



REPLY TO
ATTENTION OF

CENWD-RBT

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
PORTLAND OR 97208-2870

26 NOV 2012

MEMORANDUM FOR Commander, Kansas City District (CENWK-PM-CJ/John Benson)

SUBJECT: Review Plan (RP) Approval for Turkey Creek Flood Damage Reduction Project
Review Plan, Kansas City, Kansas, Kansas City District

1. Reference memorandum, CENWK-ED, 15 June 2011, subject: Turkey Creek Flood Damage Reduction Project Review Plan, Kansas City, Kansas, Kansas City District, Northwestern Division, Review Plan Submittal (Encl).
2. The RP for the Turkey Creek Flood Damage Reduction project is approved.
3. This RP has been prepared in accordance with EC 1165-2-209. Some elements of the project will include an independent external peer review. The Business Technical Division of the Northwestern Division will serve as the Review Management Organization for execution of this plan.
4. Any revisions to this RP will require new written approval from this office. For further information, please contact Mr. Steve Bredthauer at (503) 808-4053.

Encl


ANTHONY C. FUNKHOUSER, P.E.
COL, EN
Commanding



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05 JUL 2011

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Encl

James J. Hearn, SES
for JOHN R. MCMAHON
BG, USA
Commanding



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, KANSAS CITY DISTRICT
700 FEDERAL BUILDING
601 E. 12TH STREET
KANSAS CITY, MISSOURI 64106-2896

REPLY TO
ATTENTION OF:

CENWK-ED

15 June 2011

MEMORANDUM FOR Commander, Northwestern Division, USACE

SUBJECT: Turkey Creek Flood Damage Reduction Project Review Plan, Kansas City, Kansas,
Kansas City District, Northwestern Division, Review Plan Submittal

1. Enclosed for Major Subordinate Command (MSC) Commander approval is the Turkey Creek Flood Damage Reduction Project Review Plan. This Review Plan has been prepared according to EC 1165-2-209, Civil Works Review Policy.
2. The District point of contact (POC) for questions or requests for additional information may be referred to Ms. Melissa Corkill, Project Manager, at (816) 389-3697 or email at Melissa.R.Corkill@usace.army.mil.


REX GOODNIGHT
Chief, Engineering Division
Kansas City District

Turkey Creek Flood Damage Reduction Project Review Plan
June 2011

**REVIEW PLAN
FOR THE
TURKEY CREEK FLOOD DAMAGE REDUCTION PROJECT
KANSAS CITY, KANSAS
KANSAS CITY DISTRICT
NORTHWESTERN DIVISION**

15 JUNE 2011



**US Army Corps
of Engineers ®**
Kansas City District

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1.0 Purpose and Requirement.

1.1.1 Purpose and Authority. The purpose of this Review Plan (RP) is to define the scope and level of review for implementation documents for the Turkey Creek Flood Damage Reduction Project (Turkey Creek Project). The project is half way complete with the implementation phase. This RP is a stand-alone document but is and will be included as an appendix to current and future Project Management Plans (PMPs) prepared for Turkey Creek Projects.

The Turkey Creek project is authorized by Section 101(a)(24) of the Water Resources Development Act of 1999, Public Law 106-53 as amended by Section 123 of Division D of the Consolidated Appropriations Resolution, 2003, Public Law 108-7.

1.1.2 Documents for review. The project is in the implementation phase. The implementation documents are the plans, specifications, design analysis reports, and O&M manuals.

1.2 Requirement. This review plan is required by EC 1165-2-209 (31 JAN 10), which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision and implementation documents through independent review. The EC outlines three levels of review: District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR).

1.2.1 Address inquiries on the review plan to the contacts listed below:

District Quality Control

Kansas City District.....Ms. Melissa Corkill (816) 389-3697

ATR and IEPR

Review Management Office

Northwestern Division.....Mr. Steven Fink (503) 808-3824

Northwestern Division.....Mr. Kevin Crum (503) 808-4053
(509) 540-4578 BB

1.2.2 References.

- a. Engineer Circular 1105-2-408, Peer Review of Decision Documents, 31 MAY 05
- b. Engineer Circular 1105-2-410, Review of Decision Documents, 22 AUG 08
- c. Engineering Circular 1165-2-209, Water Resources Policies and Procedures: Civil Works Review Policy, 31 JAN 10
- d. Engineer Regulation 1105-2-100, Planning Guidance Notebook, 20 NOV 07
- e. Engineer Regulation 1110-1-12, Quality Management, 30 SEP 06
- f. US Army Field Manual 5-19, *Composite Risk Management*, 21 AUG 06

2.0 Review Documents Information

2.1 General. Turkey Creek is a relatively small urban stream that flows for about 15 miles in metropolitan Kansas City. Frequent flooding occurs along Turkey Creek. The project is a single purpose project – flood damage reduction. This project has two non-Federal sponsors: 1) Kansas City, Missouri (KCMO) and 2) The Unified Governments of Wyandotte County and Kansas City, Kansas (UG).

The Turkey Creek Project consists of several features that are being constructed and have been constructed as part of various construction contracts. The Turkey Creek Project can be divided into two major types of flood protection: 1) Turkey Creek Channel and 2) Hillside Interceptors. The Turkey Creek Channel consist of the following features which are at various stages from design through construction completion: Tunnel, Trapezoidal Channel, Levee/Berm, Environmental Enhancement, Walled Channel, Restored Channel, two railroad bridge relocations, and two auto bridge relocations. The Hillside Interceptors have not been constructed and will take water from an adjacent hillside and route it through underground stormwater pipes to Turkey Creek, reducing the flooding currently associated with the lack of hillside drainage. The Hillside Interceptors have been subdivided into smaller projects and are referred to as the following: Cherokee Interceptor, Rainbow Interceptor, Missouri Hillside Interceptors. The Mission Hillside Interceptor is currently a locally preferred plan that would be 100% funded by UG. For the purposes of this review plan, the Hillside Interceptors will be referred to as the Hillside Interceptors with no subdivision necessary as they are all similar in nature, design, use, and complexity.

The first construction project on Turkey Creek was the Turkey Creek Tunnel and was awarded in 2006 and completed in 2009. This same year the Operations and Maintenance Manual was completed and the tunnel turned over to the project sponsors. Also completed are the trapezoidal channel, one RR bridge relocation, and one auto bridge relocation. Near construction completion is the Turkey Creek Levee/Berm/Environmental Enhancement Area and the Turkey Creek Walled Channel. Yet to be designed and constructed is the restored channel area and the Hillside Interceptors.

The restored channel area consists of a railroad bridge relocation, a roadway bridge relocation (Mill Street Bridge), a berm, retaining walls, channel excavation, a flood gate and a flood warning system.

2.2 In-Kind Contributions. The project sponsors, KCMO and UG, completed the initial repairs on the Turkey Creek Tunnel which were authorized as work-in-kind credit towards the total project costs for Turkey Creek. This work was worth approximately \$5 million.

2.3 Site Description. Turkey Creek runs near Interstate I-35 through an urban area of Kansas City, Kansas. Turkey Creek empties into the Kansas River just after passing through the Turkey Creek Tunnel. The channel projects are all located along the Turkey Creek Channel within this urban area. The Hillside Interceptor project area extends generally east from Turkey Creek into the nearby hills that drain into Turkey Creek in Kansas City, Kansas and Kansas City, Missouri. The hillside drainage areas are fully developed urban and industrial area.

2.4 Implementation Documents. Implementation documents include the plans, specifications, design analysis report (DAR), and Operations and Maintenance Manuals. The purpose of implementation documents is to provide a detailed plan for construction. The plans, specifications, and DAR will be developed by a USACE project delivery team (PDT) or Architect/Engineering firms. Construction contractors are expected to complete the remaining construction. Operations and maintenance manuals are also completed by USACE PDTs or AEs.

2.4.1 Factors Affecting the Scope and Level of Review. This section addresses the factors necessary to determine the appropriate scope and level of review for these documents. This information is used by the PDT and vertical team to assess the appropriate level of review and types of expertise represented on the review teams. Following are factors considered in selecting the type of review.

2.4.1.1 Project Cost. The total cost of the Turkey Creek Flood Damage Reduction Project is authorized at \$92 million. No single construction project is expected to exceed \$15 million. As of 2011, Turkey Creek is approximately 50% complete with approximately \$40 million dollars yet to be obligated and expended. Remaining channel work is estimated at \$20 million and the Hillside Interceptors are estimated at \$20 million.

2.4.1.2 Factors considered but not deemed influential. The engineering employed to support the implementation documents is hydraulics, materials science, geotechnical evaluation, structural design, and civil engineering. The design and design methods in the implementation documents are not based on novel methods, do not present complex challenges for interpretation, do not contain precedent-setting methods or models, and do not present conclusions that are likely to change prevailing practices. This project does not have significant environmental impact, does not negatively change any visible aspect of Turkey Creek, disturbs no known cultural or historically significant sites, and has a small land-based construction area. Little to no public controversy has been encountered to date and none is expected.

3.0 Levels of Review.

3.1 There are three main levels of review considered for the Turkey Creek Project: 1. District Quality Control, 2. Agency Technical Review, and 3. Independent External Peer Review. Each level, and how it applies to the project, is explained below.

3.2 District Quality Control. DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is under review. Basic quality control tools used on the Turkey Creek Project include a Quality Management Plan providing for seamless review, peer quality checks and reviews, supervisory reviews, project delivery team (PDT) reviews, constructability reviews and established ISO certified Business Quality Practices (BQPs) used to ensure quality procedures are followed.

DQC efforts include the necessary expertise to address compliance with published Corps policy. When policy and/or legal concerns arise during DQC efforts that are not readily and mutually resolved by the PDT and the reviewers, the district seeks issue resolution support from Northwestern Division and Headquarters, U.S. Army Corps of Engineers (HQUSACE) in accordance with the procedures outlined in Appendix H, ER 1105-2-100 or other appropriate guidance.

DQC is required for all projects on Turkey Creek and is addressed later in this review plan.

3.3 Risk Informed Decisions on Appropriate Reviews. All work products undergo DQC and all implementation documents must undergo ATR. However, there is some level of judgment applied to determine if IEPR is required. Therefore, this RP includes documentation in Attachment 3 of the risk-informed decision on the IEPR level of review.

3.4 Agency Technical Review (ATR). ATR is an in-depth review undertaken to ensure the quality and credibility of the government's scientific information, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the

project/product. ATR is mandatory for all decision and implementation documents. The purpose of ATR is to ensure proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. ATR teams are comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team is selected from outside the Northwestern Division.

3.4.1 Required ATR Team Expertise. The ATR team consists of at least 4 members including the ATR team lead. The following paragraphs describe the list of required disciplines as well as the experience required by each of the ATR team members. ATR teams will be established for Turkey Creek's various projects. As the project progresses over the next six years, it is anticipated that ATR team members may change or be added. Prior to beginning each major feature listed in Table 1 the review team and lead will be evaluated and assignments made as necessary. See Table 5 for a list of current ATR team members.

3.4.1.1 Hydraulics. The Hillside Interceptor ATR team member will be an expert in the field of gravity and pressure pipe hydraulics, and be familiar with commonly used drainage features. The channel ATR team member may be the same as the Hillside Interceptors but should have strong experience in open channel flow in streams/creeks similar to Turkey Creek.

3.4.1.2 Structural. The Hillside Interceptor ATR team member should have experience in pipe design and shoring of existing features during construction. The channel ATR team member may be the same as the Hillside Interceptors but should have experience in structural channel walls.

3.4.1.3 Geotechnical. The Hillside Interceptor ATR team member should have experience in geotechnical investigations and shoring of existing features during construction. The channel ATR team member should have experience in channels, channel scour, and foundations.

3.4.1.4 Civil. The Hillside Interceptor ATR team member should be familiar with design and installation of gravity and pressure pipe in a municipal setting. The channel ATR team member should have experience in flood damage reduction projects including grading and utility work.

3.4.1.5 Other disciplines/functions involved in the project included as needed with appropriate experience and educational requirements.

3.4.2 Documentation of ATR. EC 1105-2-408 requires the use of DrChecks (<https://www.projnet.org/projnet/>) to document all ATR comments, responses, and associated resolution accomplished. ATR team members must register with the DrChecks website and they will receive access to DrChecks through the project manager. A PDT member is assigned to take the lead in resolving comments for each of the primary project disciplines. It is the PDT member's responsibility to coordinate resolution of the comment with other team members as required, evaluate the DrChecks comment, enter the PDT's response into DrChecks, and ensure the ATR team member conducts a comment backcheck. It is the PDT member's responsibility to ensure all DrChecks ATR comments in their discipline are properly addressed, resolved, and closed.

3.4.3 In some situations, especially addressing incomplete or unclear information, comments may seek clarification or try to assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the vertical team for resolution. Review Reports are considered an integral part of the ATR documentation and will:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

3.4.4 ATR Issue Resolution. ATR efforts include the necessary expertise to address compliance with applicable published policy. When policy and/or legal concerns arise during ATR that are not readily and mutually resolved by the PDT and the reviewers, the District will seek issue resolution support from the Northwestern Division and HQUSACE in accordance with the procedures outlined in ER 1105-2-100 (Appendix H), or other appropriate guidance.

3.4.5 ATR Completion. ATR is considered complete and certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. A sample ATR certification is included as Attachment 1.

3.5 Independent External Peer Review (IEPR). IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. Any work product that undergoes ATR may also undergo Type I and/or Type II IEPR. In general, decision documents undergo Type I IEPR and implementation documents undergo Type II IEPR (or Safety Assurance Review). Meeting the specific conditions identified for possible exclusions is not, in and of itself, sufficient grounds for recommending exclusion.

3.5.1 Type I IEPR. The Turkey Creek Project does not require Type I IEPR because it is in the implementation phase and does not contain decision documents.

3.5.2 Type II IEPR. A Type II IEPR is conducted to insure public health, safety, and welfare. The circumstances requiring a Type II IEPR are described in Appendix E of EC 1165-2-209. Each of those circumstances is explicitly considered in developing a risk-informed rationale for determining the appropriate level of review, including the need for a safety assurance review. Except for some specific features within the restored channel area, this project is not anticipated to require Type II IEPR because it does not pose a significant threat to public health, safety, or welfare. See attachment 3 for details regarding the Type II IEPR decision.

3.5.3 Type II IEPR Decision. Based on the analysis provided in Attachment 3, it is recommended that Type II IEPR be conducted on some specific features on Turkey Creek. Table 1 contains a summary of the types of reviews to be conducted on the Turkey Creek Flood Damage Reduction Project.

Table 1. Turkey Creek Flood Damage Reduction Project: EC 209 Review Levels

Project Implementation Document	DQC	ATR	IEPR II (SAR)	Notes
Tunnel - All	Completed	NA*	NA*	
Walled Channel Construction	Completed	NA*	NA*	
Walled Channel O&M Manual	Yes	Yes	No	
Levee/Berm Construction	Completed	NA*	NA*	
Levee/Berm O&M Manual	Yes	Yes	No	
Restored Channel Design and Construction	Yes	Yes	Yes	
Restored Channel O&M Manual	Yes	Yes	No	
Mill Street Auto Bridge Relocation by UG	NA**	NA**	NA**	
Hillside Interceptor Design, Construction and O&M Manuals	Yes	Yes	No	

*Project Features Constructed Prior to Review Plan

**Work is municipal bridge completed by project sponsor, UG. H&H as well as channel work in the area is considered part of the Restored Channel.

See Attachment 3 of this Review Plan for IEPR decision documentation.

3.6 Policy and Legal Compliance Review. The Kansas City District Office of Counsel is responsible for legal review of decision and implementation documents and signs a certification of legal sufficiency prior to construction of the project.

3.7 Model Certification/Approval. EC 1165-2-209 requires certification (for Corps models) or approval (for non-Corps models) of planning models used for all planning activities. Because this project is in the implementation phase verification of models is not required.

4.0 Posting Review Plans.

4.1 District. The Kansas City District maintains a web site that hosts electronic versions of review plans for its studies/projects as well as a list of the current and active Review Plans with links to the documents. Northwestern Division and HQUSACE postings also link to the district's site. The district will establish a mechanism on their web site for allowing the public to comment on the adequacy of the RP, and will consider public comments on RPs. The RP is published on the Kansas City District's public internet site following approval by Northwestern Division. The Kansas City District website is located here: <http://www.nwk.usace.army.mil/index.cfm>.

4.2 Northwestern Division. Northwestern Division will post on its website, and update at least every three months, an agenda of RPs. The agenda describes all decision and implementation documents, the RP for each entry on the agenda, and provides a link from the agenda to each document made public. The Northwestern Division's website is located here: <http://www.nwd.usace.army.mil/home.asp>

5.0 Review Schedules and Costs

5.1 DQC Schedule and Cost. DQC, which includes peer reviews and a biddability, constructability, operability, and environmental (BCOE) review, will be accomplished within NWK. The entire DQC process is intertwined with project execution and will add approximately 2 to 3 months to a typical Turkey Creek implementation finished product such as plans and specs or O&M manual. Cost of DQC is approximately 5% to 10% of design fees. Turkey Creek PMPs contain detailed schedules and costs for DQC including peer reviews, ATR, and BCOE.

5.1.1 Peer Reviews. Prior to ATR, all implementation documents will receive a peer review. The peer review is conducted by a peer in the same discipline and double checks calculations, assumptions, and other design details used in the design and specifications.

5.1.2 ATR. US Army Corps of Engineers experts will examine the processes and assumptions used in the design. Prior to BCOE, all ATR comments will be considered and resolved. ATR review disciplines are listed in Table 4.

5.1.3 BCOE. The BCOE review reviews all aspects of the documents used to bid for a construction contract to ensure they will result in a biddable and constructible project. BCOE occurs prior to advertising the contract for bids. The BCOE review disciplines are listed in Table 5.

5.1.4 Certification of Technical and Legal Review. Also prior to awarding the contract, the implementation documents will receive a certification of technical and legal review from the Kansas City District's Office of Counsel. Turkey Creek's decision documents have already undergone a review for legal sufficiency in regards to the National Environmental Policy Act and it is not anticipated that this will be required again for Turkey Creek's Implementation Documents.

5.2 ATR Schedule and Cost. ATR will be accomplished outside of NWK. The ATR process takes about 1 to 2 months spread out over the project duration for a typical Turkey Creek project. Following is the typical schedule for a Turkey Creek ATR review. This schedule applies to each final product and not interim submittals sent to the ATR team such as a 35% design:

5.2.1 ATR Schedule

Review documents and charge sent to ATR Team	D
ATR DrChecks comments complete	D+14
ATR draft report	D+19
Interim review meeting	D+20
DrChecks evaluations complete	D+25
PDT completes revisions	D+30
ATR backchecks complete; DrChecks closed	D+30
ATR signs certification form	D+30
ATR final report	D+35
Report sent to NWD for approval	D+35
Report approved by NWD	D+40

5.2.2 ATR Cost. Following are the estimated costs for ATR per project/contract:

Table 2. ATR Costs

Discipline	Estimated Labor Cost
ATR Team Lead	\$15000
Supporting Disciplines	\$5000 ea. @ 4 ea. =\$20,000
TOTAL	\$35,000

5.3 IEPR Schedule and Cost.

IEPR will be accomplished outside of the US Army Corps of Engineers on the selected features of Turkey Creek. IEPR is expected to add 3 months to finalizing each Turkey Creek product for which IEPR has been determined applicable. IEPR is expected to cost \$150,000 for Turkey Creek.

5.4 Model Certification/Approval Schedule and Cost. Model certification is not applicable to Turkey Creek implementation documents.

6.0 Public Participation.

Public comments are welcome on the review plan. The review plan is posted on the Kansas City District's web page located here: <http://www.nwk.usace.army.mil/index.cfm>. The public comment period is 30 days. The Kansas City District will consider public comments and recommend changes to the review plan if necessary to the Northwestern Division. Significant and relevant public comments will also be provided to reviewers prior to conduct of the review. Also, due to changes in the project, the review plan may require updates. Updates are posted to the same website and the Public will have a similar opportunity to comment on review plan updates. The Public, including scientific or professional societies, is not asked to nominate potential reviewers. Public comments on the review plan may be made by writing or emailing the following contact:

Kansas City District, Corps of Engineers
 c/o Melissa Corkill, CENWK-PM-CJ
 601 E. 12th St.
 Kansas City, MO 64106
 Email: melissa.r.corkill@usace.army.mil

7.0 Review Teams.¹

Table 3. Project Delivery Team

The people listed here work on some or all of the Turkey Creek projects discussed in this review plan.

Name	District	Discipline
	CENWK	Project Management
	CENWK	Civil
	CENWK	Civil
	CENWK	Civil

¹ Names will be removed in version posted for public review to protect privacy.

	CENWK	Civil
	CENWK	Geotechnical
	CENWK	Geotechnical
	CENWK	Geotechnical
	CENWK	Hydraulics
	CENWK	Hydraulics
	CENWK	Structural
	CENWK	Structural
	CENWK	Structural
	CENWK	Geology
	CENWK	Cost Estimating
	CENWK	Specifications
	CENWK	Construction Management
	CENWK	Real Estate
	CENWK	Legal

Table 4. Agency Technical Review Team

ATR teams will be identified as the projects are developed. Below is a table established for the Cherokee Interceptor Design.

Name	District	Discipline
	CEMVP	Geotechnical
	CEMVP	Structural
	CELRH	Hydraulics
	CEMVP	Civil

Table 5. BCOE Reviewers

Name	District/Section	Discipline
	CENWK-ED	Engineering, Division Chief
	CENWK-CD	Construction, Division Chief
	CENWK-CD	Construction Branch Chief
	CENWK-ED-G	Geotechnical Branch Chief
	CENWK-ED-D	Design Branch Chief

Table 6. Drawings Approval for In-House Design

Name	District/Section	Discipline
	CENWK-ED	Engineering Division Chief
	CENWK-ED-H	Hydrologic Branch Chief
	CENWK-ED-G	Geotechnical Branch Chief
	CENWK-ED-D	Design Branch Chief

Attachment 1: ATR Certification

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the [product type & short description of item] for [project name and location]. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks_{SM}.

SIGNATURE

[Name]

Date

ATR Team Leader

[Office Symbol or Name of AE Firm]

SIGNATURE

[Name]

Date

Project Manager (home district)

[Office Symbol]

SIGNATURE

[Name]

Date

Review Management Office Representative

[Office Symbol]

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

[Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

[Name]

Date

Chief, Engineering Division (home district)

[Office Symbol]

Attachment 2: IEPR Decision Documentation

1.0 According to EC 1165-2-209, the vertical team make a risk-informed decision to conduct Type II IEPR or make a recommendation to the Chief of Engineers to not conduct Type II IEPR.

2.0 The following table, based on Field Manual 5-19, *Composite Risk Management* was used to assess each risk in the IEPR tables.

Table A-1. Risk Assessment Matrix

	Risk Probability			
Risk Severity	Frequent	Likely	Seldom	Unlikely
Catastrophic	Extremely High	Extremely High	High	Moderate
Critical	Extremely High	High	Moderate	Low
Marginal	High	Moderate	Moderate	Low
Negligible	Moderate	Low	Low	Low

3.0 The following tables detail the risks, frequency, severity, risk assessment, and how the risk contributes to the IEPR decision for each major portion of the Turkey Creek Project.

Table A-2. Turkey Creek Hillside Interceptors.
Type II IEPR Risk Assessment (Implementation Documents)

Risk	Risk Probability	Risk Severity	Risk Assessment	Risk Contributes to IEPR Decision?	Notes
Project poses a significant threat to human life	Unlikely	Catastrophic	Moderate	No	The completed project will have a negligible effect on the threat to human life.
Project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices	Unlikely	Marginal	Low	No	This project does not involve any innovative materials or techniques based on novel methods or complex challenges.
The project design requires redundancy, resiliency, and robustness to minimize risk of failure	Unlikely	Marginal	Low	No	This project does not require redundancy, resiliency or robustness
The project has unique construction sequencing or a reduced or overlapping design construction schedule	Seldom	Negligible	Low	No	This project does not have unique construction sequencing
Risk of a faulty or incomplete design making it to construction	Seldom	Marginal	Moderate	No	DQC and ATR by personnel with experience on similar projects will mitigate the risk of faulty or incomplete design
Risk of contractor misinterpreting design which results in project failure	Unlikely	Marginal	Moderate	No	Construction quality control procedures will mitigate this risk.

Based on the above assessment, as well as the fact that the project is limited in scope and impact that it would not significantly benefit from Type II IEPR, it is the risk-informed decision of the vertical team that **Type II IEPR is not required for Turkey Creek Hillside Interceptors**. The Turkey Creek Hillside Interceptors are storm water pipes that act just like municipal storm water collection systems except that the flows intercepted are limited to flows entering above the 1% flood elevation and are designed to intercept flows that would normally reach the "State Line Ponding Area". The State Line Ponding Area is a commercial area along Southwest Blvd that consists of restaurants, retail stores, and industrial sites.

Table A-3. Turkey Creek Operations and Maintenance Manuals
Type II IEPR Risk Assessment (Implementation Documents)

Risk	Risk Probability	Risk Severity	Risk Assessment	Risk Contributes to IEPR Decision?	Notes
Project poses a significant threat to human life	Unlikely	Catastrophic	Moderate	No	The completed project will have a negligible effect on the threat to human life.
Project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices	Unlikely	Negligible	Low	No	This project does not involve any innovative materials or techniques based on novel methods or complex challenges.
The project design requires redundancy, resiliency, and robustness to minimize risk of failure	Unlikely	Negligible	Low	No	This project does not require redundancy, resiliency or robustness
The project has unique construction sequencing or a reduced or overlapping design construction schedule	Seldom	Negligible	Low	No	This project does not have unique construction sequencing or other construction sequencing to consider
Risk of a faulty or incomplete design making it to construction	NA	NA	NA	No	Design and construction faults are not applicable to O&M manuals
Risk of contractor misinterpreting design which results in project failure	NA	NA	NA	No	Design and construction faults are not applicable to O&M manuals

Based on the above assessment, as well as the fact that the project is limited in scope and impact that it would not significantly benefit from Type II IEPR, it is the risk-informed decision of the vertical team that **Type II IEPR is not required for Turkey Creek Operations and Maintenance Manuals.**

Table A-4. Turkey Creek Restored Channel Type II IEPR Risk Assessment (Implementation Documents)

Risk	Risk Probability	Risk Severity	Risk Assessment	Risk Contributes to IEPR Decision?	Notes
Project poses a significant threat to human life	Unlikely	Catastrophic	Moderate	Yes	The completed project will have some effect on the threat to human life. This is a flood damage reduction project in an urban area.
Project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices	Unlikely	Marginal	Low	No	This project does not involve any innovative materials or techniques based on novel methods or complex challenges.
The project design requires redundancy, resiliency, and robustness to minimize risk of failure	Seldom	Critical	Moderate	Yes	Mill Street closure mechanism may need some redundancy to prevent the public from crossing the bridge during some storm events.
The project has unique construction sequencing or a reduced or overlapping design construction schedule	Seldom	Marginal	Moderate	Yes	The 4.4 RR bridge may require specific sequencing to minimize an increased risk of flooding during construction.
Risk of a faulty or incomplete design making it to construction	Seldom	Marginal	Moderate	No	DQC and ATR by personnel with experience on similar projects will mitigate the risk of faulty or incomplete design
Risk of contractor misinterpreting design which results in project failure	Unlikely	Catastrophic	Moderate	No	Construction quality control procedures will mitigate this risk.

It is the risk-informed decision of the vertical team that **Type II IEPR is recommended for Turkey Creek Restored Channel implementation documents**. This decision is based on the following:

1. The above assessment.
2. Due to height restriction below the I-35 bridge, the relocated Mill Street bridge will overtop during a 10 % flood event. The flood gate across Mill Street, when closed, will prevent a 1% storm event from escaping the channel. Traffic control devices/structures will be required to prevent traffic from crossing the bridge during more frequent storm events as the bridge will be inundated more frequently than the need for the flood gate to be closed. The life safety risk inherent with a bridge that is flooded as frequently as during a 10% flood event is possible cause for IEPR review.
3. During construction of the new 4.4 Railroad bridge over Turkey Creek and before the old bridge can be demolished, the floodway along Turkey Creek will change such that a 1% storm event could cause some flooding in areas not currently flooded by Turkey Creek. These areas are industrial and don't constitute a large area. The sequence of construction and concern for increased flooding during construction is possible cause for IEPR review.
4. The impacts to the I-35 bridge foundation caused by increased flow within Turkey Creek should be evaluated. The bridge supports are located within the 1% storm event area and will see increased flows over before project conditions. Scour potential will be evaluated in this area and is possible cause for IEPR review.