street inlets at the west and south portion of the neighborhood, but those inlets had issues with poor street drainage and street flooding. #44 Willow Hill Road received water from all sides, originating from both the Lorenzo Lane neighborhood and Willow Hill neighborhood. Private drainage systems at #44 Willow Hill Road were insufficient to handle the flows, either due to inlet capacity or under capacity of the existing pipes. #44 Willow Hill Road had a high risk of structural flooding and had flooded severely in the past. Basement flooding was also reported to the City by #11 and #43 Willow Hill Road. Pool flooding was reported by #11 Willow Hill Road. Yard flooding was

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reported by #8, #10, #11, #14, #15, #43, #44, #45, and #46 Willow Hill Road as well as #2, #3, and #5 Loren Woods Drive. The Willow Hill Stormwater Infrastructure Project was constructed to alleviate these issues.

Construction started in June 2021 and concluded in October 2022. HR Green performed the design and Bi-State Utilities was the general contractor.



*Figure 13: Photo taken after construction was completed at #44 Willow Hill Road. Prior to the project, this property had a history of severe structural flooding. Photo taken October 2022.*

### **Robin Hill Lane – McKnight Lane Bank Stabilization Project (1618)**

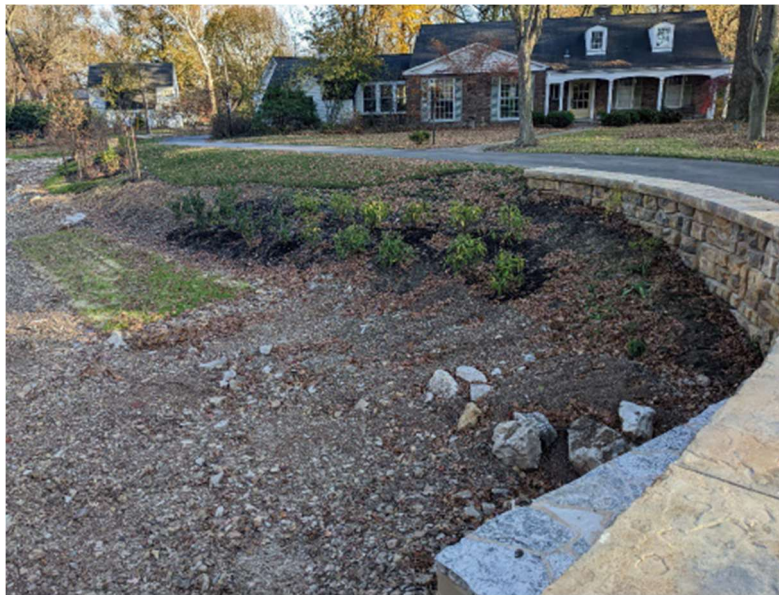
This \$1.9 Million project included construction of approximately 840 lineal feet of storm channel renovation that included bank stabilization, a triple box culvert, retaining walls, storm sewer adjustments, replacement of approximately 107 lineal feet of 18-inch diameter sanitary sewer to be installed in a casing, a prefabricated pedestrian bridge, landscape restoration, and appurtenances constructed in the Brookside, McKnight Lane and Robin Hill Subdivisions in the City of Ladue, Missouri.

Prior to the project, structural damage was occurring to the existing stone block retaining wall at Country Club Creek from #7 Brookside Lane to #8 McKnight Lane. Portions of the stone block wall had been replaced through the years with concrete retaining walls that were in fair condition. The channel bottom was composed of granite cobble stone with sections patched with concrete overlay.

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Severe erosion and mass wasting was occurring along the property line with #2 and #3 Robin Hill Lane exposing private storm outfalls and threatening a shed on the property. Construction rubble was placed along the bank as protection at #3 Robin Hill Lane, but much of the rubble was carried and deposited downstream. The culvert under the Brookside Lane cul-de-sac was undersized and forced stream flow out of its bank on the upstream side. Water then flowed over the cul-de-sac preventing road access by #'s 7, 5 and 12 Brookside Lane.

Construction started in May 2021 and the project was substantially completed in July 2022. Intuition & Logic, Inc. performed the design and Gershenson Construction was the general contractor.



*Figure 14: Completed view of Robin Hill Lane – McKnight Lane streambank stabilization improvements.*



*Figure 15: Completed view of Robin Hill Lane – McKnight Lane streambank stabilization improvements.*

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## Cancelled Master Plan Projects

In accordance with Ordinance No. 2137, Section 2-326(b), a recommendation to place a project on inactive status shall include conditions which, if met, will permit the inactive status to be lifted. Upon placement of a project upon inactive status, all application of City resources shall be suspended until such a time as the project is returned to active status. A project may be returned to active status if all specified conditions have been met, and the project has been reviewed and approved by the committee. Placement of a project upon inactive status shall be reported annually to the City Council as part of the rolling five-year implementation plan.

### **Deerfield – Wakefield Stormwater Infrastructure Project (1601.01)**

The design of the project by engineering firm HR Green started in July 2018 and was intended to include construction of a large retention basin and pipe conveyance to reduce flooding of houses, garages, roads, and yards in a residential area northwest of Tilles Park. The site lies between Interstate 64 and Litzsinger Road, and west of McKnight Road. Currently, sinkholes provide the only stormwater outlet. Most of the homes in this area were constructed between 1930 and 1960. Little or no storm sewer infrastructure was constructed at the time of initial development, relying on sinkholes to drain approximately 104 acres. Phase I of the project was estimated to cost \$7 Million.

Due to an inability to obtain easements required to move forward with construction, the Storm Water Advisory Committee placed the Deerfield-Wakefield Stormwater Infrastructure Improvements Project on inactive status at the July 13, 2023 meeting. At the September 28, 2023 meeting, the Committee moved to release previously recorded easements. Fourteen (14) easements dedicated to the City of Ladue were previously recorded with the St. Louis County Recorder of Deeds, including a Permanent Drainage Easement from 12 Wakefield Drive, and the following Temporary Construction Easements: 1, 2, and 15 Danfield Road, 32 Daniel Road, 38 Deerfield Terrace, 19, 21, 25, and 27 Ellsworth Lane, 7 Trails End Lane, 1 and 12 Wakefield Drive, and 50 Woodcrest Drive. Once an easement is released, it is void. Released easements will need to be signed again in order to be valid. Easements granted to the St. Louis Metropolitan Sewer District (MSD) were never recorded and therefore did not need to be released. Release documents were prepared by City of Ladue attorneys, signed by Mayor Nancy Spewak, and recorded with the St. Louis County Recorder of Deeds on November 15, 2023.

The Stormwater Advisory Committee established a set of conditions which, if met, will permit the inactive status to be lifted and the Project to return to the Committee for consideration. These conditions are listed in the meeting minutes from the September 28, 2023 meeting of the Storm Water Advisory Committee and are listed below:

1. Obtain all remaining easements for the Project, including easements for properties previously obtained, but whose ownership and/or title has changed.

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2. Obtain written acknowledgement or reaffirmations from property owners who previously donated easements to confirm they are still in favor of the Project.
  3. Obtain easements that were previously obtained and recorded, then released as a result of the Project's placement on inactive status.
  4. Obtain Temporary Construction Licenses from Deerfield Road subdivision, Ellsworth Lane subdivision, Daniel Estates subdivision, and Deerfield Terrace subdivision and Permanent Sewer Easements from Daniel Estates and Deerfield Terrace subdivisions. At the time of this memo, Trust indentures for these subdivisions have lapsed or never been established, so there are no "trustees" presently serving who are authorized to provide these licenses or consents. Per advice from the City Attorney, signatures from all three property owners on Deerfield Terrace (30, 34, 38) and the three impacted property owners on Daniel Road (24, 28, 32) would be required to cover the Permanent Easements and Temporary Construction Easements for Deerfield Terrace Subdivision and Daniel Estates Subdivision. Signatures from 41 and 47 Deerfield (which the City will purchase), 28 Deerfield, and 10, 11, and 12 Wakefield would be required to cover the Temporary Construction License for Deerfield Road Subdivision. The Wakefield lots are involved as their subdivision indicates they have rights to the eastern half of Deerfield Road along their respective properties. Signatures from all property owners on Lindworth Drive, Wild Rose Drive, Deer Creek Lane, and Ellsworth Lane, as well as signatures from the Woodcrest Drive Trustees, would be required to cover the Temporary Construction License on Ellsworth Lane.

### **Babler Lane Stormwater Infrastructure Project (1602)**

The design of this project by engineering firm EDM Inc. started in September 2018. The stormwater collection system at Babler Ln consists of roadside ditches and driveway culverts. The majority of flow in the area comes from pipes under Lindbergh Boulevard to the west and Litzsinger Road to the south. The various roadside ditches and driveway culverts are unable to handle this flow. In addition, everything coming through the Babler Lane subdivision drains to a series of sinkholes at #5 Babler Lane where the creek abruptly ends. Downstream of the sinkholes, there is no defined drainage path to the 54-inch diameter culvert at Winding Ridge Rd. Immediately downstream of the sinkholes the overland topography is slightly uphill (#5 Babler Lane) detaining runoff before flowing to the culvert. Based on field observations and the photos provided, once the sinkhole's outlet and sinkhole's storage has reached its capacity, the water backs up onto Babler Lane and onto the adjacent yards, creating flooding and erosion.

The project intended to construct approximately 1,781 lineal feet of storm pipe sewer varying in size from 15-in to 48-in diameter and appurtenances meeting a level of service of 1:15, and remove and replace approximately 533 lineal feet of 12-in sanitary sewer running parallel to the project alignment. The project was estimated to cost \$1.7 Million.

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On September 3, 2020 easement donation requests were sent to 11 property owners. As of December 2020, only 4 of the 11 easements have been obtained, and 7 easements remain outstanding. A lawsuit was filed by the property owner at 10075 Litzsinger Road against the City seeking a temporary restraining order and damages. Because of these developments, City Staff recommended that the project be moved to inactive status at the December 10, 2020 meeting of the Storm Water Advisory Committee. The Committee unanimously approved the placement of the Babler Lane Stormwater Infrastructure Project on inactive status.

In accordance with Ordinance No. 2137, Section 2-326(b), the Stormwater Advisory Committee established a set of conditions which, if met, will permit the inactive status to be lifted and the Project to return to the Committee for consideration:

1. Obtain all remaining easements for this project including easements for properties previously obtained, but whose ownership and/or title has changed.
2. Obtain written acknowledgements or reaffirmations from property owners who previously donated easements to confirm they are still in favor of the project; and
3. Obtain dismissal of the above referenced lawsuit, together with indemnification from property owner at 10075 Litzsinger Road, and payment to the City to compensate the City for its costs, expenses and professional fees incurred in the referenced lawsuit supra.

## Cancelled Metropolitan St. Louis Sewer District (MSD) Projects

MSD has cancelled the following MSD stormwater projects planned for Ladue due to inability to obtain easements or easement-related litigation:

- Daniel Road Storm Sewer Relief (MSD Project Number 12703)
- Warson Road South 2000 Streambank Stabilization (MSD Project Number 13293)

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## Small Project Stormwater Grant Program

The Small Project Stormwater Grant Program (Program) is authorized under City of Ladue Ordinance #2137 Section 2-329 to help property owners address limited storm water problems such as, but not limited to, yard flooding, flooding from an inadequate sinkhole, flooding from an inadequate conveyance, yard erosion, creek erosion, water entering a basement or structure, and/or structural erosion at their property from stormwater runoff.

The program does not apply to projects intended to alleviate problems associated with the regulated floodplain as mapped by the Federal Emergency Management Agency (FEMA).

“...The owners of any property (collectively, Property Owner(s)) located within the City of Ladue (the City), may apply for a grant from the storm water account fund (the Fund) as allocated by the City Council to the Ladue Storm Water Grant Program (the Grant Program), to cover up to 50% of the total Property Owner(s)' eligible costs, up to a maximum of \$35,000 per project, to design, review, install, and inspect a City-approved storm water project (a Project) under the Grant Program. The minimum Project cost is \$5,000 with a City match of \$2,500.”

The Program requires a front-end commitment on the part of the Property Owners to develop a scope of work; prepare construction plans; obtain regulatory approvals; obtain required permits; prepare, obtain and record easements and ancillary agreements, as appropriate; take construction bids; and complete construction of the project. The activities normally require the property owner to hire a licensed design professional(s) and contractors. The City does not make referrals of either engineers or contractors. Pre-approval of funding is required.

To date, seventeen applications have been filed for a total request of \$290,335.73:

- One is complete with a disbursement of \$10,350.00 in 2018 funds;
- Two are complete with a disbursement of \$44,955.78 in 2019 funds;
- Two are complete with a disbursement of \$62,271.60 in 2020 funds;
- Two are complete with a disbursement of \$18,301.00 in 2021 funds;
- One is complete with a disbursement of \$22,733.85 in 2022 funds;
- One is complete with a disbursement of \$25,000.00 in 2023 funds;
- Two funding requests totaling \$35,582.86 for disbursement from the 2024 funds have been approved (one for \$8,000 has been withdrawn and one for \$27,582.86 will be reimbursed from 2025 funds).
- Of the remaining five, one application has been withdrawn; and four are inactive.

To date a total of \$183,612.23 in City funds have been disbursed under the program. The Public Works Department receives about 2 to four inquiries per month regarding the grant program.

## Federal Emergency Management Agency (FEMA) Flood Buyout Program

The City of Ladue applied for federal assistance to purchase eleven at-risk homes for pre-flood, fair-market value, demolish the structures, and return the area to greenspace. The City is over two years into the application process and has been awarded mitigation funding for seven residential properties by the Federal Emergency Management Agency (FEMA) under the Flood Mitigation Assistance (FMA) grant program and Hazard Mitigation Grant Program (HMGP) administered by Missouri State Emergency Management Agency (SEMA). Flood buyout applications for four additional properties are currently under review. The eleven residential properties fall under one of four flood buyout applications: Hazard Mitigation Grant Program (HMGP), Fiscal Year 2022 Flood Mitigation Assistance (FMA), Fiscal Year 2023 Flood Mitigation Assistance (FMA), or Fiscal Year 2024 Flood Mitigation Assistance Swift Current.

The chart below shows the status of each flood buyout, current as of January 2025. The Flood Buyout Program is voluntary. The City is not obligated to purchase a property nor is a property owner required to sell a property. As of January 2025, two property owners have declined the City’s offer to purchase their properties and withdrawn from the flood buyout program (13 Foxboro Road and 22 Foxboro Road).

HMGP	FY2022 FMA	FY2023 FMA	FY2024 Swift Current
✓ 14 Foxboro Road Demolition Complete	 12 Foxboro Road Demolition in Progress	16 Foxboro Road	20 Foxboro Road
✗ 22 Foxboro Road Property Owner Withdraw	✗ 13 Foxboro Road Property Owner Withdraw	Application Under Review by FEMA 23 Foxboro Road	Application Under Review by SEMA
✓ 25 Foxboro Road Demolition Complete	✓ 15 Foxboro Road Demolition Complete	10050 Conway Road	Application Under Review by SEMA
	✓ 26 Foxboro Road Demolition Complete		

Figure 16: Status of Flood Buyouts, current as of January 2025

Demolition is complete at four properties (14 Foxboro Road, 15 Foxboro Road, 25 Foxboro Road, and 26 Foxboro Road). Demolition is underway at one property (12 Foxboro Road).



*Figure 17: Before, during, and after the demolition of 14 Foxboro Road.*

The City is waiting for news regarding the status of the Fiscal Year 2023 FMA application that, as of January 2025, is under review by FEMA. In September 2024, the application was “identified for further review” by FEMA. The City’s application appears to be the only application from Missouri moving forward.

The City’s Fiscal Year 2024 Swift Current application for the buyout of 20 Foxboro Road was submitted in November 2024 and, as of January 2025, is under review by SEMA.

## Oversight of Metropolitan St. Louis Sewer District (MSD) Projects in Ladue

City Staff maintain a collaborative relationship with MSD, including oversight of MSD’s stormwater and sanitary sewer projects inside City limits. MSD submits project plans for City review during the planning and design phase, and after review, City Staff provide MSD with requirements letters outlining City requirements as applicable to the specific scope of work for each MSD project. During the construction of major MSD stormwater and sanitary sewer projects, City Staff attend weekly construction team progress meetings. These meetings serve to keep City Staff informed of project progress, upcoming work, and resident concerns. City Staff visit MSD project construction sites bi-weekly for land disturbance permit inspections and to ensure City requirements are followed.

## Stormwater Plan Review

Ordinance numbers 2100, 2148 and 2163 define stormwater management requirements for site development in the City of Ladue. In the Spring of 2017, Public Works staff began assisting Building Department staff with the review of site improvement plans for compliance with the requirements of these ordinances. The goal of the ordinances is to mitigate the increase in runoff attributed to an increase in watershed imperviousness associated with “in-fill” construction and the re-development of the urbanized area in Ladue. Stormwater site plan review and enforcement of ordinance

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requirements are a frontline defense in preventing the development of new stormwater related problems and in the mitigation of existing problems.

The following is a general summary of the City's review policy:

- Each land development project must submit a plan that demonstrates that any increase in stormwater runoff is being detained on the property and that any significant changes in stormwater discharge velocity is being appropriately managed on the property.
- MSD review and approval is required if one acre or more of the site is being disturbed; or if the development includes a new or replacement home or commercial building, even if less than one acre is disturbed.
- Home building additions, non-habitable outbuildings, and site features/improvements (driveways, patios, swimming pools, hardscape, etc) that disturb less than one acre DO NOT need MSD review and approval.
- The technical baseline is compliance with MSD rules and regulations. Ladue does not have technical requirements/guidance on top of MSD. MSD approval means that the requirements for flood and channel protection, and water quality, as appropriate, have been met.
- Per Ladue requirements any increase in impervious area and discharge for the 15-year-20 minute rainfall event must be quantified; and a Best Management Practice (BMP) must be provided to manage the runoff increase. BMP plans, sizing/performance calculations, operation and management (O&M) data, etc, must be provided.
- Submittal of lot greenspace calculations and the credits being applied for (if any) are also required.

Public Works Engineering Staff review plans submitted to the Ladue Building Department to insure adherence to City stormwater and sinkhole requirements. Review comments are recorded in the Ladue Building Department iWorQ system. Direct communication between Public Works Engineering Staff and developers' engineers is often required for more complicated projects.

## Stormwater Complaint Investigation

The SMP is a complaint driven program. The program started with problem identification based on stormwater complaints collected city-wide. City staff continue to maintain a stormwater complaint database. Recently collected data is added to the City's Geographic Information System (GIS). Needs Assessment changes can warrant additional projects being developed and added to the Stormwater Master Plan.

Public Works staff responds to complaints received in a timely manner; normally within one business day. The complaint is initially screened in a phone call and is generally followed up with a site visit by

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Public Works staff. The staff member evaluates the complaint and determines the party responsible for problem resolution; private or public. If the complaint is about a problem that is isolated to a single property and privately sourced (not related to the action or inaction of a public entity or utility), it is usually the responsibility of the property owner. Jurisdiction is defined and communicated by the staff member and suggestions are offered.

If the problem involves multiple properties, jurisdiction is defined and communicated by the staff member and suggestions are offered. In some cases, the complaint may stem from a code violation; in that case it is referred to the Building Department for possible code enforcement.

If the problem is publicly sourced (related to the action or inaction of the City), jurisdiction is defined and communicated by the staff member and referred to the Director and/or Superintendent of Public Works. The complaint may warrant maintenance or repair of a City facility. The complaint may warrant development and implementation of a Stormwater Master Planned project possibly requiring execution on an emergency basis.

If the problem is sourced from a public entity other than the City of Ladue, jurisdiction is defined and communicated by the staff member and suggestions are offered. Resolution may require the property owner/stakeholder to file a complaint with another public entity. Communication with AT&T, Ameren Missouri, Charter, Metropolitan St Louis Sewer District (MSD), Missouri American Water Company, Spire, Missouri Department of Transportation, Saint Louis County and neighboring municipalities is not uncommon.

Suggestions provided to residents often include possible City assistance through the City of Ladue Small Project Storm Water Grant Program. Detailed information about the grant program is provided to the property owner and available to the public on the City's website.

Complaints regarding stream channel maintenance are one of the most frequent complaints received by the Public Works staff. There is a common misconception that the City or MSD has jurisdiction and responsibility for stream channels. That responsibility actually falls to each individual property owner. Possible violations of the stream buffer ordinance, or the nuisance ordinance (prohibiting dumping junk, debris, etc.) are referred to the Building Department for possible code enforcement. Correcting streambank erosion is the responsibility of the property owner, who may be able to obtain assistance from MSD or the City through the Small Project Stormwater Grant Program.

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# Funding Sources

## City of Ladue ½ Cent Sales Tax

There is an active and on-going half cent sales tax inside City of Ladue limits that is funneled directly to the City's Stormwater Fund and to be used exclusively for stormwater purposes. The sales tax proceeds were approximately \$1,160,000 in Calendar Year 2024 with annual growth of 2% anticipated.

## Metropolitan St. Louis Sewer District Operation Maintenance Construction Improvements District (OMCI)

The MSD Board of Trustees passed a resolution at their October 10, 2024 meeting regarding the OMCI tax rates. The Board has approved keeping the Deer Creek OMCI tax in place but at 1/4 of the current rate. This reduced tax will appear on property tax bills starting December 2025, with funds available for use in 2026. Until then, the existing tax rate will continue to apply. Ladue received \$310,206 in OMCI funds for 2023, \$325,424 in OMCI funds for 2024, and is scheduled to receive \$339,717 in OMCI funds for 2025. The reduced OMCI funds in 2026 are anticipated to approximately half of what was received in 2025.

City Council, City Staff, and Lloyd Palans, Chair of the Storm Water Advisory Committee and member of MSD's Rate Commission, were active in petitioning for the MSD Board to keep the OMCI tax in place.

## Metropolitan St. Louis Sewer District Proposition S Tax

The MSD stormwater municipal grant program (Prop S) tax passed at the April 2, 2024 election and the tax will start being charged in 2025. Non-residential customers will see their first bill in February 2025 while residential customers will see Prop S on their property tax in December 2025. These funds will also be available for use in 2026. Ladue is set to receive a \$75,000 municipal grant per year in Prop S tax proceeds. In addition to the municipal grant, it is anticipated that MSD will endeavor additional in-house stormwater projects in Ladue with the proceeds from the Prop S tax.

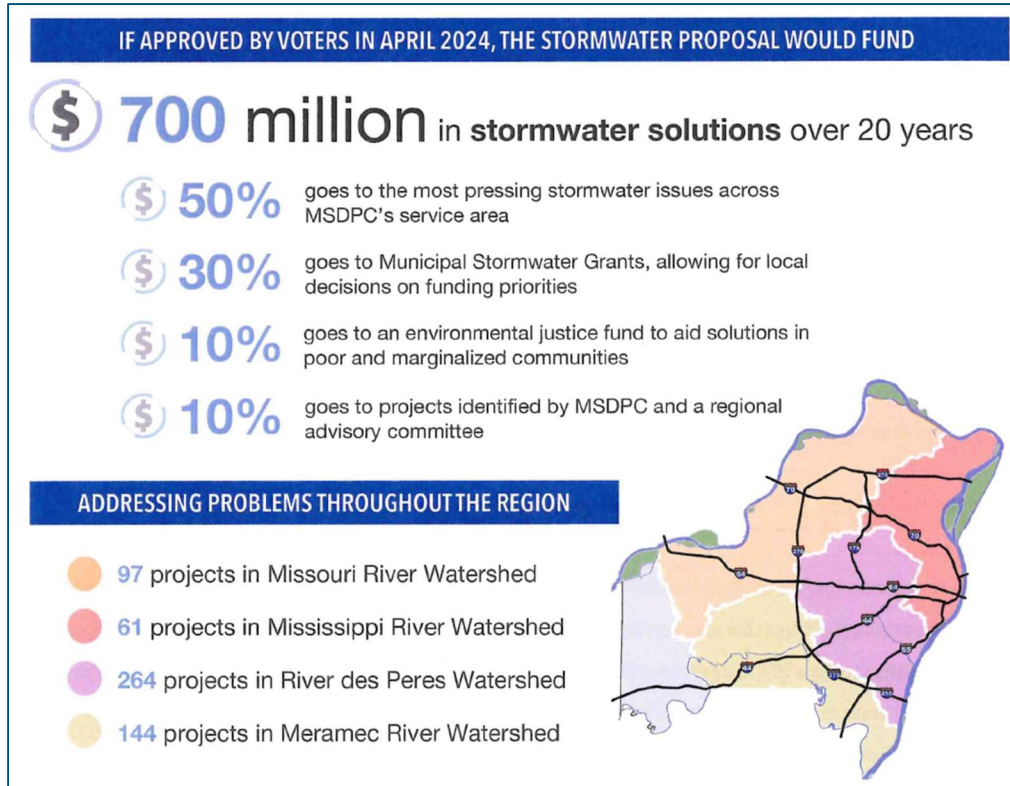


Figure 18: Prop S graphic from a packet shared at a 2023 MSD Local Leaders Luncheon attended by Public Works staff.

## Federal Emergency Management Agency (FEMA) Flood Buyout Programs

The City of Ladue applied for federal assistance to purchase eleven at-risk homes for pre-flood, fair-market value, demolish the structures, and return the area to greenspace. The City is over two years into the application process and has been awarded mitigation funding for seven residential properties by the Federal Emergency Management Agency (FEMA) under the Flood Mitigation Assistance (FMA) grant program and Hazard Mitigation Grant Program (HMGP) administered by Missouri State Emergency Management Agency (SEMA). Flood buyout applications for four additional properties are currently under review.

The eleven properties fall under one of four flood buyout application programs.

The level of federal funding provided for each property is determined by the application guidelines and FEMA flood severity ranking. See the table below for the federal funding level of each property's buyout costs. The cost of the buyouts include appraisals, title work, asbestos identification and abatement, demolition and grading, environmental survey, project management, as well as the purchase price of the property.

Property	Federal Funding Level
12 Foxboro Road	100%
13 Foxboro Road	90%
14 Foxboro Road	75%
15 Foxboro Road	90%
16 Foxboro Road	90%
20 Foxboro Road	75%
22 Foxboro Road	75%
23 Foxboro Road	90%
25 Foxboro Road	75%
26 Foxboro Road	90%
10050 Conway Road	100%

Figure 19: Federal Funding Level of the Flood Buyout Program Properties

## Missouri Department of Natural Resources (DNR) American Rescue Plan Act (ARPA) Grant

The City applied for State American Rescue Plan Act (ARPA) funding in July 2022 for a Stormwater Infrastructure Grant administered by Missouri Department of Natural Resources (DNR). The application did not score highly enough to receive funding and was placed on the waitlist. The City’s application was ranked 72, and the top 67 applications were selected in 2022 for funding, with application #68 partially funded.

In August 2024, a representative from DNR contacted City staff with news that there was additional ARPA Stormwater Infrastructure Grant funding available, and the City was eligible. The City’s original application was for the Deerfield-Wakefield Stormwater Infrastructure Improvements project, a project that has since been placed on inactive status due to the inability to obtain easements necessary to construct the project. The original application was for \$5,000,000.00 of state funding with \$1,356,900.00 local match, or 78.65% state and 21.35% local match. DNR allowed the City to obtain funding for other eligible City stormwater infrastructure projects at the funding ratio of 78.65% state and 21.35% local match. Projects had to be under contract by October 22, 2024 to be eligible for the ARPA funding grant.

City staff submitted the following list of projects for waitlist ARPA funding, totaling \$741,176.17 of state funding. The award agreement between the City and DNR was executed in December 2024.

<b>Total</b>	<b>\$942,372.75</b>
<b>DNR ARPA Share</b>	<b>\$741,176.17</b>
<b>City of Ladue Share</b>	<b>\$201,196.58</b>

<b>Project Name</b>	<b>Phase</b>	<b>Consultant</b>	<b>\$ Under Contract</b>	<b>\$ Share: DNR ARPA 78.65%</b>	<b>\$ Share: City of Ladue 21.35%</b>
1642-R24 Tributary 6 Storm Sewer Improvements	Design Construction Phase Services	HR Green	\$190,415.75	\$149,761.99	\$40,653.76
Clayton Road Over Glen Creek Culvert #43 Replacement	Study and Design	HR Green	\$126,791.00	\$99,721.12	\$27,069.88
Clayton Road Over Glen Creek Culvert #43 Replacement	Design Supplemental	HR Green	\$9,960.00	\$7,833.54	\$2,126.46
Clayton Road Over Glen Creek Culvert #43 Replacement	Construction Phase Services	HR Green	\$88,936.00	\$69,948.16	\$18,987.84
Ladue Road over Country Club Drainage Culvert Replacement	Study	Reitz & Jens	\$53,000.00	\$41,684.50	\$11,315.50
Ladue Road over Country Club Drainage Culvert Replacement	Design	Reitz & Jens	\$151,000.00	\$118,761.50	\$32,238.50
Ladue Road over Country Club Drainage Culvert Replacement	Construction Phase Services	Reitz & Jens	\$80,000.00	\$62,920.00	\$17,080.00
Conway Road Over Unnamed Deer Creek Tributary East & West Culverts Replacement	Study	Horner & Shifrin	\$61,900.00	\$48,684.35	\$13,215.65
2401 Upper Ladue Road #23 Storm Sewer Improvements	Design	EDM Inc.	\$180,370.00	\$141,861.01	\$38,509.00

All projects in the table above are part of the Stormwater Management Program 5-Year Capital Improvement Plan for 2024-2029 that was approved by City Council at the August 19, 2024 meeting.

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# Strategic Initiatives

## Investigation into Additional Funding Sources

City staff are continually looking for opportunities to compete for additional stormwater grant funding. Additional grant funding expands the City's ability to solve stormwater problems in the community. City staff stay current on grant opportunities through seminars, government agency notification subscriptions, professional developments events, and training.

## Design Manual Development

City staff has identified an opportunity to better serve our residents through the Storm Water Plan Review Process. In 2025, City staff will recommend that City Council enter a contract with a consultant to create a Design Manual incorporating and expanding City design standards. Design standards explained in one cohesive location will allow for more streamlined stormwater plan reviews, as careful examination of the Design Manual will reduce the need for back-and-forth between City stormwater plan review staff and developer's engineers.

## Sinkhole Maintenance Public Education

City staff will be working on the development of educational materials regarding best practices for the maintenance of sinkholes which are located in various locations in Ladue with increased concentration in the southeastern quadrant of Ladue. City staff have previously developed educational materials for creek and stream maintenance and will utilize those materials as a template.

## Stormwater Program Staffing Structure

Since 2016, the City of Ladue has staffed management of the stormwater program with part-time engineering staff with oversight from the Director of Public Works. Currently, there are two part-time professional engineers each working approximately 20 – 25 hours weekly who perform the essential tasks of Stormwater Master Plan development and oversight, project management for the various Master Plan projects, stormwater complaint response, oversight of the small stormwater grant program, stormwater plan review, and stormwater funding acquisition. This innovative staffing model has been very successful but does stretch to its limits during the construction of the larger scale projects. Review of the staffing structure in conjunction with review of staff augmentation opportunities will be key during the 2024 - 2029 Stormwater Master Plan cycle.

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# Revision Notes

Revision: 1; 01/16/2025, first issue to SWAC

## Appendix

Appendix A: Bill 2360: an ordinance modifying Chapter 110, Article V – Sinkholes and Karst features regulations

Appendix B: Staff Memo dated February 8, 2024 “Bill 2360 – Modifications to Chapter 110, Article V of the Code of Ordinances”

Appendix C: Bill 2361: an ordinance modifying Chapter 2, Article X – Stormwater Control Program

Appendix D: Staff Memo dated February 8, 2024 “Bill 2361 – Modifications to Chapter 2, Article X, Stormwater Control Program

Appendix E: Modifications to Ladue Score Sheet Methodology (2 pages)

Appendix F: “How does a problem become a project?” diagram

Appendix G: City of Ladue, Missouri Bridge and Culvert Locations, dated November 2002

Appendix H: 2024 Stormwater Master Plan Project List

Appendix I: 2024 Stormwater Management Program 5-Year Capital Improvement Plan

Appendix J: Exhibits for the seven (7) Stormwater Master Plan projects in the 5-Year Capital Improvement Plan

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# Appendix A

Appendix A: Bill 2360: an ordinance modifying Chapter 110, Article V – Sinkholes and Karst features regulations

**BILL NO. 2360**

**ORDINANCE NO. 2360**

**AN ORDINANCE MODIFYING CHAPTER 110, ARTICLE V – SINKHOLES AND KARST FEATURES REGULATIONS**

**WHEREAS**, in April 2020, the City adopted Bill 2250 which established regulations regarding development near sinkhole and karst features after careful study and review by the Stormwater Advisory Committee; and

**WHEREAS**, Public Works engineering staff who performs the site development review for projects that include sinkholes or karst features, has proposed minor revisions to three sections of the ordinance for the purpose of clarification; and

**WHEREAS**, the Stormwater Committee, at their January 25, 2024 meeting, reviewed and recommended adoption of the modifications to the proposed sinkhole and karst features ordinance; and

**WHEREAS**, City Council, after careful review, desires to and finds it in the best interests of the community to modify Chapter 110, Article V for the purpose of modifying existing regulations for Sinkholes and Karst Features within the City of Ladue which further bolster the functionality of sinkholes while outlining preservation requirements; and

**WHEREAS**, a copy of this bill has been made available for public inspection prior to its consideration by the Council and read by title two times in an open meeting prior to passage.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LADUE, ST. LOUIS COUNTY, MISSOURI, AS FOLLOWS:**

SECTION 1. The City of Ladue hereby amends four sections of Chapter 110, Article V of the Ladue Code of Ordinances entitled, 'Sinkholes and Karst Features' as shown in the form of Exhibit A, attached hereto and incorporated herein by reference with proposed new language depicted in underlined font and eliminated language struck through. All other provisions within Chapter 110 not modified by Exhibit A shall remain in full force and effect.

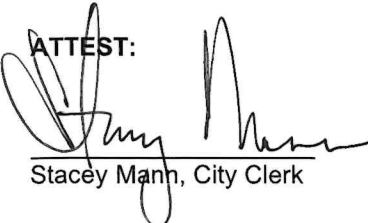
SECTION 2. This Ordinance shall be in full force and effect from and after its adoption and approval by the Mayor.

**PASSED THIS 20TH DAY OF FEBRUARY 2024.**

  
\_\_\_\_\_  
Presiding Officer

**ADOPTED AND APPROVED THIS 20TH DAY OF FEBRUARY 2024.**

  
\_\_\_\_\_  
Nancy Spewak, Mayor

**ATTEST:**  
  
\_\_\_\_\_  
Stacey Mann, City Clerk

**EXHIBIT A:  
MODIFICATIONS TO**

**CHAPTER 110, ARTICLE V, SINKHOLES AND KARST FEATURES**

**DIVISION 2. - GENERAL PROVISIONS**

Sec. 110-172. - POLICY

This policy is set forth for new development in areas containing sinkholes. Development in sinkhole areas will be based upon the following approach:

- 1. Avoidance**
- 2. Minimization**
- 3. Mitigation**

Construction in sinkholes and sinkhole flooding areas shall be avoided. Exceptions will be made only in situations where it can be conclusively demonstrated to the Director of Public Works, or his or her designee, that there are no practical alternatives to such construction.

Where avoidance of sinkholes and sinkhole flooding areas is unavailable, measures that will have minimal impact on the sinkhole or receiving water are required. Plans for minimal alteration can be approved by the Director of Public Works, or his or her designee, provided it is conclusively demonstrated that the proposed plan is the minimum practical alternative.

Potential impacts of construction on the sinkhole, flooding elevations, and receiving waters must be studied and assessed, and recommendations made for mitigation of potential impacts upon flooding, structural stability, and groundwater quality before the development plan can be approved by the Director of Public Works, or his or her designee. The degree and sophistication of study required will increase in proportion to the potential impacts.

## Sec. 110-175. – SINKHOLE EVALUATION REPORT

...

### (b)(3)(b) Sinkhole Flooding Area

The sinkhole flooding area is obtained by determining the area inundated by runoff from a storm with an annual exceedance probability of one percent (100-year storm) and a duration of twenty-four hours as determined by MSD.

Where the estimated volume of runoff exceeds the volume of the sinkhole depression, the depth, flow rate, and volume of overflow shall be estimated. ~~and~~ The sinkhole flooding area can be estimated as the area below the maximum flooding elevation in the sinkhole depression. Where the volume of the sinkhole is sufficiently large that storage in the sinkhole depression will materially affect estimated outflow rates and volumes, reservoir routing can be used, if desired, to determine the maximum flood stage in the sinkhole.

In sinkhole cluster areas, the overflow volume shall be included to determine the maximum estimated flooding elevations in the next downstream sinkhole. Continue this analysis downstream until the lowest sinkhole of the sinkhole cluster is reached or overflow reaches a surface watercourse or pathway. The overflow path downstream of the sinkhole depression shall be shown on a topographic map with a maximum contour interval of four feet.

...

### (b)(4)(a) Water Quality Management Measures

Many sinkholes drain a small watershed. Where sheet flow is the predominate runoff to a sinkhole, erecting and maintaining reliable silt control barriers around the sinkhole during construction and providing a vegetative buffer area around the sinkhole to filter out potential contaminants is required.

Where inflow to sinkholes is concentrated, the effort required to capture and filter out contaminants increases significantly. Required water quality management measures are as set forth below:

#### 1. Sediment and Erosion Control During Construction

Existing ground cover shall not be removed within twenty feet of the sinkhole eye and a silt barrier shall be erected and

maintained around the outer perimeter of the buffer area. Vegetative cover must be of sufficient quality to provide desired filtration.

A ditch check(s) will be required at each point where concentrated flow is discharged into the sinkhole.

## 2. Post Construction Permanent Management Measures

Where flow into the sinkhole occurs as sheet flow, water quality requirements can be satisfied by maintaining a permanent vegetative buffer area with a minimum width of twenty feet around the sinkhole flooding area.

Concentrated flows may be discharged into the sinkhole through stable grass or rock lined swales and channels designed for non-erosive velocities. Temporary erosion control measures such as sod or erosion control blankets shall be provided during the grow-in period.

Clearing and pruning of trees and undergrowth, and limited grubbing of roots is permitted within the twenty feet wide buffer area around the sinkhole eye. Dumping of landscaping debris in the sinkhole flooding area is prohibited. Landscaping and minor gardening is permitted outside of the sinkhole eye provided erosion and sediment discharge is limited through use of minimum tillage and non-buoyant mulches.

## Sec. 110-176. - NEW DEVELOPMENT REQUIREMENTS

...

(b) Recreational facilities such as hiking, jogging, and bicycling trails, playgrounds, exercise courses, swimming pools, and grass playing fields are permitted within the sinkhole flooding area provided they are not located within twenty feet of the eye of the sinkhole.

## Sec. 110-177. - Appeal procedures.

~~The administrative review procedure as established by the City of Ladue shall hear and decide appeals and requests for modifications to the requirements of this article. The~~ Board of Adjustment as established by the City of Ladue shall hear and decide appeals and modification requests from the requirements of this ordinance. When seeking a modification, it shall be the burden of the applicant to show good cause why such modification should be granted and how such is still within the intent and spirit of the ordinance.

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# Appendix B

Appendix B: Staff Memo dated February 8, 2024 “Bill 2360 – Modifications to Chapter 110, Article V of the Code of Ordinances”

**CITY OF  
LADUE  
Public Works**

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To: Mayor Nancy Spewak  
Member of City Council

From: Anne Lamitola, PE *Anne C. Lamitola*  
Director of Public Works & Building

Date: February 8, 2024

Subject: Bill 2360 – Modifications to Chapter 110, Article V of the Code of Ordinances

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Bill 2360 consists of modifications to four sections of the Sinkhole Ordinance which was first established in April 2020. In the policy section of the ordinance, 110-172, the modifications adds language about the sinkhole flooding area which often extends beyond the confines of the sinkhole depression area and must be considered with regard to development in such areas. Modifications to 110-175 include additional information that will be needed for the sinkhole evaluation report and also clarifies what is permitted for post construction management measures. Section 110-176 enhances the setback from the eye of the sinkhole to twenty feet for recreational facilities. Section 110-176 clarifies the appeal process for denials.

These changes were proposed by Stormwater Engineer Denny Welker who performs the plan review for development projects submitted to the Building Department that involve more complex stormwater design. These changes were presented to the Stormwater Advisory Committee on January 25, 2024 who made a recommendation for approval by the City Council.

If you would like to discuss this or any Public Works or Building Department item on the City Council agenda, please contact me at (314) 993-5665 ext. 1301 or by e-mail at [alamitola@cityofladue-mo.gov](mailto:alamitola@cityofladue-mo.gov).

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# Appendix C

Appendix C: Bill 2361: an ordinance modifying Chapter 2, Article X – Stormwater Control Program

**BILL NO. 2361**

**ORDINANCE NO. 2361**

**AN ORDINANCE MODIFYING CHAPTER 2, ARTICLE X – STORMWATER CONTROL PROGRAM**

**WHEREAS**, on August 18, 2016, the City adopted Bill 2137 which established the Stormwater Control program for the City of Ladue; and

**WHEREAS**, in advance of the Stormwater Master Plan update scheduled for Calendar Year 2024, Public Works engineering staff, who manages the implementation of the program, drafted modifications to the ordinance to reflect current practices and the incorporation of lessons learned from the initial implementation of said program; and

**WHEREAS**, the Stormwater Committee, at their January 25, 2024 meeting, reviewed and recommended adoption of the modifications to the Stormwater Control ordinance; and

**WHEREAS**, City Council, after careful review, desires to and finds it in the best interests of the community to modify Chapter 2, Article X for the purpose of modifying existing regulations for the Stormwater Control Program within the City of Ladue; and

**WHEREAS**, a copy of this bill has been made available for public inspection prior to its consideration by the Council and read by title two times in an open meeting prior to passage.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LADUE, ST. LOUIS COUNTY, MISSOURI, AS FOLLOWS:**

SECTION 1. The City of Ladue hereby Chapter 2, Article X of the Ladue Code of Ordinances entitled, 'Stormwater Control Program' as shown in the form of Exhibit A, attached hereto, and incorporated herein by reference with proposed new language depicted in underlined font and eliminated language struck through. All other provisions within Chapter 2 not modified by Exhibit A shall remain in full force and effect.

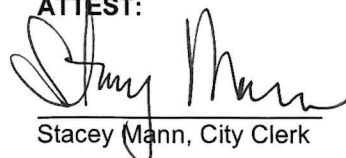
SECTION 2. This Ordinance shall be in full force and effect from and after its adoption and approval by the Mayor.

**PASSED THIS 20TH DAY OF FEBRUARY 2024.**

  
\_\_\_\_\_  
Presiding Officer

**ADOPTED AND APPROVED THIS 20TH DAY OF FEBRUARY 2024.**

  
\_\_\_\_\_  
Nancy Spewak, Mayor

**ATTEST:**  
  
\_\_\_\_\_  
Stacey Mann, City Clerk

**EXHIBIT A:**

## **ARTICLE X. - STORM WATER CONTROL PROGRAM**

### **Sec. 2-320. - Storm water control program.**

The purpose of this article is to address the City of Ladue's (the "city") desire to assist its residents, define the storm water control program (the "program") for the city, and define a process that will allow the city to transition from considering storm water as a private responsibility in which the city intervenes only in emergency situations to one where storm water control is facilitated between Metropolitan St. Louis Sewer District (MSD), the city, and the private property owners within the community.

It is the intention of the city to address, within the constraints of the storm water fund budget, storm water concerns for affected city infrastructure as well as private properties where surface drainage conditions have created a negative impact. This program is currently funded from portions of the sales tax of one-half-cent collected for the payment of storm water improvements and remediation within the city (the "storm water fund"). Notwithstanding anything to the contrary, the city shall not be obligated to undertake any storm water project, nor is the city committing to address all storm water concerns within the city boundaries.

### **Sec. 2-321. - Storm water advisory committee.**

The implementation of the program shall be facilitated by a storm water advisory committee (the "committee") which shall consist of five members who shall be residents of the city. The committee shall make recommendations for development and implementation of the program to the city council. The members of the committee shall be appointed by the mayor with the approval of the city council. Each member of the committee shall serve for a term of three years, or until their successor is duly appointed and qualified. The mayor and director of public works ("director") shall serve as ex officio members of the committee.

The committee shall perform various tasks as described in this article, which shall include, but not limited to, ~~annual~~-review of the problem point density map (the "heat map"), ~~initial and~~-periodic review of the storm water master plan, development of an initial implementation plan, ~~annual-periodic~~ update of such plan, review of the long-term stormwater fund budget, periodic review of the overall program, and development of recommendations to the city council, as needed, on storm water related matters. The committee may seek input from appropriate agencies, groups or individuals as necessary to evaluate the plan and suggest necessary revisions.

### **Sec. 2-322. - Background and project identification.**

(a) The director is responsible for the identification of potential projects through analysis of public infrastructure or through input received by individual residents ~~through the heat map~~. ~~A~~The heat map will be utilized to guide further study for the ~~initial~~ storm water master plan and will ~~initially~~ focus on storm water concerns identified in the storm water needs assessment that have the highest statistical need.

~~(b) The heat map will be updated annually by the director to aid in the identification of problem areas.~~The heat map was developed from input received from individual residents through a public engagement process, data provided by MSD, and through analysis of public and private infrastructure and stream evaluation with outside professional consultants. The heat map illustrates problem area priorities and stream conditions by color, with the highest priority areas illustrated in red, and the lowest priority areas in green.

(c) The ~~annual~~ update of the ~~Master Plan~~heat map shall be presented to the committee for approval and shall include the addition to the database of problem areas identified from other source(s) since the previous update. The ~~annual~~ update of the ~~heat map~~Master Plan shall include the deletion from the database of problem areas previously addressed or remediated by the storm water master plan.

~~(d) As part of the Master Plan update process, public input shall be solicited by notifying the public about the meeting following the City's standard meeting notification process.~~

~~(ed) Minimum project standards.~~

(1) Projects identified to be a part of the program shall meet the following minimum guidelines:

- a. Threatened public structure or improvement; or
- b. Surface flows altered or caused by a public improvement; or
- c. Cannot reasonably be completed by individual property owners due to the necessary involvement of other parties or agencies outside of that individual's control; or
- d. Threatened private or public roadway; or
- e. Altered upstream conditions; or
- f. Inadequate system design under previously less restrictive development regulations; or
- g. Inadequate system maintenance.

(2) The city has a responsibility to the public regarding expenditure of public funds. As such, priority and weighting of storm water projects shall be determined based upon problem categories specified on the city project identification information sheet (the "Ladue Score Sheet"), attached to the ordinance from which this article is derived as Exhibit A. The director may amend Exhibit A from time to time as necessary and appropriate upon the review and approval of the committee.

(3) The purpose of the Ladue Score Sheet is to calculate a benefit to cost ratio ("BCR") which is developed on a project-by-project basis by first calculating the total benefit points utilizing the MSD storm water project prioritization system and inputting that value into the Ladue Score Sheet as the project benefit points. The MSD storm water project prioritization system shall serve as the basis for developing the BCR on the Ladue Score Sheet. Other data required for the Ladue Score Sheet are data points that are unique to the city and include problem category multipliers and number of properties benefitted which are further defined on the Ladue Score Sheet.

(4) Issues determined by the director to be the result of the actions of an individual property owner impacting his or her own property are not eligible for consideration. Issues created as the result of the actions of an individual property owner which impact downstream properties are not eligible, but instead shall be considered a matter subject to civil action between affected parties. The maintenance of functioning systems under the control or ownership of other agencies, political subdivisions, private individuals or subdivision trust associations are not eligible for inclusion.

**Editor's note**— Exhibit A was not included in the codification of this article.

### **Sec. 2-323. - Benefit calculation and storm water master plan.**

Upon identification of priority areas for further analysis ~~utilizing the heat map~~, the director shall cause development of a storm water master plan for those problem areas. Highest priority areas, ~~as illustrated on the heat map~~, are eligible for further analysis and inclusion in the storm water master plan that will include the following:

- (1) Establishment of a preliminary scope of work for a concept solution;
- (2) Calculation of MSD benefit points utilizing the ~~then current~~ MSD stormwater projects prioritization system ~~dated October 10, 2006~~;
- (3) ~~Establishment of~~ engineer's opinion of probable cost (EOPC); and
- (4) Calculation of the BCR on the Ladue Score Sheet as attached to this article.

The BCR calculation includes adjustments to MSD benefit points, by applying ~~various~~ multipliers ~~including but not limited to~~ for the number of properties benefitted divided by the number of properties impacted, and for problem category weighting as defined

on the Ladue Score Sheet. The problem category weightings were developed in response to priorities determined by the city. Additionally, the definition of a benefited property, as well as the definition of an impacted property, are also defined on the Ladue Score Sheet. It is understood that a project may include multiple problem categories. The weighting multiplier to be used in the BCR shall be the number associated with the highest priority problem category identified for that project as determined by the director.

The storm water master plan shall be presented to the committee for review and recommendation to the city council. The storm water master plan shall consist at minimum of items (1) through (4) as listed above for each area of concern analyzed. The committee shall review the plan in open session and shall seek input from any and all agencies, groups or individuals as necessary to evaluate the storm water master plan and revise it as necessary. ~~All affected property owners shall be informed of this review at least one week prior to the session through notice given by first class mail. Upon solicitation of public input, the~~ The committee may alter, adopt or reject the benefit calculation for placement in the Master Plan program. The storm water master plan shall be updated at regular intervals, but not less than once every five years or as approved by city council, under the direction of the director, under contract with a qualified professional services provider or utilizing internal resources.

### **Sec. 2-324. - Ranking system.**

Projects approved by the committee for recommendation to the city council shall be ranked with the highest priority given to those with the highest BCR. Projects shall be inserted into the rankings based solely on the calculated ratio regardless of timing and/or order of identification. ~~The storm water master plan shall be presented annually to the city council in the form of a~~ The long-term stormwater fund budget shall be prepared as rolling five-year implementation and budgeting plan recommended by the committee as part of the city's annual budget process which results in budget adoption by City Council. ~~The rolling five-year implementation long-term stormwater fund and budgeting plan~~ shall be based upon the comparison of implementation cost of the highest-ranked projects with the funding available for storm water projects in the fund.

### **Sec. 2-325. - Outside party participation.**

Individual property owners, subdivision organizations, private lanes, public agencies, and other interested parties may make a monetary contribution to a project. Any contributions pledged by outside sources shall be identified as a part of the EOPC and deducted from the total project cost prior to the calculation of the BCR. This adjusted ratio shall be utilized in the project ranking. No project with an adjusted ranking shall be implemented prior to the commitment and deposit of funds by the private sources. Funds from private sources shall be placed in an ~~interest bearing~~ interest-bearing

escrow account in the name of the city identifying the source of such private funds prior to the commitment of any resources by the city for a project.

### **Sec. 2-326. - Reevaluation/inactivation.**

(a) Each project shall be reevaluated by the committee not less than every five years. If changes in project scope or cost are identified by the director or requested by the affected property owners, the project may be reevaluated annually prior to the presentation of the ~~storm water master plan long-term stormwater fund budget to~~ the city council.

(b) In the event that the progress of a project becomes stalled during the design stage due to a failure to reach an agreement/solution with the impacted parties, and it is so deemed by the committee, a project may be recommended to be placed on inactive status. Prior to this designation, a hearing shall be held at a regularly scheduled meeting of the committee. The recommendation to place a project on inactive status shall include a set of conditions which if met will allow the inactive status to be lifted. All affected property owners shall be informed of this recommendation at least one week prior to the meeting of the committee through notice given by first class mail. Upon recommendation of placement upon inactive status, all application of city resources shall be suspended, ~~unless a change of circumstances justifies a review such that the project may return to active status. until such a time as the project is returned to active status.~~ A project may be returned to active status once all conditions have been met and the project has been reviewed and approved by the committee. This placement of a project upon inactive status shall be reported ~~annually~~ to the city council, ~~as part of the rolling five-year implementation plan.~~

### **Sec. 2-327. - Minimum design/construction standards.**

All projects shall be designed to meet the requirements of the city, MSD, the Missouri Department of Natural Resources, the United States Army Corps of Engineers and any other necessary regulatory agency or political subdivision having rights established under local, state or federal law. Additionally, projects shall not create a material negative impact to any downstream property.

### **~~Sec. 2-328. -- Long-term Stormwater Fund budget Five-year implementation program.~~**

The committee shall ~~develop receive and review an updated long-term stormwater fund budget implementation plan~~ annually by ~~September~~ August 1 which ~~then plan~~ shall be presented to the city council as a part of its annual budgeting process. This ~~budget document implementation plan~~ shall include projects recommended for funding in the upcoming year and, ~~at minimum, the~~ four following years. The first two years of the

implementation plan shall contain specifically identified projects as well as the associated design, property/easement acquisition and construction costs related to these projects and the necessary budget requests. The ~~final~~<sup>next</sup> three years of the ~~implementation budget plan~~ shall consist of a general identification of potential budget requests for continued implementation of the plan. Upon adoption of the ~~long-term stormwater fund budget five-year implementation plan~~ and the necessary budget requests, the director shall be responsible for implementation of the plan.

### **Sec. 2-329. - Small project storm water grant program.**

The owners of any property located within the city, may apply for funds from the storm water grant program fund (the "grant program") to recover up to 50 percent of the total property owner's eligible costs, to a maximum of \$~~3~~<sup>25</sup>,000.00 per project/owner, to design, review, install, and inspect a city-approved storm water project. Details about the grant program are attached to the ordinance from which this article is derived as Exhibit B. The director may amend Exhibit B from time to time as necessary and appropriate upon the review and approval of the committee.

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# Appendix D

Appendix D: Staff Memo dated February 8, 2024 “Bill 2361 – Modifications to Chapter 2, Article X, Stormwater Control Program

CITY OF  
**LADUE**

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**Public Works**

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**MEMORANDUM**

To: Honorable Mayor Nancy Spewak  
Members of the City Council

From: Anne C. Lamitola, P.E. *Anne C. Lamitola*  
Public Works Director

Date: February 8, 2024

Subject: Bill 2361 – Modifications to Chapter 2, Article X, Stormwater Control Program

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Beginning in Summer 2023 Public Works Engineering staff and the Stormwater Advisory Committee have been reviewing the Stormwater Control Program ordinance which was established by Ordinance in August 2016. This review was driven by the Stormwater Master Plan update which is scheduled for Calendar Year 2024 and occurs every five years. The timing for the ordinance review coincided with the completion of the implementation plan that was adopted in 2017 and has been implemented over the course of the last six years resulting in the completion of three projects identified in the Master Plan and the placement of the other two projects on inactive status. The review allowed for the ordinance to be updated to match the actual practices and incorporate lessons learned from the project Implementation Phase. The Stormwater Advisory Committee discussed changes at three regular meetings and held a special work session in November 2023 devoted to this review.

In addition to the ordinance, the stormwater project Score Sheet and the Small Stormwater Grant program were reviewed and updated. Although the ordinance modifications require adoption of an ordinance, the Stormwater Advisory Committee can approve the stormwater project Score Sheet changes and the small project grant program updates. At their January 25, 2024 meeting, the Stormwater Advisory Committee approved an updated project score sheet and changes to the grant program. The updated score sheet has been included in the packet for your reference. Changes to the score sheet include:

- Adjustment to the problem category for public roadway flooding
- Establishment of three new multipliers
  - Easement multiplier to further incentivize projects that require fewer easements.
  - Trustee Indenture multiplier to incentivize projects with documented trustees that have legal authority to execute project documents.
  - Public Health and Safety Multiplier to incentivize projects that promote health and safety.
- Adding a cost per easement into the budget

With regard to the small grant, the committee approved increasing the per project grant allocation from \$25,000 to \$35,000 (is included in the ordinance), increase the annual budget allocation from \$100,000 to \$140,000 (requires approval through annual budget adoption), and establishes a 5-year maintenance agreement requirement in lieu of the perpetual maintenance agreement that had been in place since the inception of the grant program. The maintenance agreement modification was approved in an effort to encourage more program participation.

With regard to the Ordinance Modifications, the following provides a summary of the changes:

- Modifies language regarding the heat map which was utilized for the initial stormwater master plan to further emphasize that the Master Plan will be presented every five years to the Stormwater Advisory Committee and City Council for approval.
- Adds threatened public roadway as a project type.
- Updates reference to the current MSD prioritization system in lieu of the date specific system which is subject to change.
- Updates the notification process regarding the Master Plan update to follow the City's standard meeting notification process.
- Explains that the long-term stormwater budget, which identifies specific projects, will be updated annually, and reported to the SWAC.
- Adds language regarding inactive status projects.
- Increases the small stormwater grant City share from \$25,000 to \$35,000.

If you would like to discuss this item, please contact me by phone at (314) 993-5665 in the office or by email at [alamitola@cityofladue-mo.gov](mailto:alamitola@cityofladue-mo.gov)

City of Ladue

## PROJECT IDENTIFICATION INFORMATION SHEET

Storm Water Management Program  
Phase II: Master Plan  
Ladue, Saint Louis County, Missouri

**PROJECT NAME:** Briarwood Drive  
**LOCATION:** Briarwood Subdivision  
**PROJECT No:** 1611.01

<b>STATUS:</b> Updated 5-16-2019	
<b>Easements Required:</b>	5
<b>Properties Benefited:</b>	5
<b>Properties Impacted:</b>	5
<b>Project Benefit Points:</b>	1522
<b>Property Benefit Multiplier: X</b>	1.00
<b>Priority WGT Multiplier: X</b>	1.15
<b>Easement Multiplier: X</b>	1.25
<b>Trust Indenture Multiplier: X</b>	1.0
<b>Public Health &amp; Safety Multiplier: X</b>	1.0
<b>Adj Prjct Benefit Points:</b>	2187.88
<b>EOPC, thousand:</b>	\$ 2,244.25
<b>Assumed Cost of Easements:</b>	\$ -
<b>Cost Sharing, MSD:</b>	\$ -
<b>Cost Sharing, Other:</b>	\$ -
<b>Adj EOPC, thousand:</b>	\$ 2,244.25
<b>Benefit to Cost Ratio:</b>	<b>0.97</b>

<b>Problem Categories:</b>	
<input checked="" type="checkbox"/>	<u>WGT</u> <u>Description</u>
<input checked="" type="checkbox"/>	1.15 Habitable structural flooding & erosion from overland flow (non-floodplain)
<input type="checkbox"/>	2.00 Public roadway flooding & erosion
<input checked="" type="checkbox"/>	1.10 Private roadway flooding & erosion
<input type="checkbox"/>	1.05 Flooding from inadequate stormwater
<input type="checkbox"/>	1.05 Maintenance of stormwater
<input type="checkbox"/>	1.05 Non-habitable structural flooding
<input type="checkbox"/>	1.00 Yard erosion & erosion of driveway
<input checked="" type="checkbox"/>	1.00 Yard flooding
<input type="checkbox"/>	0.85 Structural flooding from creek
<b>Benefited Property Definition:</b>	
1	A benefited property is one at which physical disturbance occurs to construct storm water improvements.
2	A property that does not receive a physical disturbance to construct storm water improvements.
3	A property that only receives a financial benefit from storm water improvements is NOT a benefited property.
<b>Impacted Property Definition:</b>	
1	An impacted property is one at which physical disturbance occurs to construct storm water improvements.
MSD/MO American Water Base Map	
Laclede Gas Map	
FEMA FIRM Map	
USGS Quad	
<b>Attachments</b>	
<input checked="" type="checkbox"/>	Scope of Work
<input checked="" type="checkbox"/>	Benefit Points Calculation
<input checked="" type="checkbox"/>	Engineer's Opinion of Probable Construction Cost
<input checked="" type="checkbox"/>	Property Contact Information
<input checked="" type="checkbox"/>	Improvement Concept Plan

Adjustment to Problem Category Multiplier: The multiplier for public roadway flooding and erosion is proposed to be increased to 2.0 from 1.15.

New Easement Multiplier is based on number of easements required. The following multipliers are proposed:

- 0 easements = 2.0
- 1-2 easements = 1.5
- 3-5 easements = 1.25
- 6-15 easements = 1.0
- 16+ easements = 0.75

New Trust Indenture Multiplier is included to give a boost to the projects which have documentation by subdivision trustees that proves they have the legal authority to authorize necessary project documents, such as TCEs, easements, restoration agreements, etc. The proposed multipliers are:

- Have provided documentation = 1.2
- Have not provided documentation = 1.0

New Public Health & Safety Multiplier is included to address projects which will promote health and safety within the community. The following multipliers are proposed:

- High = 2.0
- Medium = 1.0
- Low = 0.8

Assumed Cost of Easements is proposed to be added to the adjusted engineer's opinion of probable construction cost. This cost can be at a per easement basis.

**Notes:** The project is located in the FEMA 100-yr floodplain. A Floodplain Study and a No-Rise Certificate or LOMR will be required. Permitting through the USACE will also be required.

---

# Appendix E

Appendix E: Modifications to Ladue Score Sheet Methodology (2 pages)

City of Ladue

## PROJECT IDENTIFICATION INFORMATION SHEET

Storm Water Management Program  
 Phase II: Master Plan  
 Ladue, Saint Louis County, Missouri

**PROJECT NAME:** Briarwood Drive  
**LOCATION:** Briarwood Subdivision  
**PROJECT No:** 1611.01

<b>STATUS:</b> Updated 5-16-2019	
<b>Easements Required:</b>	5
<b>Properties Benefited:</b>	5
<b>Properties Impacted:</b>	5
<b>Project Benefit Points:</b>	1522
<b>Property Benefit Multiplier: X</b>	1.00
<b>Priority WGT Multiplier: X</b>	1.15
<b>Easement Multiplier: X</b>	1.25
<b>Trust Indenture Multiplier: X</b>	1.0
<b>Public Health &amp; Safety Multiplier: X</b>	1.0
<b>Adj Prjct Benefit Points:</b>	2187.88
<b>EOPC, thousand:</b>	\$ 2,244.25
<b>Assumed Cost of Easements:</b>	\$ -
<b>Cost Sharing, MSD:</b>	\$ -
<b>Cost Sharing, Other:</b>	\$ -
<b>Adj EOPC, thousand:</b>	\$ 2,244.25
<b>Benefit to Cost Ratio:</b>	<b>0.97</b>

<b>Problem Categories:</b>	
<input checked="" type="checkbox"/>	<u>WGT</u> <u>Description</u>
<input checked="" type="checkbox"/>	1.15 Habitable structural flooding & erosion from overland flow (non-floodplain)
<input type="checkbox"/>	2.00 Public roadway flooding & erosion
<input checked="" type="checkbox"/>	1.10 Private roadway flooding & erosion
<input type="checkbox"/>	1.05 Flooding from inadequate stormwater
<input type="checkbox"/>	1.05 Maintenance of stormwater
<input type="checkbox"/>	1.05 Non-habitable structural flooding
<input type="checkbox"/>	1.00 Yard erosion & erosion of driveway
<input checked="" type="checkbox"/>	1.00 Yard flooding
<input type="checkbox"/>	0.85 Structural flooding from creek
<b>Benefited Property Definition:</b>	
1 A benefited property is one at which physical disturbance occurs to construct storm water improvements.	
2 A property that does not receive a floodplain improvement.	
3 A property that only receives a floodplain improvement is NOT a benefited property.	
<b>Impacted Property Definition:</b>	
1 An impacted property is one at which physical disturbance occurs to construct storm water improvements.	
MSD/MO American Water Base Map	
Laclede Gas Map	
FEMA FIRM Map	
USGS Quad	
<b>Attachments</b>	
<input checked="" type="checkbox"/>	Scope of Work
<input checked="" type="checkbox"/>	Benefit Points Calculation
<input checked="" type="checkbox"/>	Engineer's Opinion of Probable Construction Cost
<input checked="" type="checkbox"/>	Property Contact Information
<input checked="" type="checkbox"/>	Improvement Concept Plan

Adjustment to Problem Category Multiplier: The multiplier for public roadway flooding and erosion is proposed to be increased to 2.0 from 1.15.

New Easement Multiplier is based on number of easements required. The following multipliers are proposed:  
 • 0 easements = 2.0  
 • 1-2 easements = 1.5  
 • 3-5 easements = 1.25  
 • 6-15 easements = 1.0  
 • 16+ easements = 0.75

New Trust Indenture Multiplier is included to give a boost to the projects which have documentation by subdivision trustees that proves they have the legal authority to authorize necessary project documents, such as TCEs, easements, restoration agreements, etc. The proposed multipliers are:  
 • Have provided documentation = 1.2  
 • Have not provided documentation = 1.0

New Public Health & Safety Multiplier is included to address projects which will promote health and safety within the community. The following multipliers are proposed:  
 • High = 2.0  
 • Medium = 1.0  
 • Low = 0.8

Assumed Cost of Easements is proposed to be added to the adjusted engineer's opinion of probable construction cost. This cost can be at a per easement basis.

<b>Project Source:</b>			
<input checked="" type="checkbox"/>	Citizen Complaint	<input checked="" type="checkbox"/>	MSD
<input checked="" type="checkbox"/>	Ladue	<input type="checkbox"/>	Other:
<b>Coordination Required:</b>			
<input checked="" type="checkbox"/>	MSD	<input checked="" type="checkbox"/>	MO DNR
<input checked="" type="checkbox"/>	Corps of Engineers	<input type="checkbox"/>	MODOT
<input type="checkbox"/>	County Highways	<input type="checkbox"/>	City Streets
<input type="checkbox"/>	County Parks	<input type="checkbox"/>	City Parks
<input type="checkbox"/>	Railroad:		
<input checked="" type="checkbox"/>	Subdivision Trustees		
<input checked="" type="checkbox"/>	Other: Local Utilities		

**Notes:** The project is located in the FEMA 100-yr floodplain. A Floodplain Study and a No-Rise Certificate or LOMR will be required. Permitting through the USACE will also be required.

City of Ladue

**PROJECT IDENTIFICATION INFORMATION SHEET**

Storm Water Management Program  
 Phase II: Master Plan  
 Ladue, Saint Louis County, Missouri

**PROJECT NAME: Conway Road #10033 Bank Stabilization**  
**LOCATION: Conway Road**  
**PROJECT No: 1604.02-R24**

**STATUS:**

Easements Required:	4
Properties Benefited:	4
Properties Impacted:	4
Project Benefit Points:	560
Property Benefit Multiplier: X	1.00
Priority WGT Multiplier: X	1.15
Easement Multiplier: X	1.25
Trust Indenture Multiplier: X	1.00
Public Health & Safety Multiplier: X	1.00
Adj Prjct Benefit Points:	805.00
EOPC, thousand:	\$1,060.65
Easement Cost, thousand:	\$4.00
Cost Sharing, MSD:	
Cost Sharing, Other:	
Adj EOPC, thousand:	\$1,064.65
Benefit to Cost Ratio:	0.76

**Problem Categories:**

- | <input checked="" type="checkbox"/> | WGT  | Description   |
|-------------------------------------|------|---|
| <input checked="" type="checkbox"/> | 1.15 | Habitable structural flooding & erosion from overland flow (non-floodplain) |
| <input type="checkbox"/>            | 2.00 | Public roadway flooding & erosion   |
| <input type="checkbox"/>            | 1.10 | Private roadway flooding & erosion  |
| <input type="checkbox"/>            | 1.05 | Flooding from inadequate sinkhole   |
| <input type="checkbox"/>            | 1.05 | Maintenance of stormwater system facilities                                 |
| <input type="checkbox"/>            | 1.05 | Non-habitable structural flooding & erosion                                 |
| <input checked="" type="checkbox"/> | 1.00 | Yard erosion & erosion of common ground or unmaintained area                |
| <input checked="" type="checkbox"/> | 1.00 | Yard flooding   |
| <input checked="" type="checkbox"/> | 0.85 | Structural flooding from creeks or rivers (floodplain)                      |

Revise to "Habitable structural flooding (non-floodplain) and erosion"

**Benefited Property Definition:**

- 1 A benefited property is one at which flooding and/or erosion is reduced;
- 2 A property that does not receive an actual reduction in flooding or erosion from the construction of storm water improvements is NOT a benefited property; and
- 3 A property that only receives a financial gain from the construction of storm water improvements is NOT a benefited property.

Blue highlights are updates to the sheet which have already been incorporated.

**Impacted Property Definition:**

- 1 An impacted property is one at which physical disturbance occurs to construct storm water improvements.

**Project Source:**

- Citizen Complaint  MSD
- Ladue  Other:

**Coordination Required:**

- MSD  MO DNR
- Corps of Engineers  MODOT
- County Highways  City Streets
- County Parks  City Parks
- Railroad:
- Subdivision Trustees
- Municipality: City of Ladue
- Other: Local Utilities

MSD/MO American Water Base Map Number(s): 19M

Laclede Gas Map Number(s): 155-85

FEMA FIRM Map Number(s): 29189C0194K

USGS Quadrangle Map(s): Creve Coeur, MO

**Attachments**

- Scope of Work
- Benefit Points Calculation
- Engineer's Opinion of Probable Construction Cost
- Property Contact Information
- Improvement Concept Plan

**Notes:** The project is located in the FEMA 100-yr floodplain. A Floodplain Study and a No-Rise Certificate or LOMR will be required.

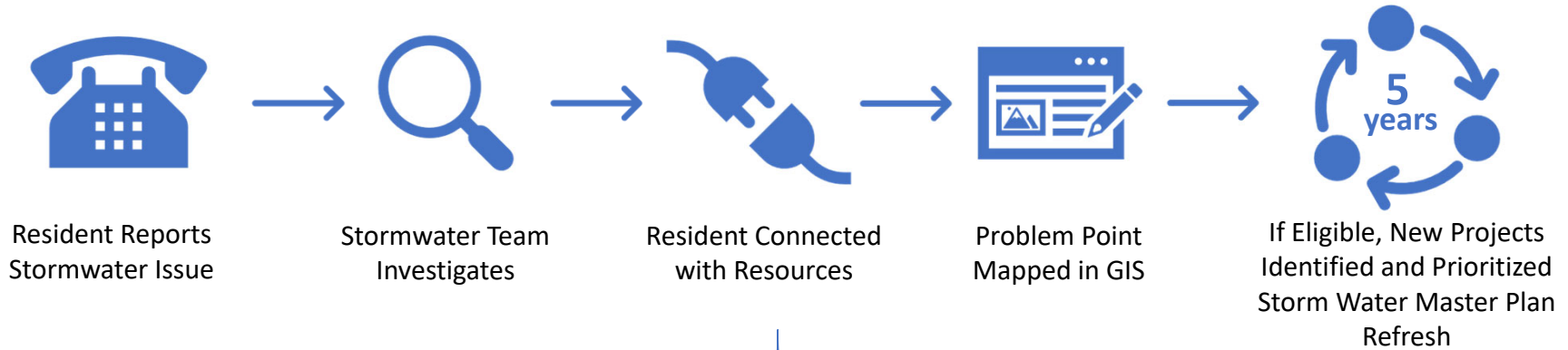
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# Appendix F

Appendix F: “How does a problem become a project?” diagram

# How does a *problem* become a *project*?

## City of Ladue Stormwater Management Program



City of Ladue, Missouri

- Small Projects Storm Water Grant program
- Storm Water Master Plan Projects



Deer Creek Watershed Alliance

- Rainscaping Cost-Share Program



Metropolitan St. Louis Sewer District (MSD)

- Customer Service Call Center: 314-768-6260
- Rainscaping Small Grants Program



Federal Emergency Management Agency (FEMA)

- National Flood Insurance Program
- Flood Buyout Programs:
- Hazard Mitigation Grant Program (Disaster Declaration Required)
  - Flood Mitigation Assistance Grant Program

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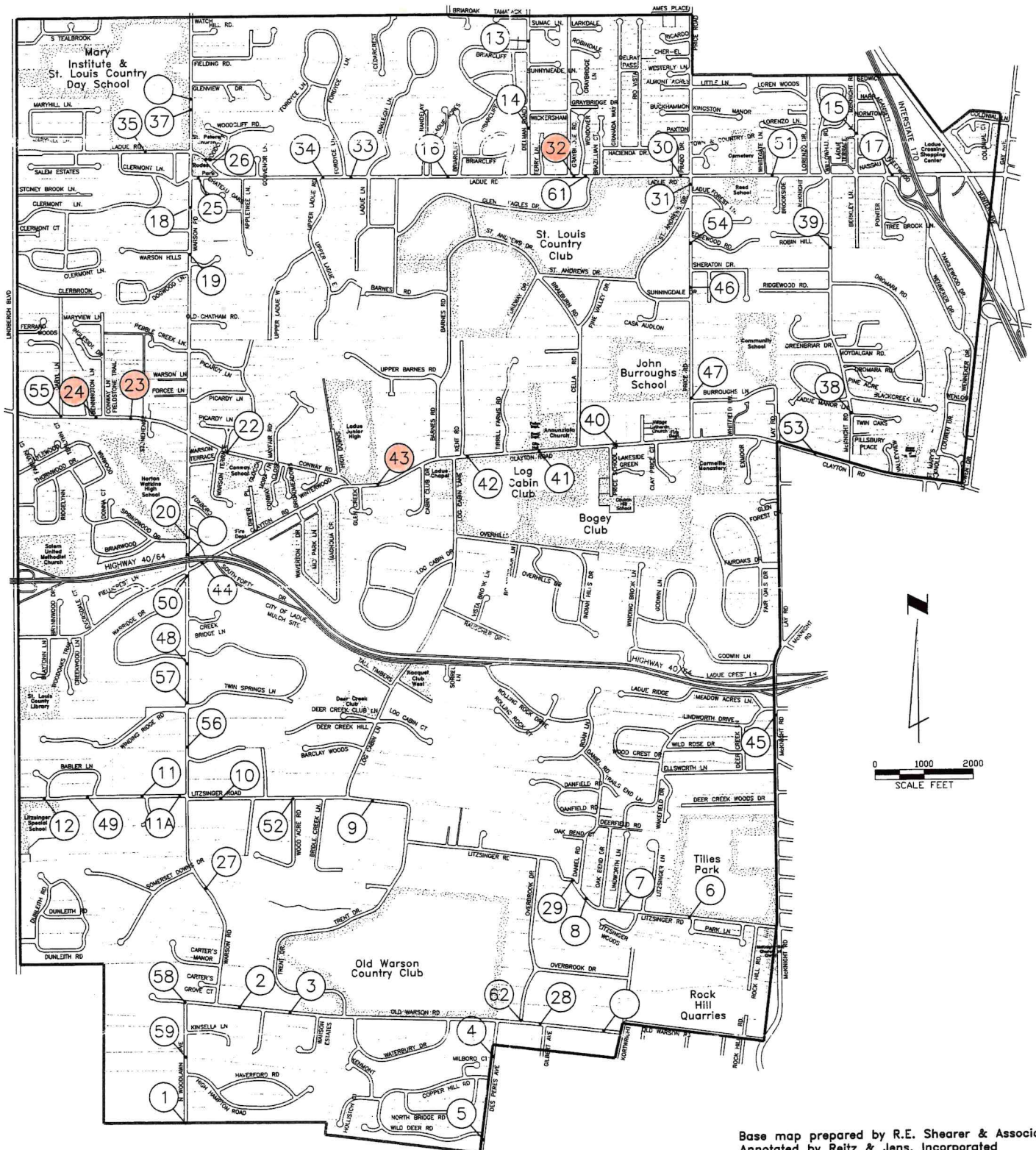
# Appendix G

Appendix G: City of Ladue, Missouri Bridge and Culvert Locations, dated November 2002

# CITY OF LADUE, MISSOURI

## Bridge & Culvert Locations

November, 2002



Base map prepared by R.E. Shearer & Associates  
Annotated by Reitz & Jens, Incorporated

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# Appendix H

Appendix H: 2024 Stormwater Master Plan Project List



# 2024 Stormwater Master Plan Project List

Project Number	Project Name	2019 Master Plan				2024 Update				Change	Notes
		2019 EOPC	2019 Adjusted Benefit Points	2019 BCR	2019 Rank	2024 Adjusted EOPC	2024 Adjusted Benefit Points	2024 BCR	2024 Rank		
2401	Upper Ladue Road #23 Culvert Improvements	N/A	N/A	N/A		\$878,556	4528.33	5.1543	1		
1642-R24	Tributary 6 Storm Sewer Improvements	N/A	N/A	N/A		\$576,798	1014.88	1.7595	2		
1604.02-R24	Conway Road #10033 Bank Stabilization	N/A	N/A	N/A		\$978,627	805.00	0.8226	3		
2402	Lorenzo Lane Storm Sewer Improvements	N/A	N/A	N/A		\$410,714	330.00	0.8035	4	-4	
1627.01-R24	Tributary 4 Bank Stabilization: South of Conway	N/A	N/A	N/A		\$1,356,477	937.65	0.6912	5		
1631-R24	Tributary 5 East Bank Stabilization	N/A	N/A	N/A		\$600,298	403.43	0.6720	6		
1902	Old Warson #9650 Storm Sewer	\$ 1,500,000.00	115.00	0.0767	35	\$486,104	288.00	0.5925	7	28	Pending 3-Way Cost Share
1625.02	Pebble Creek at Warson Road Bank Stabilization	\$ 548,891.55	418.60	0.7626	2	\$713,931	418.60	0.5863	8	-6	
1623-R24	Clayton Road Bank Stabilization	N/A	N/A	N/A		\$2,501,986	1303.33	0.5209	9		
1613.04-R24	Prado Bank Stabilization	N/A	N/A	N/A		\$1,796,452	934.40	0.5201	10		
1622-R24	Larkdale-Robindale Bank Stabilization	N/A	N/A	N/A		\$663,423	301.01	0.4537	11		
1611.01	Briarwood Drive	\$ 2,244,245.21	1750.30	0.7799	1	\$2,811,788	1249.19	0.4443	12	-11	
1901	Old Warson #9822 Storm Sewer	\$ 220,000.41	31.63	0.1437	28	\$328,997	144.00	0.4377	13	15	
1625.05-R24	Glenview-Woodcliffe East Bank Stabilization	N/A	N/A	N/A		\$764,569	266.80	0.3490	14		
1632	Sorrel Lane Bank Stabilization	\$ 1,811,139.58	635.00	0.3506	11	\$2,140,245	635.00	0.2967	15	-4	
1629-R24	Tributary 5 South Bank Stabilization	N/A	N/A	N/A		\$1,478,748	433.16	0.2929	16		
1603.02-R24	Overbrook Drive Bridge Bank Stabilization	N/A	N/A	N/A		\$318,390	90.75	0.2850	17		
1613.01-R24	Prado Storm Trunk Improvements	N/A	N/A	N/A		\$19,643,843	5477.07	0.2788	18		
1625.04	Glenview-Woodcliffe West Channel and Culvert	\$ 2,149,293.34	701.50	0.3264	14	\$2,543,098	701.50	0.2758	19	-5	
1621	Ladue Forest Lane #6 Bank Stabilization	\$ 538,377.04	134.05	0.2490	20	\$638,017	167.56	0.2626	20	0	
1615.01-R24	Briarcliff Channel Improvements	N/A	N/A	N/A		\$2,355,198	616.00	0.2615	21		
1615.03	Briarcliff North Storm Sewer Improvements	\$ 3,598,243.30	1785.07	0.4961	5	\$4,261,140	1071.04	0.2514	22	-17	
1624	Pebble Creek South Bank Stabilization	\$ 1,816,550.81	606.36	0.3338	13	\$2,153,628	485.09	0.2252	23	-10	
1643	Burroughs Lane Drainage Improvements	\$ 818,217.87	246.75	0.3016	15	\$1,060,008	236.25	0.2229	24	-9	
1612B	Upper Ladue Road In-Line Storage	\$ 1,329,248.89	337.33	0.2538	18	\$1,570,853	337.33	0.2147	25	-7	
1630	Tributary 5 West Bank Stabilization	\$ 2,483,076.08	914.25	0.3682	9	\$3,140,049	625.80	0.1993	26	-17	
1615.02	Glen Eagles #42-Ladue Road Drainage	\$ 941,435.72	179.55	0.1907	24	\$1,112,427	215.46	0.1937	27	-3	
1610	Log Cabin Drive	\$ 3,155,808.39	1177.47	0.3731	8	\$3,740,286	706.48	0.1889	28	-20	
1620	Black Creek Lane #2-6 Bank Stabilization	\$ 259,008.30	58.00	0.2239	22	\$308,501	58.00	0.1880	29	-7	
1626	Sebago Creek at Old Warson Bank Stabilization	\$ 1,708,787.90	613.31	0.3589	10	\$2,025,521	377.24	0.1862	30	-20	
1604.03	Conway Lane Storm Sewer	\$ 1,664,053.79	431.20	0.2591	16	\$1,974,757	344.96	0.1747	31	-15	
1628	Fordyce-Oakleigh Bank Stabilization	\$ 770,137.10	198.86	0.2582	17	\$915,379	159.09	0.1738	32	-15	
1615.05	Briarcliff #19 Storm Sewer Improvements	\$ 1,128,050.74	284.21	0.2520	19	\$1,337,540	227.37	0.1700	33	-14	
1601.02	Litzsinger Lane / Tilles Park	\$ 4,369,678.30	669.01	0.1531	26	\$5,170,050	872.63	0.1688	34	-8	
1625.01	Pebble Creek at Clermont Lane Bank Stabilization	\$ 1,467,099.82	290.58	0.1981	23	\$1,736,449	290.58	0.1673	35	-12	
1603.01	Overbrook Drive Street Flooding	\$ 813,434.65	272.45	0.3349	12	\$979,449	163.47	0.1669	36	-24	
1616.02	Louwen Drive-St. Mary's Knoll	\$ 870,605.31	208.53	0.2395	21	\$1,035,882	166.83	0.1611	37	-16	
1625.03	Woodcliffe Road #1-36 Bank Stabilization	\$ 1,069,596.23	553.05	0.5171	3	\$1,370,228	202.91	0.1481	38	-35	
1616.01	Wenneker Drive North Bank Stabilization	\$ 3,202,540.92	1653.09	0.5162	4	\$4,067,985	577.31	0.1419	39	-35	
1627.02-R24	Tributary 4 Bank Stabilization: North of Conway	N/A	N/A	N/A		\$4,068,812	498.07	0.1224	40		
1608.01A	Clermont West - Curb	\$ 1,438,623.28	256.46	0.1783	25	\$1,710,861	205.17	0.1199	41	-16	
1619	Wenneker Drive South Bank Stabilization	\$ 4,460,569.81	2025.00	0.4540	7	\$5,655,712	656.10	0.1160	42	-35	
1616.03	Louwen Drive #825	\$ 241,828.55	30.67	0.1268	31	\$288,238	30.67	0.1064	43	-12	
1634	Tributary 6 Bank Stabilization	\$ 1,567,973.26	752.97	0.4802	6	\$1,998,855	210.37	0.1052	44	-38	
1609B	Godwin Lane - East Alignment	\$ 1,595,775.30	239.49	0.1501	27	\$1,891,222	191.59	0.1013	45	-18	
1615.04	Briarcliff #27 Storm Sewer Improvements	\$ 1,285,410.51	166.06	0.1292	30	\$1,526,146	132.85	0.0870	46	-16	
1636	Brookside Lane Storm Sewer	\$ 1,349,960.02	163.43	0.1211	32	\$1,599,282	130.74	0.0817	47	-15	
1613.03	The Prado #4 Storm Sewer	\$ 279,062.82	30.45	0.1091	33	\$335,156	24.36	0.0727	48	-15	
1608.02A	Clermont East-Dogwood - Curb	\$ 1,480,361.49	197.34	0.1333	29	\$1,766,091	118.40	0.0670	49	-20	
1617	Sunny Meade Street	\$ 1,042,604.76	98.78	0.0947	34	\$1,238,756	79.02	0.0638	50	-16	
1611.02	Winwood Drive	\$ 1,229,694.10	71.50	0.0581	36	\$1,460,428	57.20	0.0392	51	-15	
1604.01	Conway Road #10134 Storm Sewer	\$ 342,470.26	14.00	0.0409	37	\$409,945	11.20	0.0273	52	-15	

Rev20240801

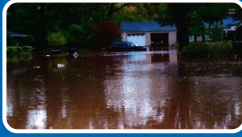
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# Appendix I

Appendix I: 2024 Stormwater Management Program 5-Year Capital Improvement Plan

# City of Ladue Stormwater Management Program

## 5-Year Capital Improvement Plan | 2024 – 2029 | \$15M



### FEMA/SEMA Flood Buyout Projects

- HMGP Flood Buyouts - 14 and 25 Foxboro Road
- FY2022 FMA Flood Buyouts - 12, 13, 15, 26 Foxboro Road
- FY2023 FMA Flood Buyouts - 16 and 23 Foxboro Road, 10050 Conway Road
- 2022 - 2025 | \$5,200,000



### City-Owned Culvert Replacement Projects

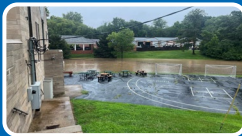
- Replacement of culverts on Ladue Rd, Clayton Rd, and two (2) on Conway Rd, as well as citywide miscellaneous culvert repairs
- 2024 - 2027 | \$3,900,000



### 2401 Upper Ladue Road #23 Culvert Improvements

- Replacement of culvert to prevent overtopping of Upper Ladue Road near #23
- 2024-2025 Design | 2025 ROW | 2026 Construction | \$880,000

2024



### 1642-R24 Tributary 6 Storm Sewer Improvements

- Various improvements including installation of a new overflow structure to reduce flood risk of Annunziata School at #925 Cella Road
- 2024 – 2025 Design | 2025 ROW | 2025 Construction | \$580,000

2024



### 1604.02-R24 Conway Road #10033 Bank Stabilization

- Bank stabilization project to be performed in conjunction with Conway East Culvert replacement project
- 2025 Design | 2026 ROW | 2027 Construction | \$980,000

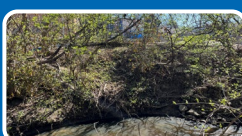
2025



### 2402 Lorenzo Lane Storm Sewer Improvements

- Installation of new storm sewers to address yard and basement flooding at #5 Willow Hill Road
- 2026 Design | 2027 ROW | 2028 Construction | \$410,000

2025



### 1627.01-R24 Tributary 4 Bank Stabilization: South of Conway

- Bank stabilization of the channel between Conway Elementary School and Warson Terrace
- 2026 Design | 2027 ROW | 2028 Construction | \$1,360,000

2025



### 1631-R24 Tributary 5 East Bank Stabilization

- Bank stabilization of the channel between Barnes Road and Kent Road near the intersection with Upper Barnes Road
- 2027 Design | 2028 ROW | 2029 Construction | \$600,000

2026



### 1902 Old Warson #9650 Storm Sewer (Pending 3-Way Cost Share)

- Installation of new storm sewers to collect runoff at the sag on Old Warson Road and route to Deer Creek
- 2027 Design | 2028 ROW | 2029 Construction | \$1,500,000 (\$500,000 City Responsibility)

2026



### City Infrastructure Projects with Stormwater Components

- Construction of stormwater components within various City infrastructure projects outside of the Stormwater Management Program
- 2024 - 2029

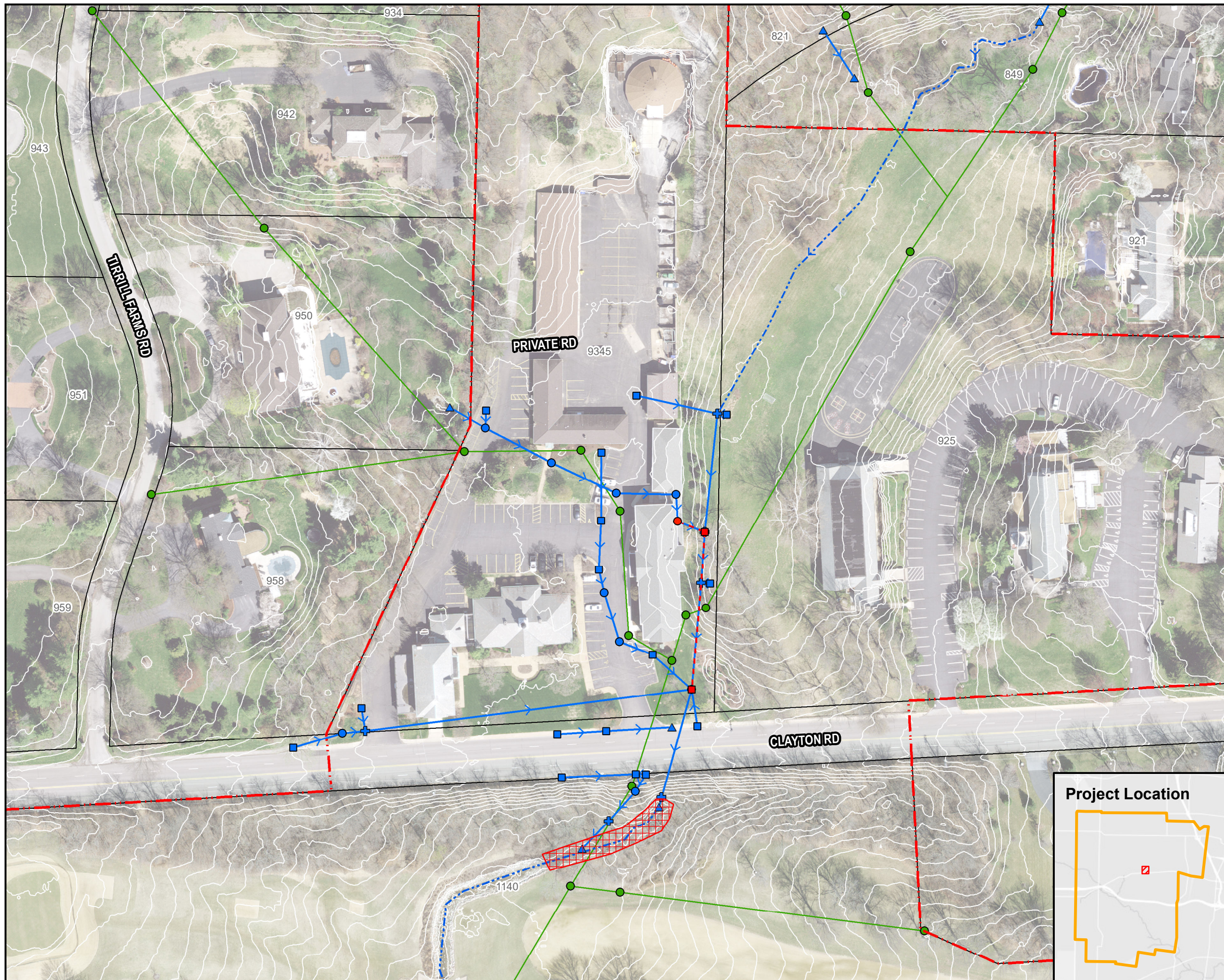
Letter of Intent Solicitation

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# Appendix J

Appendix J: Exhibits for the seven (7) Stormwater Master Plan projects in the 5-Year Capital Improvement Plan





### Legend

- 2-ft Contours
- Replace Ex. Stormwater Line
- ▨ Bank Stabilization
- ▭ Strip Map Limits
- ▭ Parcels
- > Approx. Drainage Path

**Proposed Improvements**

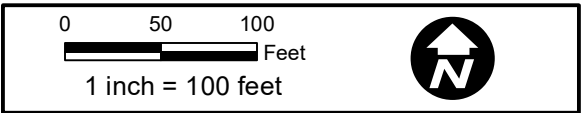
- Stormwater Inlet
- Stormwater Manhole

**Existing Stormwater Network**

- > Gravity Main
- Inlet
- Manhole
- ▲ Intake/Outfall
- ⊕ Fitting

**Existing Sanitary Network**

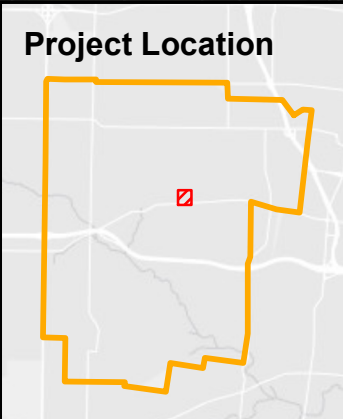
- Gravity Main
- Manhole




<b>Easements Required</b>	3
<b>Properties Benefited</b>	3
<b>Properties Impacted</b>	3
<b>Project Benefit Points</b>	1,014.88
<b>Conceptual Project Cost</b>	\$576,798.21
<b>Benefit to Cost Ratio</b>	1.760

**Problem Description**  
 Flooding and erosion due to an undersized pipe. Erosion is occurring in the channel downstream.

**Proposed Solution Description**  
 Upsize the pipe segment east of City Hall and stabilize the bank downstream of Clayton Rd.




City of Ladue Storm Water Management Program

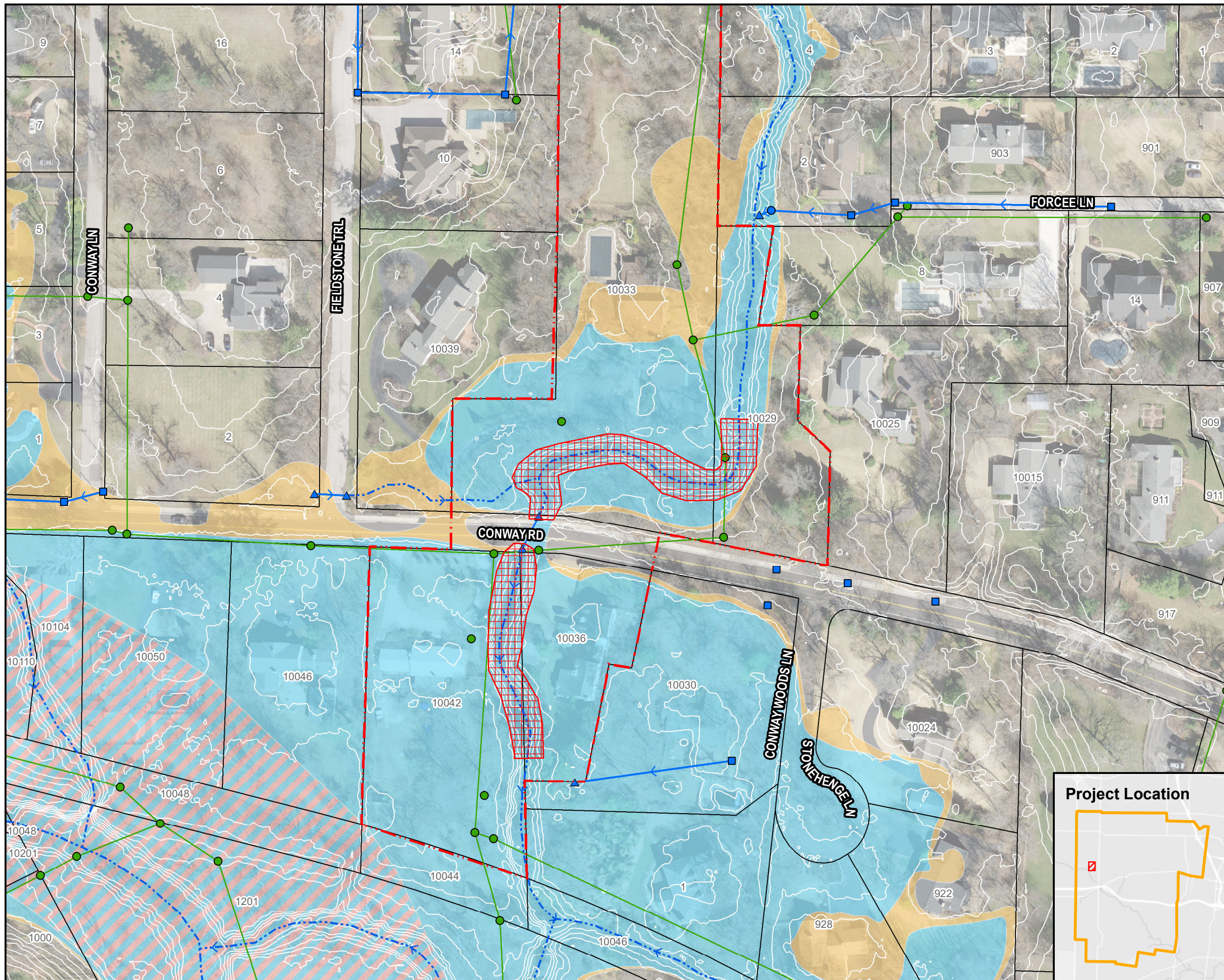


**Project 1642-R24**

Tributary 6 Storm Sewer Improvements

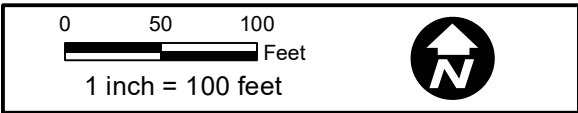


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### Legend

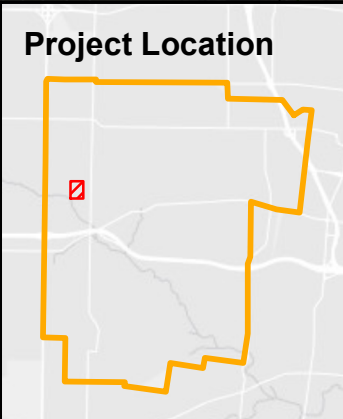
- 2-ft Contours
- Bank Stabilization
- Strip Map Limits
- Parcels
- Approx. Drainage Path
- Existing Stormwater Network**
  - Gravity Main
  - Inlet
  - Manhole
  - Intake/Outfall
- Existing Sanitary Network**
  - Gravity Main
  - Manhole
- FEMA Flood Zones**
  - Regulatory Floodway
  - 1.0% Annual Chance Flood Hazard
  - 0.2% Annual Chance Flood Hazard




<b>Easements Required</b>	4
<b>Properties Benefited</b>	4
<b>Properties Impacted</b>	4
<b>Project Benefit Points</b>	805.00
<b>Conceptual Project Cost</b>	\$978,626.81
<b>Benefit to Cost Ratio</b>	0.823

**Problem Description**  
Channel erosion threatening nearby structures.

**Proposed Solution Description**  
Bank stabilization to reduce erosion and improve the health of the creek.




City of Ladue Storm Water Management Program

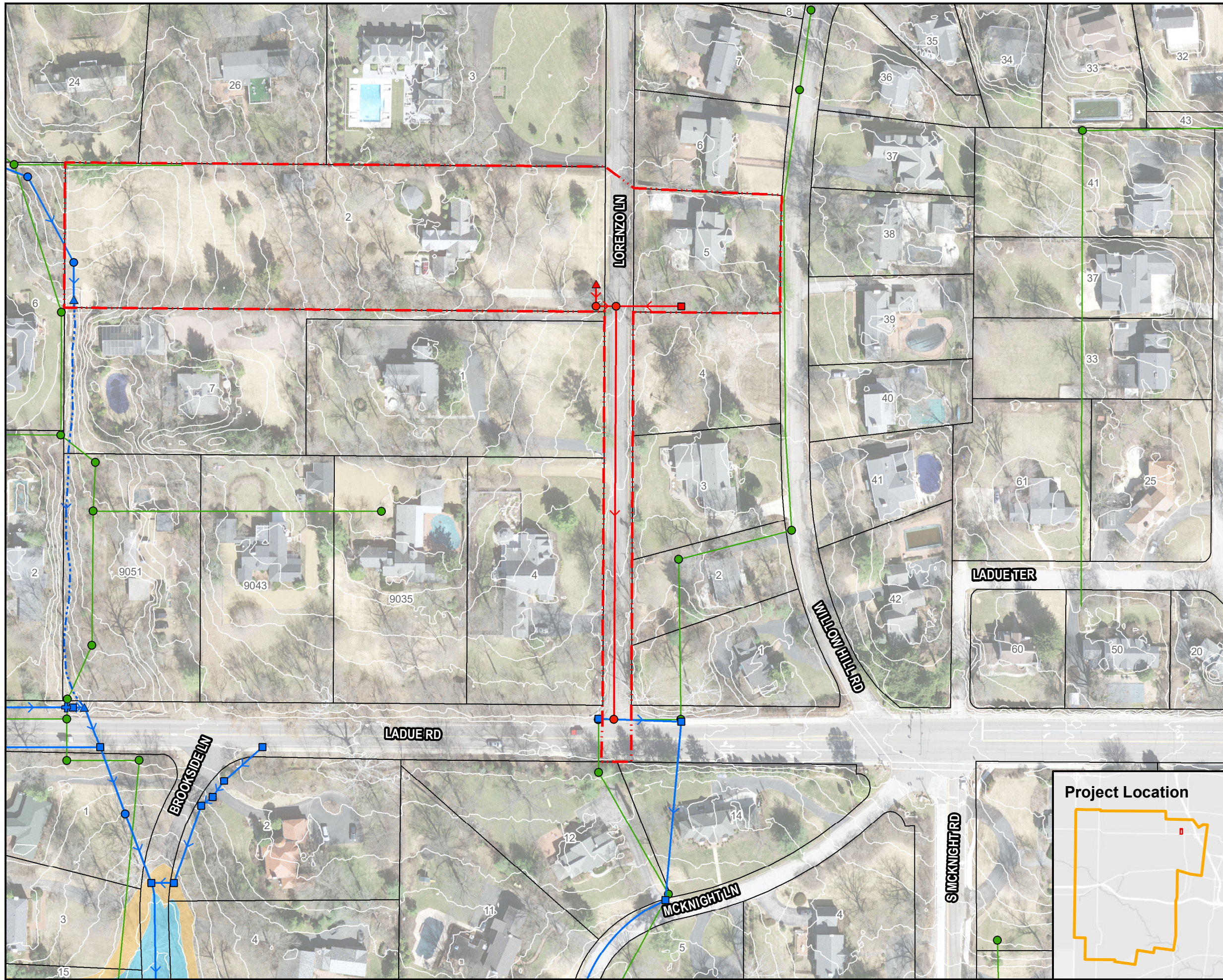


**Project 1604.02-R24**

Conway Road #10033 Bank Stabilization



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### Legend

- 2-ft Contours
- Stormwater Pipe
- Strip Map Limits
- Parcels
- Approx. Drainage Path

**Proposed Improvements**

- Stormwater Inlet
- Stormwater Intake/Outfall
- Stormwater Manhole

**Existing Stormwater Network**

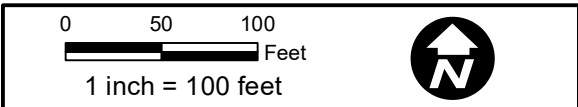
- Gravity Main
- Inlet
- Manhole
- Intake/Outfall
- Fitting

**Existing Sanitary Network**

- Gravity Main
- Manhole

**FEMA Flood Zones**

- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard




<b>Easements Required</b>	3
<b>Properties Benefited</b>	2
<b>Properties Impacted</b>	2
<b>Project Benefit Points</b>	330.00
<b>Conceptual Project Cost</b>	\$410,714.17
<b>Benefit to Cost Ratio</b>	0.803


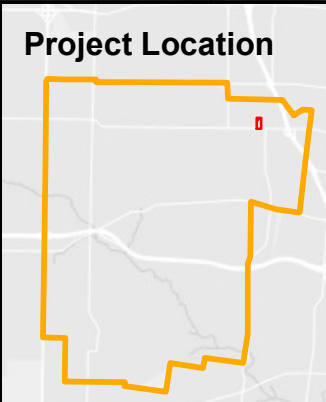
**Problem Description**  
Runoff from Lorenzolo Lane causes yard and structure flooding at #5 Willow Hill Road.

**Proposed Solution Description**  
Collect runoff at Lorenzolo Lane and #5 Willow Hill, and pipe it to an existing storm sewer.

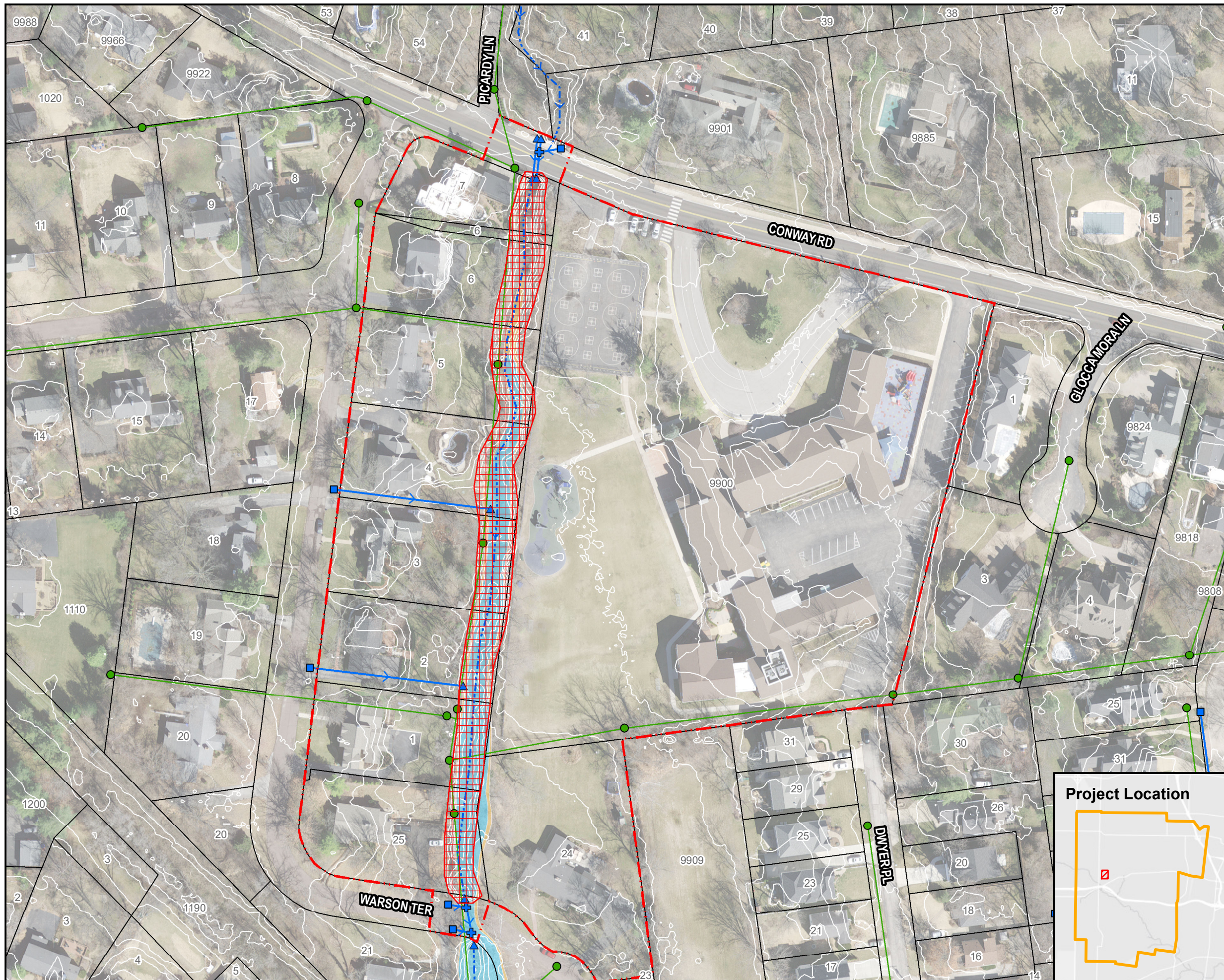
City of Ladue Storm Water Management Program



**Project 2402**  
Lorenzolo Lane Storm Sewer Improvements

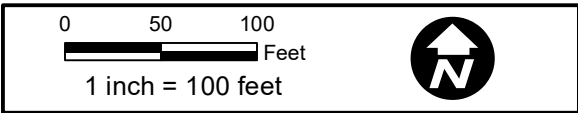



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### Legend

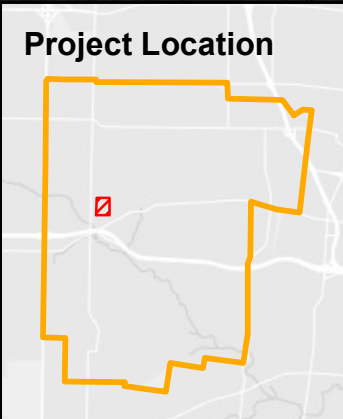
- 2-ft Contours
- Bank Stabilization
- Strip Map Limits
- Parcels
- Approx. Drainage Path
- Existing Stormwater Network**
  - Gravity Main
  - Inlet
  - Intake/Outfall
  - Fitting
- Existing Sanitary Network**
  - Gravity Main
  - Manhole
- FEMA Flood Zones**
  - 1.0% Annual Chance Flood Hazard
  - 0.2% Annual Chance Flood Hazard



<b>Easements Required</b>	10
<b>Properties Benefited</b>	5
<b>Properties Impacted</b>	10
<b>Project Benefit Points</b>	937.65
<b>Conceptual Project Cost</b>	\$1,356,476.95
<b>Benefit to Cost Ratio</b>	0.691

**Problem Description**  
Stream erosion threatening non-habitable structures and yards.

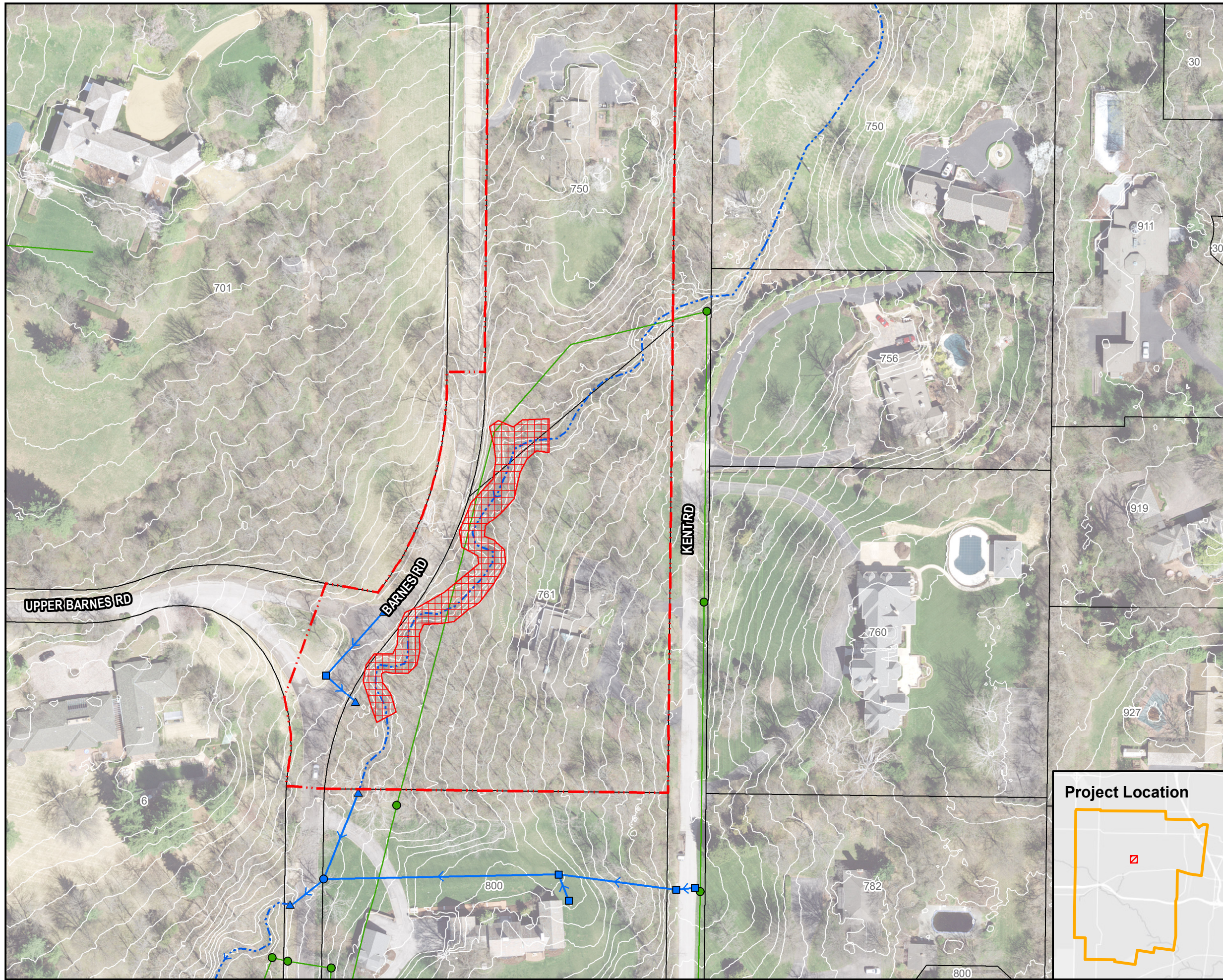
**Proposed Solution Description**  
Bank stabilization to reduce erosion and improve the health of the creek.



City of Ladue Storm Water Management Program

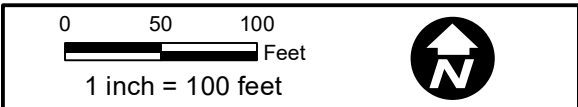
**Project 1627.01-R24**  
Tributary 4 Bank Stabilization:  
South of Conway

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### Legend

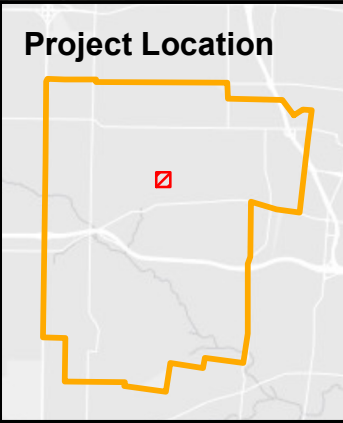
- 2-ft Contours
- Bank Stabilization
- Strip Map Limits
- Parcels
- Approx. Drainage Path
- Existing Stormwater Network
- Gravity Main
- Inlet
- Manhole
- Intake/Outfall
- Existing Sanitary Network
- Gravity Main
- Manhole





<b>Easements Required</b>	2
<b>Properties Benefited</b>	3
<b>Properties Impacted</b>	2
<b>Project Benefit Points</b>	403.43
<b>Conceptual Project Cost</b>	\$600,297.61
<b>Benefit to Cost Ratio</b>	0.672

**Problem Description**  
Stream erosion threatening Barnes Road.

**Proposed Solution Description**  
Bank stabilization to reduce erosion and improve the health of the creek.

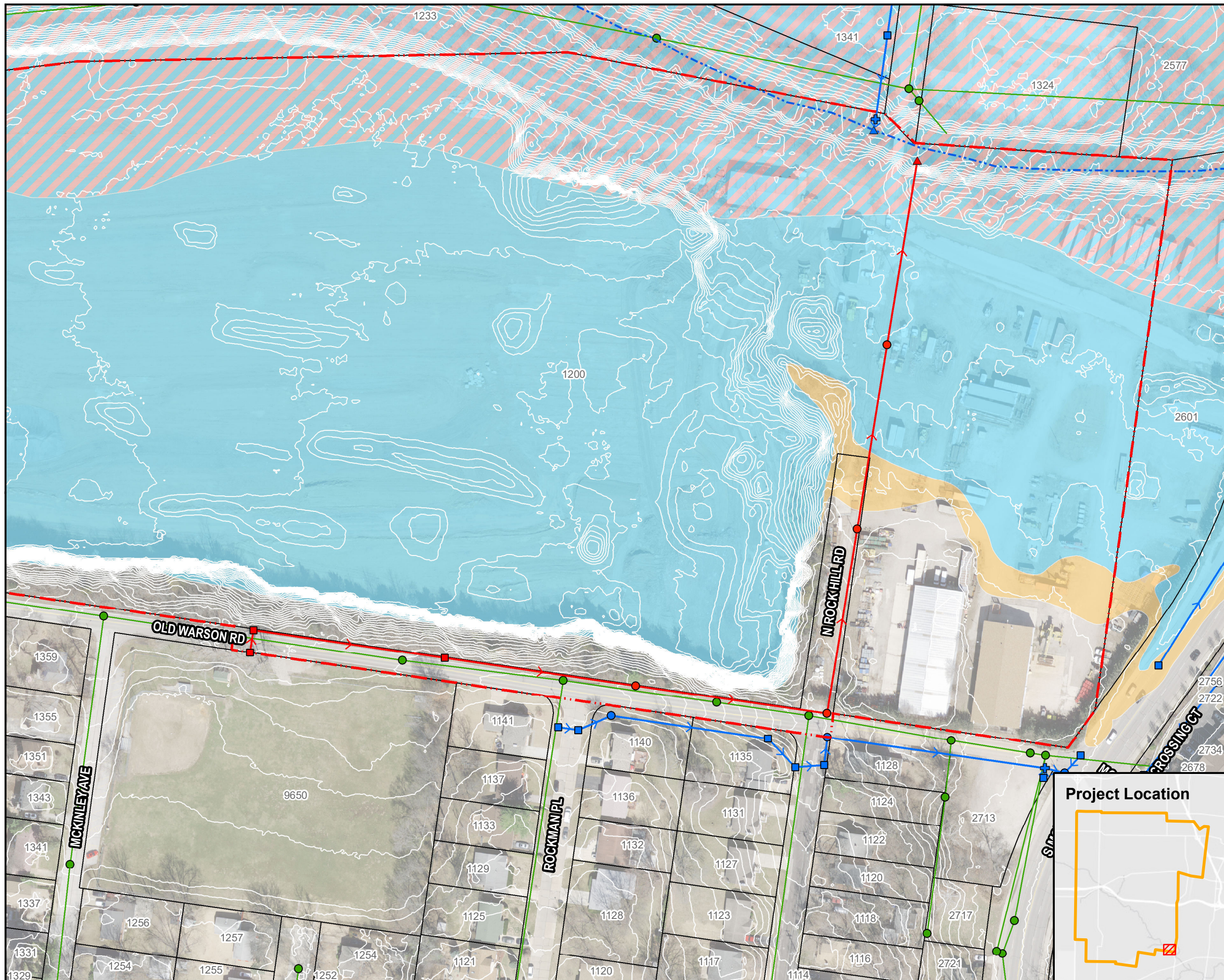


City of Ladue Storm Water Management Program


**Project 1631-R24**


Tributary 5 East Bank Stabilization

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### Legend

- 2-ft Contours
- Stormwater Pipe
- Strip Map Limits
- Parcels
- Approx. Drainage Path

**Proposed Improvements**

- Stormwater Inlet
- Stormwater Intake/Outfall
- Stormwater Manhole

**Existing Stormwater Network**

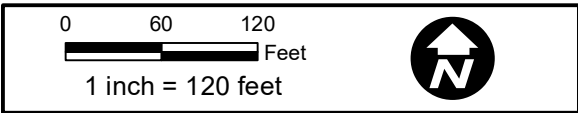
- Gravity Main
- Inlet
- Manhole
- Intake/Outfall
- Fitting

**Existing Sanitary Network**

- Gravity Main
- Manhole

**FEMA Flood Zones**

- Regulatory Floodway
- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard




Easements Required	1
Properties Benefited	1
Properties Impacted	1
Project Benefit Points	288.00
Conceptual Project Cost	\$486,103.56
Benefit to Cost Ratio	0.592


**Problem Description**  
Yard and road flooding due to lack of storm sewers on Old Warson Road.

**Proposed Solution Description**  
Install storm sewers to collect runoff at the sag on Old Warson Road and route to Deer Creek.

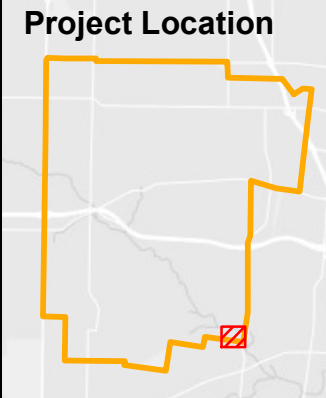
City of Ladue Storm Water Management Program



**Project 1902**



Old Warson #9650 Storm Sewer



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