

REQUEST FOR LEGISLATIVE ACTION




SEP 03 2019

Completed by County Counselor's Office:

Res/Ord No.: 20256

Sponsor(s): Crystal Williams

Date: September 16, 2019

<p>SUBJECT</p>	<p>Action Requested <input checked="" type="checkbox"/> Resolution <input type="checkbox"/> Ordinance</p> <p>Project/Title: Authorizing application for a storm water grant and authorizing the Director of Public Works to sign documents related to Missouri Department of Natural Resources storm water grant .</p>										
<p>BUDGET INFORMATION <i>To be completed By Requesting Department and Finance</i></p>	<table border="1"> <tr> <td>Amount authorized by this legislation this fiscal year:</td> <td>\$0</td> </tr> <tr> <td>Amount previously authorized this fiscal year:</td> <td>\$0</td> </tr> <tr> <td>Total amount authorized after this legislative action:</td> <td>\$0</td> </tr> <tr> <td>Amount budgeted for this item * (including transfers):</td> <td>\$0</td> </tr> <tr> <td>Source of funding (name of fund) and account code number; FROM / TO</td> <td></td> </tr> </table> <p>* If account includes additional funds for other expenses, total budgeted in the account is:</p> <p>OTHER FINANCIAL INFORMATION: <input checked="" type="checkbox"/> No budget impact (no fiscal note required)</p> <p>Prior Year Budget (if applicable): Prior Year Actual Amount Spent (if applicable):</p>	Amount authorized by this legislation this fiscal year:	\$0	Amount previously authorized this fiscal year:	\$0	Total amount authorized after this legislative action:	\$0	Amount budgeted for this item * (including transfers):	\$0	Source of funding (name of fund) and account code number; FROM / TO	
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Amount budgeted for this item * (including transfers):	\$0										
Source of funding (name of fund) and account code number; FROM / TO											
<p>PRIOR LEGISLATION</p>	<p>Prior ordinances and (date): N/A Prior resolutions and (date): N/A</p>										
<p>CONTACT INFORMATION</p>	<p>RLA drafted by: Earl Newill, P.E., Chief Engineer, 816 401-6401</p>										
<p>REQUEST SUMMARY</p>	<p>Missouri Department of Natural Resources has offered a storm water grant and loan to Jackson County and non-entitlement cites within Jackson County. The Public Works Department received the offer and has held a storm water coordinating meeting as required by the MDNR. The City of Grandview has submitted a project for the grant funds. MDNR requires that Jackson County be in charge of the grants projects, in a city or not. MDNR requires a resolution authorizing the filing of applications, and authorizing an individual to furnish information to MNDNR and to sign all necessary documents related to the grant, and to receive payments.</p> <p>We therefore request, that the Public Works department be authorized to submit applications for the grant funds, that the Director of Public Works be authorized to sign any and all documents related to the grant, and the Manager of Finance be authorized to receive grant reimbursements and redistribute to the project sponsor.</p>										
<p>CLEARANCE</p>	<p><input type="checkbox"/> Tax Clearance Completed (Purchasing & Department) <input type="checkbox"/> Business License Verified (Purchasing & Department) <input type="checkbox"/> Chapter 6 Compliance - Affirmative Action/Prevailing Wage (County Auditor's Office)</p>										
<p>ATTACHMENTS</p>	<p>MDNR Letter, Resolution Form, Application, Project Information</p>										
<p>REVIEW</p>	<table border="1"> <tr> <td>Department Director: Brian D. Gaddie, P.E. </td> <td>Date: 09/03/2019</td> </tr> <tr> <td>Finance (Budget Approval):</td> <td>Date:</td> </tr> </table>	Department Director: Brian D. Gaddie, P.E. 	Date: 09/03/2019	Finance (Budget Approval):	Date:						
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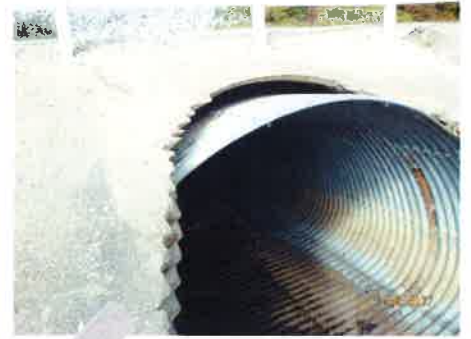
<i>If applicable</i>	
Division Manager: <i>[Signature]</i>	Date: <i>9-3-19</i>
County Counselor's Office: <i>Bryan County</i>	Date: <i>9/10/19</i>

Fiscal Information (to be verified by Budget Office in Finance Department)

- This expenditure was included in the annual budget.
- Funds for this were encumbered from the _____ Fund in _____.
- There is a balance otherwise unencumbered to the credit of the appropriation to which the expenditure is chargeable and there is a cash balance otherwise unencumbered in the treasury to the credit of the fund from which payment is to be made each sufficient to provide for the obligation herein authorized.
- Funds sufficient for this expenditure will be/were appropriated by Ordinance # _____
- Funds sufficient for this appropriation are available from the source indicated below.

Account Number:	Account Title:	Amount Not to Exceed:

- This award is made on a need basis and does not obligate Jackson County to pay any specific amount. The availability of funds for specific purchases will, of necessity, be determined as each using agency places its order.
- This legislative action does not impact the County financially and does not require Finance/Budget approval.



DRAFT

City of Grandview, MO

RAYTOWN ROAD BRIDGE REPLACEMENT STUDY

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1.0 SYNOPSIS – GRANDVIEW STRUCTURE – RAYTOWN RD.

Table 1: Existing Structure Information

Grandview Structure Identification	
Location	Raytown Rd.; Approximately 1,080 Feet South of Harry S. Truman Dr.
Existing Structure	Twin Elliptical Plate Arch Culverts, 17'-2" x 11'-4", 211' Long
Existing Load Posting	Not Posted Currently
Roadway Classification	Local
Existing Roadway Section(s)	37'-0" (West), 37'-0" (East), and 16'-0" (Median)
Posted Speed Limit	45 mph
Estimated ADT	20,000 Vehicles (design ADT)



Upstream Elevation Looking Southeast
(17'-2" x 11'-4" x 211' Culverts)



Location Map of Structure

1.1 Conceptual Report Objectives

In recent years it has become necessary for the City of Grandview's Public Works Department (Grandview) to invest continued resources in the maintenance of the existing Raytown Road pipes. Realizing the service life of the existing structure is coming to an end, Grandview completed necessary short-term repairs to ensure safety and continue functionality. These short-term repairs to the pipe structure, Jackson County Trail, and Raytown Road itself, are only intended to extend the functional life of the structure to a point in which a long-term solution is identified, designed, funded, and constructed. In line with this strategic plan, Benesch was engaged to develop this conceptual replacement report with the following objectives:

- a) Determine the Hydrologic and Hydraulic Capacity Needs of Project Site
- b) Coordinate Project Specific H&H Analysis with City's Stormwater Masterplan (Currently Underway)
- c) Account for Future Development Impacting Contributing Watershed
- d) Identify & Conceptually Evaluate Structure Replacement Options
- e) Compile List of Advantages & Disadvantages of Each Option
- f) Prepare Conceptual/Budgeting Numbers for the Replacement Options

To evaluate the hydrologic and hydraulic (H&H) conditions and performance at the project site, a HEC-RAS software model was developed. The natural, existing and proposed conditions were evaluated. A summary of the assumptions, input, and output is subsequently provided in this report. Benesch coordinated with Grandview to coordinate this project specific H&H analysis with the Stormwater Masterplan being developed independently of this project. The primary objective of the H&H analysis was the determination of the necessary waterway opening to accommodate current and future capacity needs. Based on the waterway opening, water velocities, design storm surface elevations, and predicted scour at the project site, Benesch identified four (4) potential replacement structure alternatives to be considered. These four options included:

- 1) Multi-Celled Reinforced Fixed Box (RFB)
- 2) Single-Span Precast Three-Sided Structure
- 3) Three-Span Bridge Configuration
- 4) Single-Span Bridge Configuration

Each of the above-mentioned replacement alternatives provides advantages and disadvantages to the Grandview as it pertains to initial cost, lifecycle costs, construction duration, hydraulic performance, accommodating future growth, channel migration, and aesthetic opportunities. The following report summarizes these characteristics for each alternative. Based on the preliminary priorities of Grandview, which include long-term hydraulic performance and maintenance of traffic during construction, a suggested replacement option is provided in the conclusion of this conceptual report. Beyond the H&H evaluation of the four previously mentioned replacement alternatives, the intent of this report is to provide a high-level, cursory assessment of potential project costs for Grandview to utilize for project budgeting. Refined project design and construction costs will be developed once an alternative is selected, and design plans are created.

1.2 Roadway & Traffic Conceptual Costs

Prior to the commencement of this project evaluation, Grandview established a project constraint – maintaining traffic access along Raytown Road throughout construction. Benesch based conceptual costs on this constraint, therefore, the roadway and traffic conceptual costs associated with any of the structural replacements meet the following goals:

- Maintain at Least Two lanes of traffic (One Each Way) Along Raytown Road
- Provide North-South Cross-Overs Along Raytown Road
- Include Necessary Traffic Control to Accommodate Phased Construction
- Minimize Roadway Pavement Replacement Along Raytown Road

The roadway and traffic costs for each alternative are approximately equivalent, with minor variations due to the construction limits of each structural replacement alternative. A proposed construction footprint of each alternative was identified and used to develop roadway conceptual costs, as well as estimating necessary right-of-way needs. The following sections provide additional details of each alternative and include a plan view of the conceptualized structure replacement.

2.0 EXISTING CONDITIONS

2.1 Existing Concerns

The existing structure consists of two 17'-2" x 11'-4" plate arch culvert(s), measuring approximately 211' in length. Main concerns include the following: the deteriorated condition of the structural plate arch pipes, the undesirable foundation/embankment condition surrounding the RCB, the undesirable hydraulic conditions during rain events, and the overall reduced structural capacity.

The eastern concrete headwall shows separation between the culvert and the concrete, indicating that the north culvert has settled approximately 8 inches on the downstream side, as shown in the photo below. The south culvert did not have signs of settlement at the time of inspection. There are large scour holes behind the north and south side of the eastern headwall, exemplifying unstable embankments. The worst case is a large scour void has formed under the northeast headwall, sizing approximately 3' tall x 6' long x 1' deep, also shown below.



8" Culvert Settlement



Scour Void behind Concrete Headwall

Although there are no signs of buckling or failure, a large percentage of the bottoms of both the north and south culverts shows deformation and deterioration. This has resulted in holes of various sizes and undermining up to 12" deep. Examples of this are shown below.



Example of Hole in Bottom of Culvert w/ Undermining



Typical Deterioration in Bottom of Pipe

The drainage along Raytown Road is not adequately controlled around the structure. The fill material above the structure between the roadway and the pedestrian path is being eroded away by surface drainage coming from the northbound lanes. The erosion caused by the runoff has also added to the settlement issues surrounding the structure, because when water leaves the roadway surface, it flows down along the channel embankment, adding to the erosion behind the wingwalls. Without stable headwalls and embankments, the pedestrian path east of Raytown Road has experienced sinking and ultimately collapse in August 2017. The path has been repaired, however, these issues still exist. Settlement of the culverts has also caused the eastern lane of northbound Raytown Road to sink requiring repeated asphalt overlay to be applied to maintain a consistent driving surface for travelers. Multiple efforts to cease or reduce settlement of the pipes have been unsuccessful to-date.

2.2 Existing Utilities

Neither overhead utilities nor underground utility markers were identified on site.

2.3 Existing Right-of-Way (ROW)

The conceptual layout developed for this project site identified the need for approximately 12,000 ft² of additional right-of-way (ROW). It should be noted that the existing survey for the site did not identify any established ROW extents; this estimation is based off an assumed 150' ROW corridor along Raytown Road, and includes preliminary grading and construction limits. As discussed in the project background section of this report, all ROW is assumed to be permanent. At \$1.50/square foot of ROW, this results in a maximum total estimated project ROW cost of \$18,000.00. A breakdown of each alternative's ROW requirements can be seen in Table 2.

2.4 Hydraulics and Drainage Approach

The existing structure allows a Longview Lake tributary to flow under Raytown Road approximately 1,080 feet south of Harry S. Truman Drive. The tributary creek drains an area of 3.12 square miles west of Raytown Road, and flows into Longview Lake through the structure, west to east. The existing structure is oriented perpendicular to the roadway centerline. The roadway drainage along Raytown Road also feeds into the tributary creek from both the east and west sides of the structure. No legal or short-span structures are situated upstream or downstream of the existing structure.

A hydraulic model utilizing HEC-RAS was developed to analyze the existing project site and to properly size the proposed alternative structures. Manning's n-values for the channel were chosen based upon a mostly clean channel with some stones, weeds, and ineffective slopes. Manning's values for the surrounding flood plain varied between areas of dense trees with flow into and below the branches, and areas with light brush and trees. The assumptions made for the hydraulic model can be seen in the chart to the right. The 100-year peak flow value for this structure was determined to be 2470 cfs. While the existing culvert can accommodate this flow, the soil conditions in and around the channel has shown to be very scour-prone, especially during large storm events. This scour has led to undermining of the pipes, resulting in settlement of the culvert structure itself, as well the pedestrian path and northbound Raytown Road. While remediation steps have been taken to drastically slow or cease this settlement, the highly erodible soil continues to cause issue for the existing culvert. To mitigate future scour potential, all the proposed alternative structures were selected based upon their ability to not only accommodate the 100-year storm, including backwater from Longview Lake, but also because they contain proper scour countermeasures. Designing proposed alternatives with hydraulic performance and scour potential in-mind has shown to minimize future maintenance costs and aid the replacement structure in successfully reaching its design life span.



Hydraulic Model Assumptions
Manning's n-values
<ul style="list-style-type: none"> • Channel: 0.04 • Flood Plains: 0.07 – 0.12 • Corrugated Pipe Culvert: 0.024 • Concrete Culvert: 0.011
Channel Slope: 0.008 ft/ft
Longview Lake Backwater Elevation: 903 ft

3.0 CONCEPTUAL APPROACH

3.1 Alternative Option A: Cast-in-Place Multi-Cell Reinforced Fixed Box Culvert

One possible replacement option is a reinforced concrete fixed box (RFB) culvert, consisting of triple 9' x 9' cells with concrete aprons and a beveled upstream face. The total width would be 30'-4" (along Raytown Road) and it would be 164' long (normal to Raytown Road), not including wings flared 30° and approximately 28'-9" long. The RFB culvert would cost approximately \$600,475.

The 9' x 9' openings would maintain existing flow capacity through the structure, while reducing the overall size of the structure. Since this option would be slightly smaller than the existing culvert, additional backfill would be required to stabilize the new culvert and channel, priced at \$77/cubic yard. This is the most economical design alternative, yet it offers the least improvement in hydraulic performance, and leaves little room for aesthetic features. It's possible that the profile of the pedestrian path would need to be raised slightly in order to maintain proper fill depth above the box culvert. An example of such a structure in-use is seen below.

Design Costs	
Right-of-Way	\$13,200
Engineering Design*	\$75,000
Permitting Costs	\$400
Construction Costs	
Traffic Management	\$20,000
Roadway Elements	\$250,000
Structural Elements	\$600,475
Construction Cost Subtotal	\$870,475
Contingency Cost (15%)	\$130,575
Inspection Costs**	
Part-Time Const. Inspection	\$60,000
Total Project Cost Estimate	\$1,149,650

* Includes Engineering Design and Survey

** See section 6.0 for further clarification



Advantages	Disadvantages
<ul style="list-style-type: none"> • Lowest initial cost • Low lifecycle costs • Short construction duration • Allows for future growth¹ 	<ul style="list-style-type: none"> • Lack of accommodation for channel migration • Lack of aesthetic opportunities • Large backfill/excavation costs • Possibility of erosion surrounding culvert • Large ROW acquirement due to wing walls • Little to no improvement in hydraulic performance

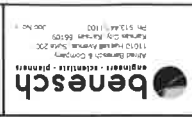
¹ Little to no future development expected upstream, therefore, impact to structure would not be significant.

NO.	REVISIONS	DATE

NOT FOR
CONSTRUCTION

TRIPLE 9' x 9' CAST-IN-PLACE
CONCRETE CULVERT ALTERNATIVE

RAYTOWN ROAD
CULVERT REPLACEMENT



PROJECT	RAYTOWN ROAD CULVERT REPLACEMENT
DATE	03/27/18
SCALE	AS SHOWN



3.2 Alternative Option B: Precast Arch

Another possible replacement option is a precast arch. Although many options are available, an O-1165 ConTech Precast Concrete Arch has been selected for purposes of this report. This structure would measure approximately 65' wide (along Raytown Road) x 164' long (normal to Raytown Road). Included in the following cost estimate are: the precast arch as a single unit, approximately 3' tall headwalls, and 20' long x 10'-6" tall wingwalls.

Although not included in this estimate, one additional feature is a variety of end treatments to enhance the aesthetic appeal of the arch, as shown below in a photo provided by ConTech. Multiple end treatments are available and would increase the headwall and wingwall price by 20-30%. The arch would most likely rest upon pedestal strip footings due to the highly erodible soil found at the project site. One benefit of utilizing a precast structure is reduced construction time as compared to a conventional cast-in-place culvert. Although the foundations would be cast-in-place, all other structural elements of the O-1165 are precast, allowing for an expedited construction schedule minimizing impact on the traveling public. An example of ConTech's precast arch with a colored masonry end treatment can be seen below.

Design Costs	
Right-of-Way	\$18,000
Engineering Design*	\$75,000
Permitting Costs	\$400
Construction Costs	
Traffic Management	\$20,000
Roadway Elements	\$250,000
Structural Elements**	\$904,000
Construction Cost Subtotal	\$1,174,000
Contingency Cost (15%)	\$176,100
Inspection Costs***	
Part-Time Const. Inspection	\$30,000
Total Project Cost Estimate	\$1,473,500

* Includes Engineering Design and Survey
 ** Does not include foundation cost of approx. \$130,000
 *** See section 6.0 for further clarification



Advantages	Disadvantages
<ul style="list-style-type: none"> • Expedited construction duration • Allows for channel migration • Increased hydraulic performance • Allows for future growth¹ • Minimizes erosion issues • Provides aesthetic opportunities 	<ul style="list-style-type: none"> • High initial cost • Difficult to inspect and rehab • Largest ROW acquirement required

¹ Little to no future development expected upstream, therefore, impact to structure would not be significant.

NO.	REVISIONS	DATE

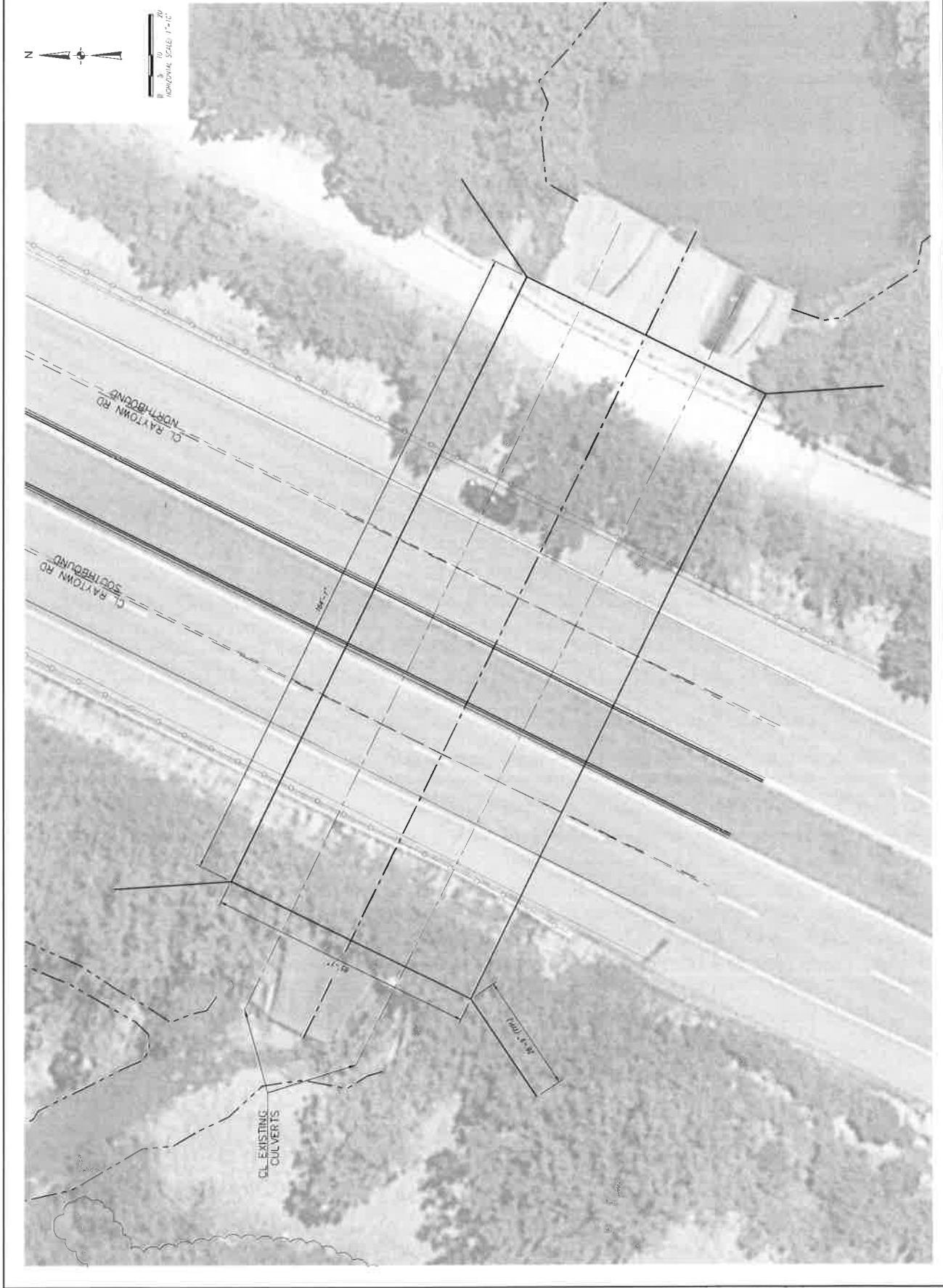
NOT FOR
CONSTRUCTION

PRECAST ARCH ALTERNATIVE

RAYTOWN ROAD
CULVERT REPLACEMENT

benesch
 ENGINEERS - ARCHITECTS - PLANNERS
 1710 HARRIS AVENUE, SUITE 200
 FARMINGTON, CT 06030
 TEL: 860.634.1100 FAX: 860.634.1101

PROJECT NO.	
DATE	
SCALE	
BY	
CHECKED	



3.3 Alternative Option C: Twin Reinforced Concrete Haunched Slab 3-Span Bridges

A third possible replacement option is a set of twin reinforced concrete haunched slab bridges with a separate bridge for the pedestrian path. Information regarding the pedestrian bridge can be found in Section 3.5. These twin structures would be 3-span (30'-40'-30'), totaling 100' in length along Raytown Road, and would each be 38' wide to match the existing two 12' lanes of vehicular traffic and a 12' bicycle lane. The end and intermediate bents would all likely rest on driven H-piles. At an estimated \$100/square foot of deck area, this option would cost approximately \$858,800 for set of twin structures.

While popular in Kansas, the reinforced concrete haunched slab (RCSH) bridges are not yet widely used in Missouri. We believe this is mainly due to lack of contractor familiarity in building them, and not for structural or hydraulic performance issues. From Benesch's extensive design and bridge inspection experience, the RCSH bridge performs better hydraulically than most multi-span prestressed concrete structures due to a very shallow superstructure. Additionally, the RCSH requires very little maintenance as it progresses through its design life. The most frequent maintenance item that inspection reports have cited is the removal of drift or debris from its intermediate bents in large channels. As this project site's channel sees only minor debris, we do not foresee this being an issue. A downfall of a multi-span structure within this site's channel is the presence of highly erodible soil around the intermediate bents. Piles would need to be driven deep enough to prevent any scour from threatening the structural stability of the RCSH's substructure, increasing overall project costs. An example of a RCSH in-use can be seen below.

Design Costs	
Right-of-Way	\$10,425
Engineering Design*	\$128,000
Permitting Costs	\$400
Construction Costs	
Traffic Management	\$20,000
Roadway Elements	\$200,000
Structural Elements	\$858,800**
Construction Cost Subtotal	\$1,078,800
Contingency Cost (15%)	\$161,820
Inspection Costs***	
Part-Time Const. Inspection	\$60,000
Total Project Cost Estimate	\$1,439,445

* Includes Engineering Design and Survey
 ** Includes cost of Pedestrian Bridge (\$98,800) (No foundation included)
 *** See section 6.0 for further clarification



Advantages	Disadvantages
<ul style="list-style-type: none"> • Low initial cost • Low life cycle costs • Increased hydraulic performance • Expedited construction duration • Allows for future growth¹ • Could accommodate channel migration • Minimizes erosion issues • Less ROW acquirement 	<ul style="list-style-type: none"> • Lack of aesthetic opportunities • Scour and debris build-up possible around substructure


¹ Little to no future development expected upstream, therefore, impact to structure would not be significant.

NO.	REVISIONS	DATE

NOT FOR
CONSTRUCTION

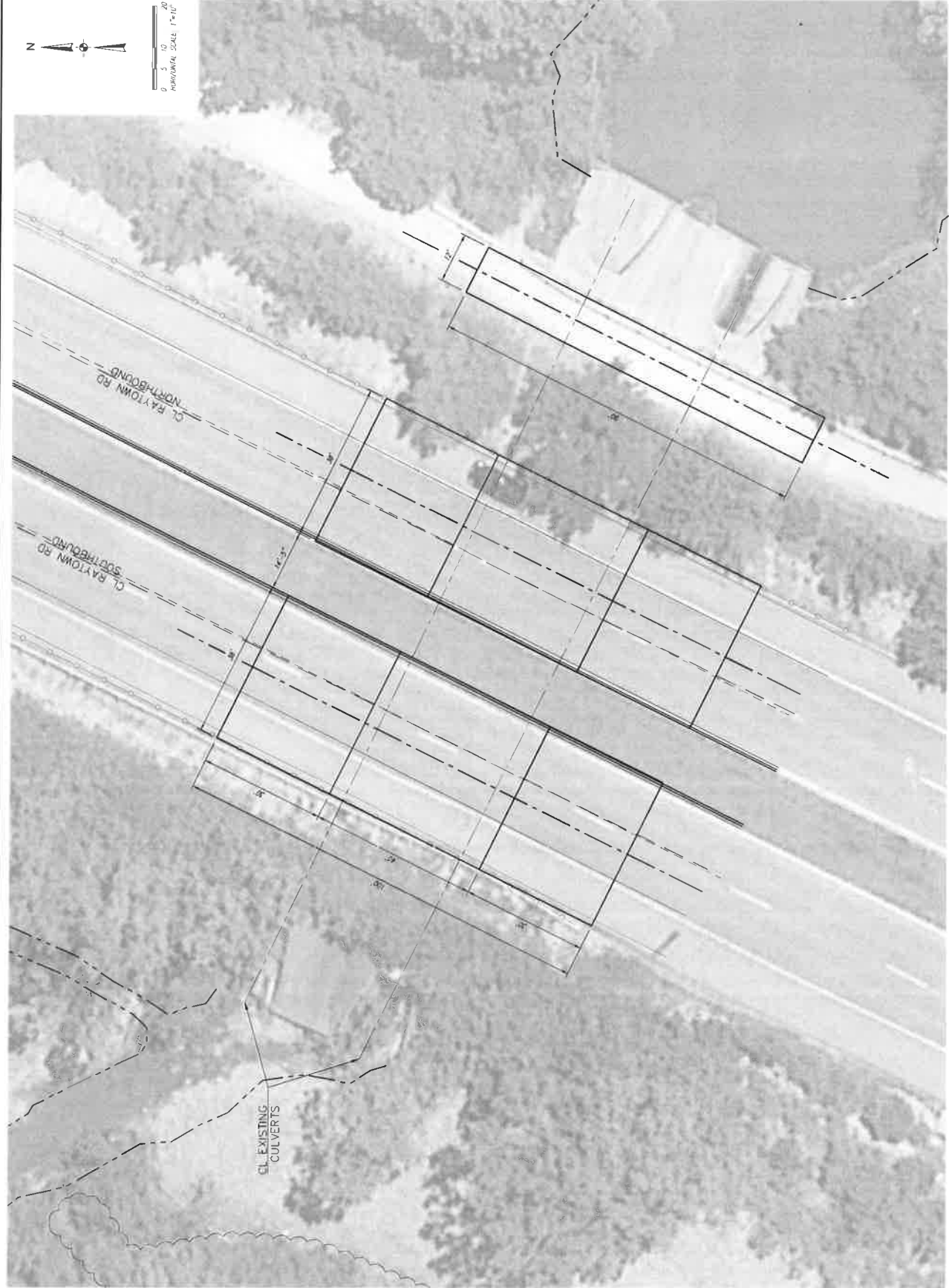
3-SPAN REINFORCED CONCRETE
HAUNCHED SLAB ALTERNATIVE

RAYTOWN ROAD
CULVERT REPLACEMENT



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DENVER, CO 80201
PHONE: 303.733.1100
FAX: 303.733.1101

PROJECT NO.	
DATE	
SCALE	



3.4 Alternative Option D: Twin Prestressed Concrete Single-Span Bridges

A final possible replacement option is a twin prestressed concrete girder bridge. Similar to the previous option, a separate bridge for the pedestrian path would be necessary, and information for that can be found in Section 3.5. These structures would consist of MoDOT Type 6 I-girders and would span 100' along Raytown Road, with a width of 38' each to maintain the existing two 12' vehicular lanes and a 12' bicycle lane. At an estimated \$120/square foot of deck area, a single span configuration would cost approximately \$1,010,800.

This alternative would allow for a single-span option utilizing a deeper section relative to the RCSH. The single-span option would be more cost-effective because the use of intermediate bents could be avoided. End bents will be founded upon driven H-piles due to the site's soil conditions. A prestressed concrete girder bridge is preferred to the RCSH alternative due to contractor familiarity and comfortability. There is little room in or around the project site for staging of the prestressed beams, but once one or both directions of Raytown Road are closed then the beams may be able to be staged on the roadway until they're ready for placement. To improve aesthetic appeal of these structures, form liners may be added to the exterior faces of the deck for additional costs. An example of a single-span prestressed I-girder bridge can be seen below.

Design Costs	
Right-of-Way	\$10,425
Engineering Design*	\$150,000
Permitting Costs	\$400
Construction Costs	
Traffic Management	\$20,000
Roadway Elements	\$200,000
Structural Elements	\$1,010,800**
Construction Cost Subtotal	\$1,230,800
Contingency Cost (15%)	\$184,620
Inspection Costs***	
Part-Time Const. Inspection	\$60,000
Total Project Cost Estimate	\$1,636,245

* Includes Engineering Design and Survey

** Includes cost of Pedestrian Bridge (\$98,800) (No foundation included)

*** See section 6.0 for further clarification



Advantages	Disadvantages
<ul style="list-style-type: none"> • Low life cycle cost • Increased hydraulic performance • Allows for future growth¹ • Could accommodate channel migration • Provides aesthetic opportunities • Minimizes erosion issues • Contractor familiarity • Adjustable span length 	<ul style="list-style-type: none"> • Highest initial cost • Longer construction duration • Lack of available staging space at site

¹ Little to no future development expected upstream, therefore, impact to structure would not be significant.

NO.	REVISIONS	DATE

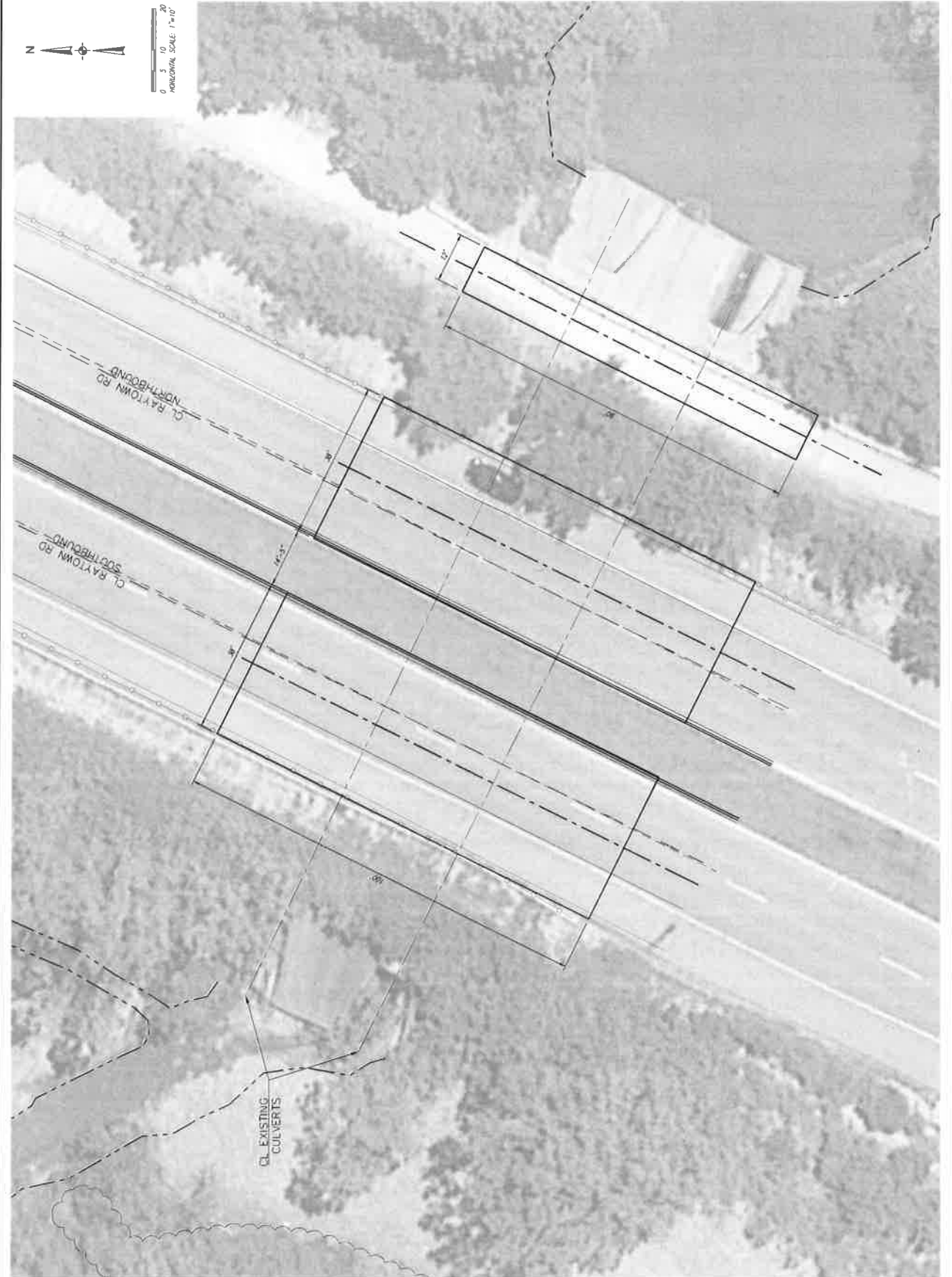
NOT FOR
CONSTRUCTION

SINGLE SPAN PRESTRESSED
CONCRETE BRIDGE ALTERNATIVE

RAYTOWN ROAD
CULVERT REPLACEMENT

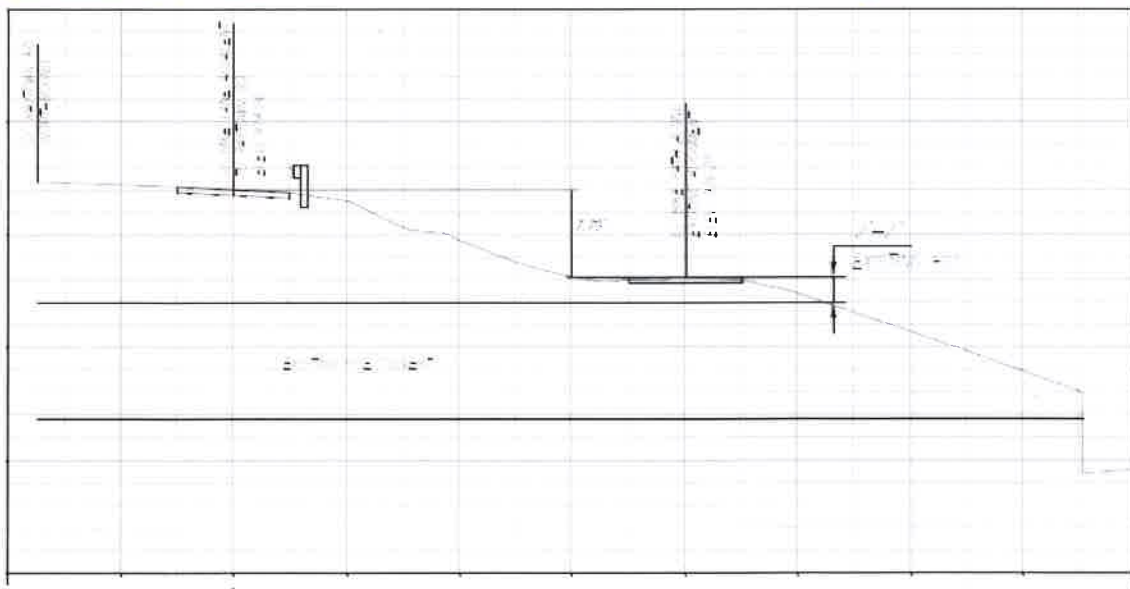
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 FAX: 816.451.1102

PROJECT	RAYTOWN ROAD
DATE	10/12/2018
PROJECT NO.	18-001
DRAWING NO.	18-001-01



3.5 Alternative Option C.2/D.2: Prefabricated Pedestrian Bridge

If the City elects to replace the existing culverts with bridge structures (either reinforced concrete haunched slab or prestressed concrete), the channel would be opened significantly. While this allows for a much more preferable hydraulic performance beneath the bridges, the existing ground under the pedestrian path would need to be excavated as well to allow the channel to flow into Longview Lake. The existing pedestrian path could then either be routed up to the bike lane along the eastern side of northbound Raytown Road, or a separate, prefabricated pedestrian bridge could be installed to maintain grade separation between the roadway and the path. Connecting the path to the bike lane along Raytown Road would require extensive path modification in order to maintain ADA-compliant slopes on its approach to the roadway elevation. The more aesthetic and pedestrian-friendly option is a 12' wide x 90' long "Express Truss" from ConTech. This bridge can be customized with a variety of characteristics and materials, however, for purposes of this report, an estimate was received based on the following customizations: a wood deck, unpainted weathering steel, steel tube handrails, and a connector-style truss. A 12' wide structure allows for simultaneous fishing and scenic views of Longview Lake while providing ample clearance for cyclists and runners on the bridge. Although not included in this estimate, the two available options for the bridge's foundation are either soil- or pile-supported. This structure would weigh approximately 40,800 pounds, would be delivered in two pieces, and carries an estimated cost of \$98,800. An example of a ConTech prefabricated pedestrian bridge can be seen below.



A conceptual layout for each of the replacement options is included with this report. As shown in the attachments, the new structures remain perpendicular to the Raytown Road roadway alignment.

Based on the assumptions stated previously, the suggested structure replacement is a single-span prestressed concrete I-girder layout with a prefabricated pedestrian bridge. This replacement option offers the most effective and practical solution to the underlining inadequacies at this project site, including poor hydraulic performance and scour settlement issues, while also improving aesthetic and recreational appeal to pedestrians, and minimizing future maintenance costs. The prestressed concrete girder alternative is also very contractor-friendly and should yield numerous competitive bids when letting occurs.

4.0 CONSTRUCTION TRAFFIC MANAGEMENT

Raytown Road carries an estimated ADT of 20,000 vehicles. As stated in the objectives, it would be ideal to maintain traffic flow along Raytown Road during construction. It may be possible to stage construction, which would allow two-way traffic to flow along either the northbound or southbound lanes during one phase, then alternating sides during a later phase. Traffic control, crossovers, and temporary shoring would be developed to facilitate this staging. The first phase of staging would involve removing half of the existing pipe structures while routing all traffic over the opposite roadway. Temporary shoring would be installed to maintain the roadway integrity of the undisturbed section. If the precast arch or culvert is selected as the replacement structure, half of its length would be constructed, fill material would be placed on top, and that side of Raytown Road would be reconstructed. Traffic would then be diverted to this newly-completed side, and excavation of the opposite side begins. The temporary shoring shall be designed in such a manner as to allow it to remain in place between each phase, yet capable of retaining soil for both directions of construction. If the bridge structures are selected as replacements, temporary shoring is still required during construction, but only for retaining soil during the first phase. Should the road need to be closed during these replacements, a detour route is available to the west via Harry S. Truman Drive, Byars Road, and High Grove Road, totaling 2.54 miles (see photo to the right). No residents along Raytown Road will be closed off from access during construction, and the detour in any direction will only amount to a couple of minutes.



5.0 ENGINEERING DESIGN

Estimated engineering design costs for this project were projected based on previous projects of similar scope and complexity. For the concrete culvert, RCSH bridge, and prestressed concrete bridge alternatives, design plans are assumed to be developed according to current MoDOT standards and in a similar manner to previous projects that Alfred Benesch & Company has completed for the State. The estimated engineering design cost for these alternatives are summarized in Table 2. For the precast arch alternative, Benesch engineers will coordinate with ConTech representatives to identify all necessary design details, but the final set of structural plans will originate from ConTech's standard library. This aids in reducing the design fee as a moderate portion of the submittal plans will have already been completed by ConTech.

6.0 CONSTRUCTION INSPECTION

This project is assumed to be funded entirely by Grandview funds, thus construction inspection services meeting the City's standards (not MoDOT's) would be necessary. It is assumed that a consultant will provide part-time construction observation for this replacement project. The preliminary estimate for the total working days for this project ranges from 60 to 100 days (5-20 weeks) depending on the selected replacement structure. One inspector is expected to be able to handle the construction observation. The primary inspector would be onsite for 4 hours per day for the duration of the project. The total estimated construction inspection costs are summarized for each design alternative in Table 2.

7.0 PROJECT COST ESTIMATE

The ultimate objective of this conceptual study was to identify possible design alternatives and provide preliminary project costs for each. A breakdown of each cost estimate is shown in the table below. Costs are provided for each of the areas identified in the project scope and objectives section of this submittal. Considering this is a conceptual study, a contingency cost of 15% was added to the construction subtotal. The intent of the contingency cost is to account for unforeseen variables not covered in this conceptual evaluation.

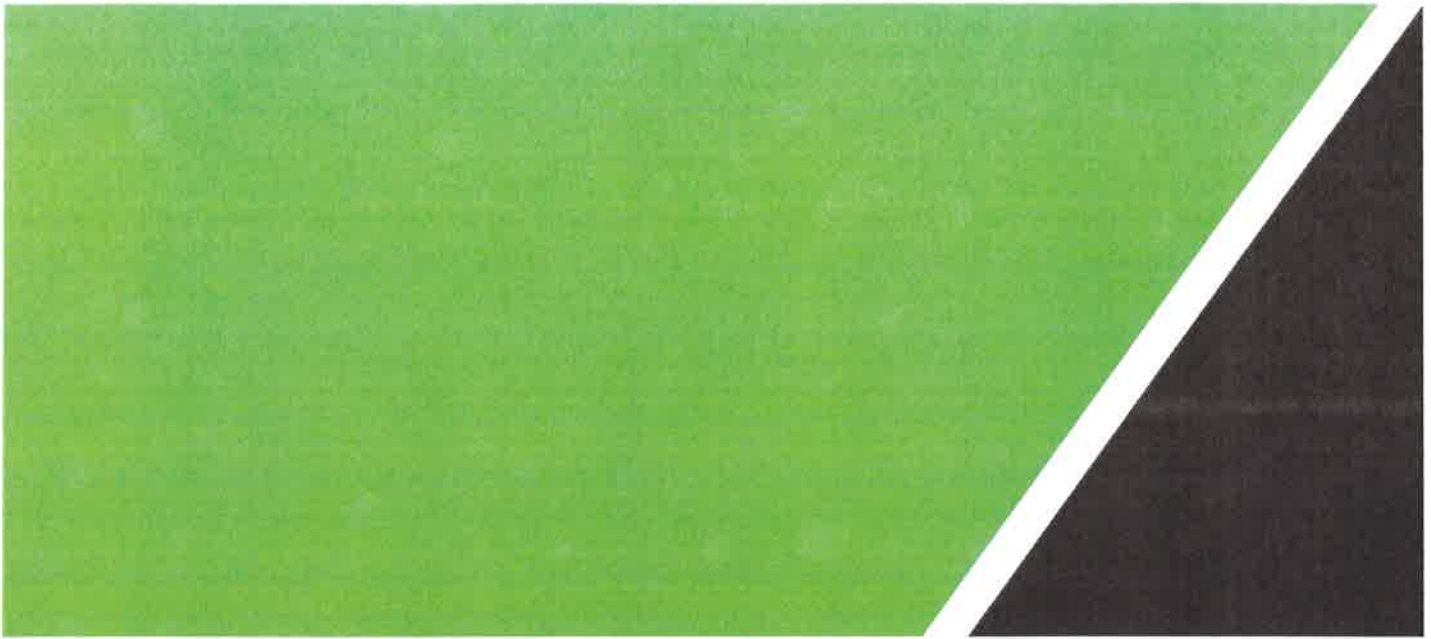
Table 2 – Summary of Design Alternative Project Costs

Design Alternative	Triple 9' x 9' Box Culvert	Precast Arch	Reinforced Concrete Haunched Slab	Prestressed Concrete I-Girder
Design Costs				
Right-of-Way	\$13,200	\$18,000	\$10,425	\$10,425
Engineering Design*	\$75,000	\$75,000	\$128,000	\$150,000
Permitting Costs	\$400	\$400	\$400	\$400
Construction Costs				
Traffic Management	\$20,000	\$20,000	\$20,000	\$20,000
Roadway Elements	\$250,000	\$250,000	\$200,000	\$200,000
Structural Elements	\$600,475	\$904,000	\$858,800**	\$1,010,800**
Construction Cost Subtotal	\$870,475	\$1,174,000	\$1,078,800	\$1,230,800
Contingency Cost (15%)	\$130,575	\$176,100	\$161,820	\$184,620
Inspection Costs***				
Part-Time Const. Inspection	\$60,000	\$30,000	\$60,000	\$60,000
Total Project Cost Estimate	\$1,149,650	\$1,473,500	\$1,439,445	\$1,636,245

* Includes Engineering Design & Survey

** Includes cost of Pedestrian Bridge (\$98,800) (No foundation included)

*** See section 6.0 for further explanation



11010 Haskell Ave. Suite 200 Kansas City, Kansas 66109



August 12, 2019

Earl Newill, P.E.
Deputy Director/County Engineer
Department of Public Works
Jackson County, MO

Mr. Newill,

After significant rainfall events in July and August 2017, City of Grandview Public Works staff learned of a collapse at the Jackson County trail that runs over double pipe roadway culverts located 4000 feet south of Harry Truman Drive under Raytown Road, adjacent to Longview Lake. The trail is the responsibility of Jackson County, but the settlement of the roadway culverts, is the responsibility of the City.

City and Jackson County Parks staff mutually agreed that a project needed to be planned and designed for to replace the roadway and trail crossings on Raytown Road at Longview Lake. The City solicited for engineering services and received five responses from local reputable design firms. After interviewing the two best responses, the City with the input of Jackson County Parks staff, determined that Alfred Benesch & Company was the best firm to do the work.

The first phase of preliminary engineering services has been completed, and a recommendation to replace the existing double pipe culverts with twin bridges has been determined. Final contract plans and construction documents are now required in order to eventually bid a bridge replacement construction project.

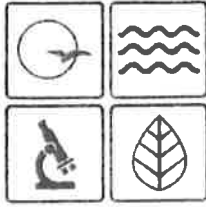
An ordinance will be presented to the Grandview Board of Alderman on August 13, 2019 seeking authorization for contract approval for services from Alfred Benesch & Company to complete the final design plans and construction contract documents required for bidding. The costs for these services are \$181,367.00. The City of Grandview is requesting that the Jackson County legislature recommend this design services contract for the Storm Water Grant Funds available to Jackson County through the Missouri Department of Natural Resources (MoDNR) at 50 percent cost participation, or \$90,683.50.

The City will delay the notice to proceed to Alfred Benesch & Company for the design contract services until a response is received from Jackson County and MoDNR regarding this grant request.

Thank you very much for your consideration.

Sincerely,

Jaclyn White, P.E, PTOE, Assoc. DBIA
City Engineer



Missouri Department of dnr.mo.gov

NATURAL RESOURCES

Michael L. Parson, Governor

Carol S. Comer, Director

July 2, 2019

Mr. Chris Jenkins, Project Manager
Jackson County Stormwater Commission
303 West Walnut
Independence, MO 64050

RE: Jackson County Stormwater Commission – Stormwater Letter of Commitment

Dear Mr. Jenkins:

The Missouri Department of Natural Resources is pleased to offer funds for storm water loans and grants to first class counties, entitlement cities, and the Metropolitan St. Louis Sewer District (MSD) for storm water control projects. Storm water control projects include control plans, stormwater studies, and construction projects.

The program is administered under 10 CSR 20-4.061 Storm Water Grant and Loan Program. Available funds must be distributed proportionately to eligible recipients by latest census population. The 2010 census was used to calculate the Jackson County share. Enclosed is a chart detailing the distribution of loan and grant funds that are available to eligible entities.

Jackson County is eligible for grant funds of \$91,712 and loan funds of \$91,712. Grant allocations can be used for 50 percent project cost. The county must provide 50 percent match, which may come from the county loan allocation.

Please consider this as a letter of intent to provide funds to the county. Recipients interested in applying for this funding opportunity should return a complete application by **November 30, 2019**. If a complete application is not received by that date, the funds allocated to you will be recovered and re-offered to other eligible storm water entities. Complete applications will include a basin plan for the project. Basin plan requirements are detailed in 10 CSR 4.061 (3) General Requirements.

Each eligible recipient must form a Storm Water Coordinating Committee (SCC). For entitlement cities, the SCC shall consist of a committee or organization unit designated by the city. In St. Louis City and County, the SCC shall consist of a committee or organizations unit designated by the Executive Director of MSD. In all other eligible counties, the SCC must be representative of the county government and incorporated municipalities in the county. When choosing projects, keep in mind that construction projects funded by these grant and loan monies must be awarded within 12 months of this letter. For planning projects, some funds must be spent within 24 months of this letter. In order to meet these deadlines, you should proceed with project development as quickly as possible once your application is accepted.

Mr. Chris Jenkins, Project Manager
July 2, 2019
Page 2

An application for this opportunity is enclosed and is available at the following address:
<https://dnr.mo.gov/forms/docs/780-2882-f.pdf>. Please contact Ms. Emilie Peterson, at
573-526-0828 or Emilie.Peterson@dnr.mo.gov, with any questions. The application should be
returned to Department of Natural Resources, Water Protection Program, P.O. Box 176,
Jefferson City, MO 65102-0176. Thank you.

Sincerely,

WATER PROTECTION PROGRAM



Hannah Humphrey, Director
Financial Assistance Center

HH:epn

Enclosures



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 WATER PROTECTION PROGRAM, FINANCIAL ASSISTANCE CENTER
STORMWATER GRANT OR LOAN APPLICATION

Submit to: P.O. Box 176, Jefferson City, MO 65102-0176
 Attn: Financial Assistance Center

FOR OFFICE USE ONLY	
DATE RECEIVED	
LOAN/ GRANT NUMBER	

APPLICANT INFORMATION			
APPLICANT NAME			FEDERAL TAX ID NUMBER / DUNS NUMBER
MAILING ADDRESS			
CITY	STATE	ZIP CODE + FOUR	COUNTY
TELEPHONE NUMBER WITH AREA CODE Ext.		APPLICANT EMAIL ADDRESS	
AUTHORIZED REPRESENTATIVE NAME		AUTHORIZED REPRESENTATIVE TITLE	
NAME OF PERSON TO CONTACT ABOUT THIS APPLICATION		TELEPHONE NUMBER WITH AREA CODE Ext.	
STATE SENATE DISTRICT NUMBER(S) FOR PROJECT		STATE REPRESENTATIVE DISTRICT NUMBER(S) FOR PROJECT	

ENGINEERING CONSULTANT INFORMATION			
CONSULTING ENGINEER			
CONSULTANT MAILING ADDRESS			
CITY	STATE	ZIP CODE + FOUR	
CONSULTANT TELEPHONE NUMBER WITH AREA CODE Ext.		CONSULTANT EMAIL ADDRESS	

GENERAL AND FINANCIAL INFORMATION		
Current Monthly User Charge Storm Water: (Attach Current Rate Ordinances) \$		
Population Served:	Number of Customers:	
Does applicant have an adequate accounting system? (Attach latest year-end financial report or audit) <input type="checkbox"/> Yes <input type="checkbox"/> No		
Amount of Storm Water Operating Reserve \$	Median Household Income of Service Area \$	Outstanding Storm Water Debt \$

ESTIMATED PROJECT COST INFORMATION (Please see 10 CSR 20-4.061 (5) for cost eligibility) Attach additional pages as needed.			APPLICANT FINANCIAL INFORMATION
Cost Estimate Dated:	Grant	Loan	If Applicable: How will the applicant repay the loan? If by rate increase, indicate the new user rate.
Land	\$	\$	
Administrative/Legal	\$	\$	
Engineering – Planning and Design	\$	\$	
Engineering – Construction Services	\$	\$	
Engineering – Construction Inspection	\$	\$	
Construction	\$	\$	
Equipment	\$	\$	Bond Information/Debt Instrument
Storm Water Control Plan Development	\$	\$	Date of Ballot Approval:
Contingency (5% of Construction)	\$	\$	Anticipated Date for Bond Election:
Total Project Costs	\$	\$	<input type="checkbox"/> General Obligation Bonds \$
Closing Costs (Loan Only) (Typically \$1,000)	\$	\$	<input type="checkbox"/> Revenue Bonds \$
Loan amount requested	\$	\$	<input type="checkbox"/> No Bonds Available

PROJECT DESCRIPTION

(ATTACH ADDITIONAL PAGES AS NEEDED OR ENGINEERING REPORT, IF AVAILABLE)

STORM WATER COORDINATING COMMITTEE Applicant has formed a Storm Water Coordinating Committee (see 10 CSR 20-4.061 (2)(I)). Please list members:**ADDITIONAL DOCUMENTATION**

THE APPLICANT HAS INCLUDED WITH THIS APPLICATION:

- Comprehensive Storm Water Management Plan (see 10 CSR 20-4.061 (3)(D) for requirements)
- Project Specific Basin Plan (see 10 CSR 20-4.061 (3)(D)2 for requirements)
- Resolution of Governing Body designating an authorized representative (form attached)

CERTIFICATION

The undersigned authorized representative certifies that the information submitted in this application is true and correct to the best of his/her knowledge and that he/she is authorized to sign and submit this application. The applicant agrees, if a loan and/or grant is awarded on the basis of this application, to comply with all applicable rules and regulations of the Department of Natural Resources and the terms and conditions of the loan and/or grant agreement. **Incomplete applications will be returned.**

SIGNATURE OF AUTHORIZED REPRESENTATIVE

DATE

NAME AND OFFICIAL TITLE (TYPE OR PRINT)

TELEPHONE NUMBER WITH AREA CODE

Ext.

PREPARER'S NAME AND SIGNATURE (IF APPLICABLE)

SIGNATURE OF PREPARER

DATE

NAME AND TITLE (PRINT OR TYPE)

TELEPHONE NUMBER WITH AREA CODE

Ext.

**RESOLUTION OF GOVERNING BODY OF APPLICANT
RESOLUTION NO. _____**

Resolution authorizing the filing of an application with the Missouri Department of Natural Resources, State Revolving Fund Program for loans under the Missouri Clean Water Law (Section 644, RSMo.).

WHEREAS under the terms of the Missouri Clean Water Law, Section 644, Revised Statutes of Missouri, the State of Missouri has authorized the making of loans and/or grants to authorized applicants to aid in the construction of specific public projects.

NOW, THEREFORE, be it resolved by _____
(governing body of applicant)

1. That _____ be and he/she is hereby authorized to execute and
(designated official)

file an application on behalf of _____
(legal name of applicant)

with the State of Missouri for a loan and/or grant to aid in the construction of:

(brief project description)

2. That _____,
(name of authorized official) (title)

he/she is hereby authorized and directed to furnish such information as the Missouri Department of Natural Resources may reasonably request in connection with the application which is herein authorized, to sign all necessary documents on behalf of the applicant, to furnish such assurances to the Missouri Department of Natural Resources as may be required by law or regulation, and to receive payment on behalf of the applicant.

CERTIFICATE OF RECORDING OFFICER

The undersigned, duly qualified and acting _____ of the
(title of officer)

_____, does hereby certify: That the attached resolution is a
(legal name of applicant)

true and correct copy of the resolution adopted at a legally convened meeting of the
_____ held on the _____ day of _____,
(name of the governing body of applicant)

_____; and further that such resolution has been fully recorded in the journal of proceedings and records in my office. IN WITNESS WHEREOF, I have hereunto set my hand this _____ day of _____.

(signature of recording officer)

(title of recording officer)

SEAL (If applicant has an official seal, impress here.)