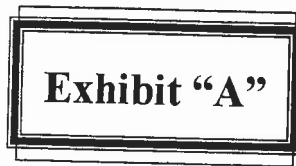


Fuller
Mossbarger
Scott &
May

FMSM
ENGINEERS



10018
International Boulevard
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45246-4839

513-860-1070
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March 19, 2003

O.1.8.4.CN0222003L01

City of Mason
Engineering and Building Department
600 Mason-Montgomery Road
Mason, Ohio 45040

Attn: Mr. Richard Fair, PE
City Engineer

Re: Proposal for Heritage Oak Park Culvert Replacement

Dear Mr. Fair:

Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) is pleased to submit our proposal for the referenced project. We have assembled a project team that is highly qualified and dedicated to helping the City of Mason with this project.

All of the work for this project will be coordinated out of our Cincinnati office. FMSM engineering professionals assisting the City of Mason on the Kings Mill Culvert Replacement have also been assigned to this project. Kleingers and Associates, a local engineering and surveying firm, will assist with surveying services for the project.

Thank you for the opportunity to submit this proposal. We want to emphasize that FMSM recognizes the importance of this project to the City of Mason and we are dedicated to making this project a success.

Sincerely,

FULLER, MOSSBARGER, SCOTT AND MAY
ENGINEERS, INC.

A handwritten signature in cursive script that reads "Stan A. Harris".

Stan A. Harris, PE
Associate

/rws

A circular stamp with a curved line across it. The text "MAR 9 2003" is visible at the bottom of the stamp.

3. Project Team



*Stan Harris will be the
Project Manager*

An important factor contributing to the success of any project is the quality of the personnel assigned to work and manage the project. FMSM has assigned a team of highly qualified and experienced team of individuals to this project. Detailed resumes outlining the experience of each project team member are included in Appendix B.

The **Project Manager** on this project will be **Stan Harris, PE**. Mr. Harris is the Manager of the firm's Cincinnati office where he is responsible for supervision of the professional, technical and clerical staff. Mr. Harris has 25 years of civil engineering and management experience and will be responsible for quality control and client satisfaction on this project.

Joe Herman, PE will lead the alternatives development and design efforts for the project. Mr. Herman has over six years experience in municipal infrastructure design and planning. Recently, Mr. Herman led the design efforts for the Kings Mill Road Culvert Replacement for the City of Mason. In addition, he is assisting the City of Mason in developing and evaluating alternatives to bring Pine Hill Lake Dam in compliance with ODNR dam safety regulations.

Jim Latchaw, PE and **Justin Leonard, EIT** have been assigned to the project team to perform the hydrologic and hydraulic evaluation of the culvert and stream channel. Mr. Latchaw has over twenty years experience performing H&H analysis and stormwater modeling for the Federal Emergency Management Agency (FEMA) and municipal clients. Mr. Leonard is a hydrologic and hydraulic engineer specializing in the application of computer models. Mr. Leonard was the prime modeler for the evaluation of Pine Hill Dam for the City of Mason. Currently, both Mr. Latchaw and Mr. Leonard are working with the City of Mason to develop updated flood inundation mapping and flood reduction alternatives in the Fairway Drive Watershed.

Eric Kistner, PE will be responsible for conducting the geotechnical investigation on this project. Mr. Kistner has been performing geotechnical investigations from FMSM's Cincinnati office for over nine years. He is an accomplished geotechnical engineer and is very familiar with local geology and native soils in and around Mason.

Dan Back, PE will perform the structural assessment of the existing box culvert and design necessary improvements. Mr. Back is a structural engineer with over twenty years experience performing structural assessments on stormwater and flood control structures. Mr. Back has performed structural

Many of the individuals assigned to this project have worked on previous projects with the City of Mason and are familiar with your project needs and expectations.



**City of Mason
Engineering and Building Department**

Fuller
Mossbarger
Scott &
May

MSM
ENGINEERS



KLEINGERS
& ASSOCIATES

Project Manager
Stan Harris, PE

Surveying

David L. Cox, PS (K&A)

Geotechnical Investigation

Eric Kistner, PE

Hydrology/Hydraulics

Jim Latchaw, PE
Justin Leonard, EIT

Design

Joe Herman, PE

Structure Analysis/Inspection

Dan Back, PE

Geographic Information Systems (GIS)

Mike Albrecht

Support Services

CADD

Clerical

Laboratory

Drilling

K & A = Kleingers & Associates

Organization Chart

FMSM has assigned experienced personnel to the project team with the technical expertise and availability to successfully complete the project in a timely manner.

design and assessments for the Ohio Department of Natural Resources, Kentucky Finance and Administration Cabinet, and the U.S. Army Corps of Engineers.

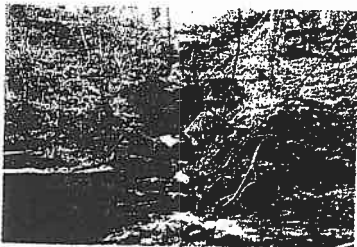
Mr. David Cox, PS will be responsible for surveying services on this project. Mr. Cox is the Survey Director for Kleingers & Associates, responsible for oversight and supervision of surveying services by the firm totaling over \$1 million annually. He is an active member of Professional Land Surveyors of Ohio and was a Past President of the Cincinnati Chapter. Mr. Cox is also a member of the Ohio Board of Registration for Professional Engineers and Surveyors and teaches basic surveying classes at Cincinnati State College in the evenings.

Mike Albrecht will provide Geographic Information System support services on the project. Mr. Albrecht worked with the City of Mason Engineering and Building Department staff to develop a Utility Management System. This effort included developing an inventory of Mason's stormwater, sanitary, and water infrastructure. The FMSM Team will rely on Mr. Albrecht's detailed knowledge and familiarity with Mason's GIS resources to augment physical data collected in the field.

In addition to the primary project team members identified above, FMSM will rely on its 200-person engineering and support staff to provide assistance, as necessary, to ensure the timely completion and success of this project.



Heritage Oak Park box culvert and stream channel.



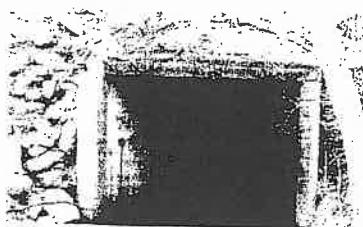
A stormwater headwall and sanitary sewer manhole were observed within close proximity to the outlet end of the culvert and may require relocation.

4. Capacity to Perform the Work

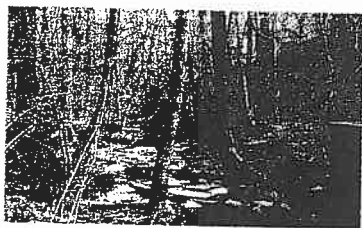
FMSM has selected qualified individuals to the project team based on the technical requirements and project elements outlined in your RFP. FMSM has assigned individuals to the project team based on their technical expertise and availability to work on the project through completion. In other words, the individuals identified in the organization chart will be the individuals working on this project and have been cleared of other commitments to ensure the successful completion of this project.

5. Project Understanding

FMSM has reviewed the Request for Proposal (RFP) and performed preliminary reconnaissance of the proposed project area. Based on these preliminary efforts, FMSM concurs with the City of Mason's assessment of the condition of the existing eight-foot by ten foot concrete box culvert at Heritage Oak Park. Evidence of structural failure was observed on several of the culvert components. Severe cracking on the top slab, outlet wing walls and downstream retaining wall were all observed. In addition,



Exposed reinforcing steel and a lack of wing walls was observed at the inlet end of the culvert.



Erosion along the US 42 embankment was observed immediately downstream of the Heritage Oak Park Culvert.

exposed reinforcing steel and concrete deterioration was identified at the inlet end. Preliminary hydraulic capacity analysis to verify appropriateness of culvert dimensions was not performed, but severe erosion downstream of the culvert and the lack of wing walls on the upstream end of the culvert suggest hydraulics could be improved.

Published flood profiles in the FEMA Flood Insurance Study (FIS) indicate approximately 11.0 feet of backwater behind the culvert for the 100-year storm event. The FIS study was performed in June 1982 and is based on watershed land use at the time of the study. Present land use in the approximately 480-acre watershed upstream of the culvert is primarily residential (1/3-acre average lot size) based on 2001 aerial photography. Warren County Auditor property data available for the area indicate that a number of the homes in this area were constructed after 1982. Consequently, backwater upstream of the culvert is anticipated to be greater than that reported in the FIS report.

Severe erosion was observed downstream of the existing culvert. Erosion along the creek can create maintenance problems for the City resulting from excessive deposition at stormwater structures. In addition, scouring of the channel, if left unchecked, could undermine the adjacent US 42 embankment.

Realignment or replacement of the Heritage Oak Park culvert will have to take into consideration existing utility infrastructure. A storm headwall and sanitary sewer manhole were observed in close proximity to the outlet headwall of the existing culvert. Design of replacement for the culvert may require relocation of these utilities.

6. Project Approach

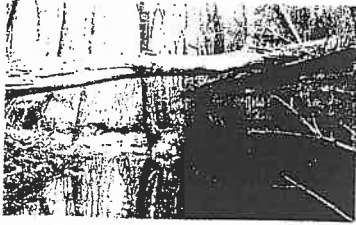
Based on our understanding of project elements and requirements outlined in the RFP, FMSM proposes the following approach.

6.1. Project Kickoff Meeting

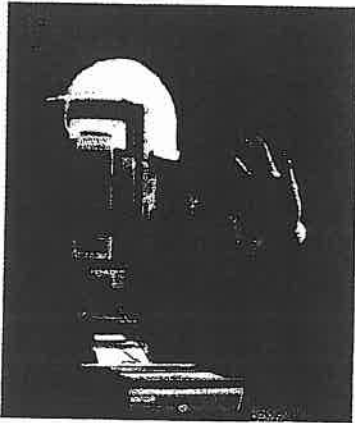
FMSM will meet with City of Mason to review project goals and constraints. Intermediate milestones for the project components (i.e. structural assessment, geotechnical investigation, etc.) will also be confirmed at the project kickoff meeting.

6.2. Data Collection and Review

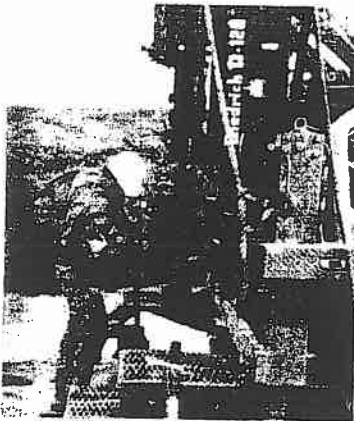
During this task, FMSM will review right-of-way drawings, Heritage Oak Park Expansion project drawings, and other plans made available by the



Failure of the retaining wall downstream of the culvert is likely attributed to scouring of the foundation during storm events.



Field surveying of the Heritage Oak Park and US 42 culverts, overburden area, and 16 stream cross sections along Muddy Creek Branch No. 1 will be performed.



FMSM will perform a geotechnical investigation of the culvert foundation and overburden soils to determine reusability of fill material and determine allowable bearing capacity

Engineering and Building Department. FMSM will also contact the Ohio Department of Transportation (ODOT) to obtain copies of the construction drawings for the adjacent US 42 roadway and downstream culvert crossing. Local utility companies will be contacted to obtain utility information within the project area.

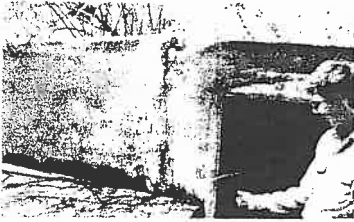
6.3. Field Survey and Utility Location

A detailed topographic survey of the Heritage Oak Park culvert and overburden area (approx. 1.75 acres) will be performed to augment existing feature and topographic information available from Warren County. Survey information will be used to develop base mapping for the culvert improvement/replacement design drawings. The topographic survey will be referenced to City of Mason control monuments and will include pavement limits, bike paths, trees, guardrail, and other permanent features. In addition, OUPS will be contacted to mark underground utility locations in the field. Burial depths of underground utilities will be determined from interviews with utility company representatives; "daylighting" of utility conduits will not be performed.

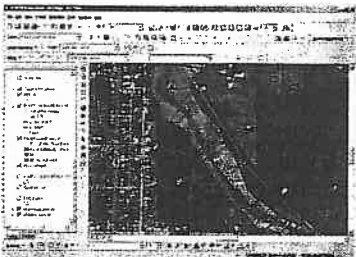
The Heritage Oak Park and US 42 culverts and wing walls will be surveyed to establish locations and verify dimensions and grades. The structure upstream of the Heritage Oak Park culvert near 200 Cowan Drive will also be surveyed. To facilitate hydraulic modeling efforts, the stream channel along Muddy Creek Branch No. 1 will be surveyed at approximately 200 foot intervals. Approximately sixteen (16) cross sections will be surveyed beginning at a point approximately 800 feet upstream of the Heritage Oak Park culvert and extending downstream to the confluence with the Muddy Creek main stem (Figure 1). Cross sections will be surveyed between the channel bank stations. Topographic information for floodplain overbank areas will be determined from Warren County GIS information. Finish floor elevations of buildings along Muddy Creek Branch No. 1 will also be obtained, as needed.

6.4. Geotechnical Investigation

FMSM will perform a subsurface investigation at the Heritage Oak Park culvert to determine soil strata, engineering properties, and make recommendations regarding the suitability of existing fill material for reuse. One boring will be advanced near the inlet and outlet ends on opposite sides of the existing culvert alignment to determine soil/bedrock conditions below the culvert invert. These two borings will be advanced to a depth of approximately 45 feet, or about 20 feet below the existing culvert invert. Two additional borings will be advanced along the existing culvert alignment to determine the nature of the backfill material. A depth of 15 feet is



A structural assessment and evaluation will be performed to observe evidence of structural failure and evaluate required improvements.



FMSM will develop HEC-HMS and HEC-RAS models for Muddy Creek Branch No. 1 to evaluate culvert capacity and identify downstream flooding potential.

The HEC-RAS model developed by FMSM for the Kings Mill Road Culvert Replacement will be used to establish tailwater conditions at the mouth of Muddy Creek Branch No. 1.

assumed for these borings. Standard Penetration Test (SPT) and undisturbed Shelby Tube samples will be obtained from the borings. All borings will be located in non-paved areas and backfilled with soil cuttings after they are completed.

All field work will be performed under the supervision of a geotechnical engineer or geologist. Laboratory testing will be performed by FMSM's in-house laboratory and in accordance with ASTM standards. Natural moisture contents will be performed on all samples. Samples of the predominant horizons encountered will be subjected to engineering classification testing. Unconfined compressive strength tests will be performed on undisturbed Shelby Tube samples.

At the conclusion of the geotechnical investigation, a report will be prepared with graphic boring logs and the results of all soil tests. Bore hole locations will be identified on project drawings. The report will include recommendations for the potential reuse of the existing fill material and allowable bearing capacity and foundation type for a culvert replacement.

6.5. Structural Assessment

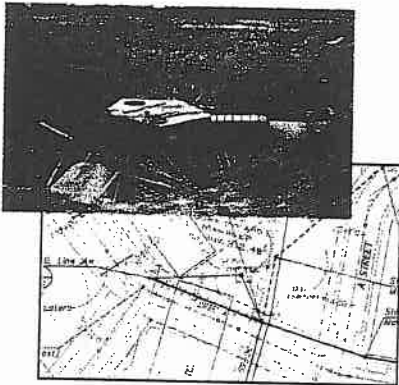
FMSM will perform a structural assessment of the existing Heritage Oak Park box culvert. The structural assessment will consist of a site visit to observe and document physical signs of structural fatigue or failure, review of as-built drawings, and structural evaluation of existing loads on the structure. Based on the physical evidence observed during the preliminary site reconnaissance, concrete coring and testing is not recommended and will not be performed. Results from the structural assessment will be included in the draft report of findings outlined in Section 6.7. Alternatives for correcting structural deficiencies will be developed during the design phase. Structural rehabilitation alternatives will not be developed if the hydraulic capacity evaluation indicates that replacement of the culvert is needed.

6.6. Hydraulic Capacity Evaluation

FMSM has delineated the watershed upstream of the proposed culvert (Figure 2). During this task, FMSM will develop a hydrologic model of the 480-acre watershed to determine the peak flow rate in the Heritage Oak Park culvert for the 10-, 50-, 100-, and 500-year storm events. Hydrologic modeling will be performed using the Corps of Engineers' HEC-HMS program and the methodology outlined in the Soil Conservation Service Technical Release No. 55 (SCS TR-55) publication. GIS techniques will be

utilized to determine the watershed runoff response using publicly available soil and land use data. Peak flow rates at the US 42 and 200 Cowan Road culverts will also be determined.

A hydraulic capacity analysis of the Heritage Oak Park and US 42 culverts will be performed using the Corps of Engineers' HEC-RAS program. Flows from the hydrologic analysis will be integrated into the HEC-RAS model to determine backwater flood stages behind each culvert. Backwater elevations will be compared to tailwater flood stages to assess if the culverts are undersized. The HEC-RAS model will extend from a point approximately 800 feet upstream of the Heritage Oak Park culvert and extend downstream to the confluence with the Muddy Creek main stem (refer to Figure 1). FMSM developed a HEC-RAS model for Muddy Creek as part of the Kings Mill Road Culvert Replacement project. Water surface profiles predicted by this model will be used as the starting boundary condition for the HEC-RAS model for Muddy Creek Branch No. 1.



FMSM will develop final construction drawings and documents suitable for bidding and constructing the proposed improvements.

During development of improvement/replacement alternatives, the HEC-RAS model will be used to evaluate proposed culvert dimensions. Predicted flood stages along the study reach for proposed replacement alternatives will be compared to existing conditions to determine the impact on upstream and downstream flood stages. Computed water surface elevations will be compared to finish floor elevations of buildings adjacent to the creek to determine the presence of structural flooding.

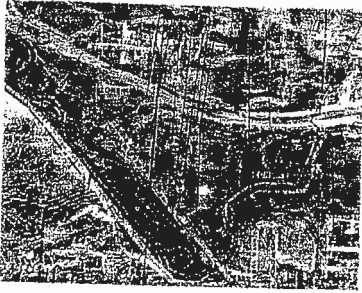
Results from the HEC-RAS model will be used to predict average velocities in the stream channel for the 10, 50, 100, and 500-year floods. Predicted velocities will be used to determine appropriate armoring measures for the channel between the Heritage Oak Park and US 42 culverts.

6.7. Develop Design Alternatives

Upon completion of tasks 6.1 through 6.5, FMSM will prepare a report summarizing project findings and proposed preliminary design alternatives. Design alternatives will reflect the findings of the geotechnical investigation, structural assessment, and hydraulic capacity analysis. Conceptual sketches and budgetary construction cost estimates will be provided for each alternative. At the conclusion of this task FMSM will meet with the City of Mason to present the report, discuss preliminary design alternatives, and provide a recommendation.

6.8. Final Design

FMSM will prepare final construction documents, suitable for bidding and constructing the project, for the selected improvement alternative.



FMSM will assist the City in preparing a LOMR application to update FEMA flood mapping of the study reach.

Documents will be similar in detail to those prepared by FMSM for the Kings Mill Culvert Replacement project. A final construction cost estimate will also be prepared. Ten (10) paper copies and one mylar set of engineering plans will be provided to the City, along with an electronic copy in AutoCAD 2000 format.

6.9. Permitting

FMSM will assist the City of Mason in obtaining state and federal permits for the proposed culvert rehabilitation/replacement and downstream channel improvements. For the purpose of the cost estimate provided with this proposal, it is assumed that required permits will be limited to a 401 Water Quality Certification and a Corps of Engineers 404 Dredge and Fill Permit. It is further assumed that the project will qualify under a nationwide permit and that an Individual Permit will not be required.

6.10. FEMA Letter of Map Revision (LOMR)

FMSM will assist the City of Mason in preparing a LOMR application to update the FEMA Flood Insurance Rate Map (FIRM) for the study reach. It is assumed that no additional hydrologic or hydraulic analysis will be performed during this task and that FMSM will be responsible solely for preparing technical support documentation for the application. Flood inundation mapping prepared for the application will be provided in FEMA's DFIRM format.

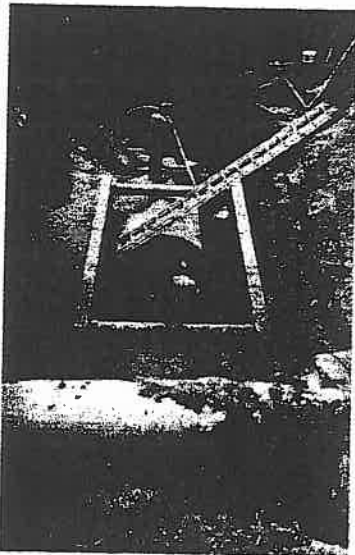
7. Estimated Cost of Service and Schedule

7.1. Estimated Cost

Based on our project understanding and approach, FMSM has broken the project into the tasks outline in Table 1. A preliminary estimate of the required man-hours by job classification are presented in Table 2.

Table 1. Preliminary Estimate of Engineering Costs

Work Task	Estimated Fee
1. Kickoff Meeting	\$ 490.00
2. Data Collection and Review	\$ 780.00
3. Field Survey and Utility Location	\$ 8,070.00
4. Geotechnical Investigation	\$ 5,830.00
5. Structural Assessment	\$ 4,860.00
6. Hydraulic Capacity Evaluation	\$ 6,620.00
7. Develop Design Alternatives	\$ 6,770.00
8. Final Design	\$ 8,040.00
9. Permitting	\$ 900.00
10. Letter of Map Revision (LOMR)	\$ 2,500.00
Totals:	\$ 44,860.00



This estimate of fees is based on the following assumptions:

- Scope is limited to that outlined in the RFP and in this proposal.
- Benchmark information for survey control will be provided by the City of Mason and will be within reasonable proximity to the project area.
- Control for the topographic and culvert survey will be established using survey grade GPS equipment.
- Field crews will have access to the site. Access to private property to survey finish floor elevations will be coordinated by the City of Mason.
- Based on FMSM's review of existing parcel information available from Warren County GIS, temporary or permanent easements are not anticipated.
- Concrete testing or coring of Heritage Oak Park culvert will not be performed.
- Borings locations for the geotechnical investigation will be accessible with a truck-mounted drill rig.
- Design drawings will be no more than 16 sheets.
- Permit and LOMR application fees will be paid by the City

Table 2. Estimated Man-Hours by Job Classification

Work Task	Estimated Man-Hours										Direct Expenses	Totals
	PM	SPE	PE	CT	GS	RS	SC	STE				
6.1. Kickoff Meeting	2	2	2									\$ 490.00
6.2. Data Collection and Review	2	4	4									\$ 780.00
6.3. Field Survey and Utility Location		2		12		8	36				\$ 1,330.00	\$ 8,070.00
6.4. Geotechnical Investigation	1	6	20	12					2		\$ 3,200.00	\$ 5,830.00
6.5. Structural Assessment	8	16	40						4			\$ 4,860.00
6.6. Hydraulic Capacity Evaluation	4	10	80		4							\$ 6,620.00
6.7. Develop Design Alternatives	8	20	40	16	8				10			\$ 6,770.00
6.8. Final Design	16	40	16	40								\$ 8,040.00
6.9. Permitting	2		8							4		\$ 900.00
6.10. Letter of Map Revision (LOMR)	4		16		16					4		\$ 2,500.00
	Total											\$44,860.00

Notes:

- PM = Project Manager
- SPE = Senior Project Engineer
- PE = Project Engineer
- CT = CADD Technician
- GS = GIS Specialist
- RS = Registered Surveyor
- SC = 3-Person Survey Crew
- STE = Stenographer

7.2. Schedule

The City has identified a design completion deadline for this project by June 30, 2003. Assuming Notice to Proceed no later than April 11, FMSM is confident that work on this project can be completed within a 90-day period to meet the City's completion deadline. Table 3 identifies target milestones for the individual work tasks.

Table 3. Project Schedule

Work Task	Completion Date
1. Kickoff Meeting	April 4, 2003
2. Data Collection and Review	April 18, 2003
3. Field Survey and Utility Location	May 16, 2003
4. Geotechnical Investigation	May 16, 2003
5. Structural Assessment	May 16, 2003
6. Hydraulic Capacity Evaluation	May 30, 2003
7. Develop Design Alternatives	May 30, 2003
8. Final Design	June 30, 2003
9. Permitting	TBD ¹
10. Letter of Map Revision (LOMR)	TBD ¹

Totals:

¹ Completion dates for permitting and LOMR application will be predicated on review by ODNR and FEMA.



10018
International Boulevard
Cincinnati, Ohio
45246-4839
513-860-1020
513-860-1073 FAX

September 4, 2002

O.1.8.4.CN0742002P01

Department of Engineering
City of Mason
3920 State Route 42
Mason, Ohio 45040

Attn: Kathy Dorman

Re: ~~Revised~~- Proposed Scope of Work and Fee Proposal
CLOMR for Pine Run and Portion of Muddy Creek
Mason, Warren County, Ohio

Dear Ms. Dorman:

Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) is pleased to submit this scope of services and fee proposal for engineering services to perform a floodplain analysis on Pine Run and Muddy Creek. The specific scope of work includes: revising HEC-HMS and HEC-RAS models developed during hydrologic and hydraulic analysis of Pine Hill Dam; determining floodplain and floodway boundaries, developing floodplain mapping and profiles; and the preparation of a Conditional Letter of Map Revision (CLOMR) for submission to the Federal Emergency Management Agency (FEMA). A CLOMR will be prepared since the floodplain analysis will assume completion of the proposed culvert replacement under Kings Mill Road currently being designed by FMSM. The study area will include Pine Run from its confluence with Muddy Creek to Mason-Montgomery Road and the approximately 2.1 mile reach of Muddy Creek extending downstream of the confluence with Pine Run to the City of Mason corporate limit. The approximate study areas are shown on the attached excerpt from the Mason FIRM.

As requested, FMSM has prepared two separate fee proposals: one for performing floodplain analysis on the Pine Run reach only, and one including the 2.1 mile reach of Muddy Creek. The following paragraphs outline specific work tasks and deliverables included in the scope of services.

Scope of Services

1.0 Revise HEC-HMS and HEC-RAS Model

The floodplain analysis will be performed using the HEC-HMS and HEC-RAS model developed by FMSM during the critical design flood analysis for Pine Hill Dam. Modification of these models is necessary to meet FEMA requirements for CLOMR submissions. The modifications will include: field surveying to determine stream cross-section geometry below the water surface (Muddy Creek only), computation of floodways, and determination of floodplain boundaries for the 10-, 50-, 100-, and 500-year storms.

FULLER, MOSSBARGER, SCOTT & MAY ENGINEERS, INC.
OFFICES IN LOXINGTON, LOUISVILLE, CINCINNATI & COLUMBUS

City of Mason
September 4, 2002
Page 2

A fully developed watershed condition was assumed in the hydraulic evaluation of Pine Hill Dam. Based on the near fully-developed land use condition that exists in the watershed today and rapid ongoing development in the Pine Hill dam watershed, it is assumed that a fully-developed watershed condition will be suitable for use in the CLOMR submittal.

1.1 Field Surveying

Stream cross-sections in the existing HEC-RAS model were developed from Warren County GIS mapping. The portion of the cross-section below the water surface was approximated assuming a trapezoidal shape. For storms smaller than the Probable Maximum Flood (PMF) used in the critical design flood analysis, the accuracy of the stream cross-section can be significant and field surveying is required to obtain an accurate representation of the channel below the water surface. Existing topographic data should be adequate for Pine Run, however, if the CLOMR is to extend down Muddy Creek, field surveying will be needed.

During this task FMSM will survey stream cross-sections along Muddy Creek at 500 to 1,000-foot intervals. Surveying will be referenced to control monuments used on the Pine Hill Dam project. Bridges or other stream crossings encountered along the study reach that were not included in the survey work for the Pine Hill Dam project will also be surveyed for inclusion in the HEC-RAS model.

1.2 Revise Models

The HEC-HMS and HEC-RAS models will be revised to meet FEMA technical requirements for CLOMR and Flood Insurance Rate Map (FIRM) submittals. Modifications to the existing HEC-HMS model will include refinement of the subwatersheds contributing to Muddy Creek to more closely identify lateral inflows. In addition, rainfall data for the 10-, 50-, 100-, and 500-year storms, along with the July 17, 2001 calibration storm, will be added to the model.

Collected field survey data will be used to refine the cross-section geometry in the existing HEC-RAS model. Additional bridges or stream crossings encountered in the field will also be added to the model.

1.3 Model Calibration

The revised models will be calibrated to available high water information for the July 17, 2001 storm. Calibration will be limited to adjusting channel roughness and watershed time of concentration values to achieve a close match between predicted and actual flood stages. It is assumed that high water information will be provided by the City of Mason for use in calibration. Field surveying high water marks is not included in this scope of services.

2.0 Floodplain Analysis

FMSM will use the revised models to determine the floodplains and floodway limits along the study reach. The revised HEC-HMS model will be used to predict runoff for the 10-, 50-, 100-, and 500-year storms.

Results from the HEC-HMS analysis will be input to the revised HEC-RAS model to determine floodplain boundaries. Floodways for the 100-year storm will be computed assuming equal conveyance reduction in the channel overbank areas. Encroachment of the floodplain during the floodway computations will not be permitted within the stream channel banks or if it results in greater than a 1-foot rise in the computed water surface elevation. FMSM will use automated mapping software in conjunction with HEC-GeoRAS to transfer hydraulic model output to flood inundation maps. This process has been successful on other projects and for FEMA in the development of flood studies.

3.0 Deliverables

3.1 Report

A letter report will be prepared which will summarize the methodology and results of the study. Floodplain work maps, in FIRM format, will be prepared that show the 100-year and 500-year flood boundaries, the floodway boundaries, and the cross section locations. All maps will be prepared in ArcView and included in the report.

3.2 LOMR Documentation

FMSM will prepare the documentation for a LOMR application. The documentation will include: the report outlined earlier; profile plots for the 10-, 50-, 100-, and 500-year floods; and an annotated FIRM showing the updated 100-year and 500-year flood boundaries, floodway limits, base flood elevations, and cross section locations.

3.3 Progress Meetings

Upon receiving the notice to proceed, FMSM will schedule a kickoff meeting with the City of Mason to coordinate the project schedule and to confirm the project scope. Monthly progress meetings will be held to update the City Engineer and staff on the project. A written monthly progress report will also be submitted. It is assumed all other communication on this project can be performed via phone or email.

Fee Estimate

Fee proposals for two study reaches were prepared. The study reach for Option 1 is the reach of Pine Run extending from Muddy Creek to Mason-Montgomery Road. The study reach for Option 2 includes the portion of Pine Run outlined in Option 1 and an approximate 2.1 mile reach of Muddy Creek extending from the confluence with Pine Run downstream to the City of Mason corporate limit. Aside from the geographic limits of the two options, all other aspects of the scope are identical.

Option 1 - Pine Run Only

Data Collection.....	\$ 6,700.00
Floodplain Delineation.....	8,420.00
Report/CLOMR Documentation	6,300.00
Project Management.....	3,480.00
Total Fee (Option 1)	\$ 24,900.00

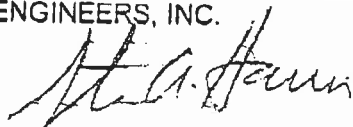
Option 2- Pine Run and Portion of Muddy Creek

Data Collection/Field Survey.....	\$ 13,260.00
Floodplain Delineation.....	15,960.00
Report/CLOMR Documentation	8,250.00
Project Management.....	4,120.00
Total Fee (Option 2)	\$ 41,590.00

Thank you for the opportunity to submit this proposal. Please call if you have any questions.

Respectfully submitted,

FULLER, MOSSBARGER, SCOTT AND MAY
ENGINEERS, INC.


Stan A. Harris, P.E.
Associate

SAH/lfb

Attachments