APPENDIX B

RESPONSES TO COMMENTS ON DRAFT LICENSE APPLICATION

Scott's Mill Hydropower Project

FERC Project No. 14867

APPENDIX B

RESPONSES TO COMMENTS ON DRAFT LICENSE APPLICATION

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
March 8, 2018

OFFICE OF ENERGY PROJECTS

Project No. 14867-000 – Virginia
Scott's Mill Hydroelectric Project
Scott's Mill Hydro, LLC

Scott's Mill Hydro, LLC
Attn: Mark Fendig
P.O. Box 13
Coleman Falls, VA 24536

Re: Staff Comments on Draft License Application for the Scott's Mill Hydroelectric Project

Dear Mr. Fendig:

On February 8, 2018, you filed a draft license application (DLA) with the Federal Energy Regulatory Commission for the proposed 4.5-megawatt Scott's Mill Hydroelectric Project. We have reviewed the DLA, and provide our comments in the enclosed Schedule A.

If you have any questions concerning this letter, please contact Jody Callihan at (202) 502-8278 or jody.callihan@ferc.gov.

Sincerely,

John B. Smith, Chief
Mid-Atlantic Branch
Division of Hydropower Licensing

Enclosures: Schedule A

Schedule A
Project No. 14867-000

General Content Requirements

1. Section 4.38(g)(1) of the Commission's regulations requires an applicant to publish, at least 14 days in advance of the joint agency meeting, a notice of the purpose, location, and timing of the joint meeting in a daily or weekly newspaper published in each county in which the proposed project is situated. There is no proof of this newspaper notice in the public record for this proceeding under docket number P-14867. Therefore, when you file the Final License Application (FLA), please include, in the consultation record, proof of publication for the newspaper notice of the joint agency meeting.

FERC 1

2. Pursuant to section 4.38(b)(3)(i)(3) of the Commission's regulations, an applicant must file with the Commission, at least 15 days in advance of the joint agency meeting, an agenda for the meeting which indicates the time and place of the meeting and issues that will be discussed. No agenda has been filed in the public record for this proceeding under docket number P-14867. If the agenda was filed under the prior proceeding for this project (under docket number P-14425), please re-file the agenda for the joint agency meeting under the correct docket number P-14867.

FERC 2

3. Under section 307(c)(3)(A) of the Coastal Zone Management Act, 16 U.S.C. § 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the Coastal Zone Management agency concurs with the license applicant's certification of consistency with the state's Coastal Zone Management Act program, or the agency's concurrence is conclusively presumed by its failure to act within 6 months of its receipt of the applicant's certification. On page E-12 of the draft license application (DLA), you state that the proposed project would be located outside of Virginia's Coastal Program Resource Management Area, but did not indicate that you consulted with the Virginia Department of Environmental Quality (Virginia DEQ) to confirm this, nor did you document that you self-certified. Although the project may not be located in a coastal zone, the project discharges flow into the Chesapeake Bay via the James River. Therefore, the project could affect the coastal zone. To help staff determine the effects of the project on Virginia's designated coastal zone, please consult with Virginia DEQ on whether the project would affect the coastal zone and what steps you need to take, if any, to comply with the state's coastal zone management program. In the FLA, please provide a copy of your correspondence with, and any responses from, Virginia DEQ.

FERC 3

General Comments

FERC-4 4. When you file the FLA, please use project number P-14867 throughout the document (including any appendices such as study reports) when referring to this project instead of P-14425, which was the docket number for a prior project at this site under a different applicant.

FERC-5 5. Several study reports are included as appendices in the DLA, including those for the: mussel survey, terrestrial habitat assessment, and phase II architectural survey. However, the DLA contains no study reports for the following studies that were conducted as part of your study plan developed through consultation with project stakeholders: (1) Assessment of Pre- and Post-Project Water Levels Upstream and Downstream of Scott's Mill Dam, (2) Bathymetric Survey, (3) Water Quality Study, (4) Sediment Chemical Analysis, (5) Impoundment Fish Species Presence, (6) Evaluation of Entrainment Potential and Turbine Passage Survival, (7) Project Effects on Fish Habitat, (8) Evaluation of Fish Passage, (9) Wetlands Assessment, (10) Recreation Resources Study, and (11) Visual Resources Study. In the FLA, please provide a complete study report for each of these 11 studies—each report can be included as a separate appendix. Similar to the report you provided for the mussel survey, a complete study report should include an introduction section that provides background on the issue being addressed; a method section that includes sampling location maps, a description of your methodology, sampling instrumentation used, and an explanation of any calculations; a results section; and a discussion section focused on associated project effects. These completed study reports are necessary so that staff can better interpret the results of the completed studies and enable us to assess potential effects of the construction and operation of the proposed project on various resources.

FERC-6 6. Appendix D includes a complete listing of all water quality standards for the entire state of Virginia. Many of these water quality parameters and locations do not pertain to the Scott's Mill Project. Therefore, when you file the FLA, please consider deleting, or at least consolidating, this information to only include those water quality standards [e.g., temperature, dissolved oxygen (DO), pH, and PCBs] that are relevant to the proposed Scott's Mill Project in terms of location and project operation.

Exhibit A – Project Description and Proposed Mode of Operation

FERC-7 7. Several of your proposals including mode of operation, turbine choice, and the number, type, and location of fishways to be installed at the project do not appear to be finalized at this time. For instance, you propose to operate the project in run-of-river mode, but on page A-4, state that "…a future option would be to operate the Scott's Mill Project in conjunction with the upstream Reusens Project, which operates as a peaking

project...." It is also unclear which type of turbines you propose to install at the project. On page A-3, you state that "...for the purposes herein, you would install LPS/Rickly axial flow turbine units...but may reconsider the use of Natel's hydroEngines...." Regarding fishways, it is unclear whether a vertical slot fishway, nature-like fishway, or trap and transport would be utilized at the project in addition to the proposed eel ramp(s). Please note that for the purposes of our analysis under the National Environmental Policy Act (NEPA), we must be able to evaluate and analyze the potential effects of the proposed project on various resources, which requires a specific proposal from the applicant regarding the facilities they propose to install and maintain at the project and how the project would be designed and operated. Therefore, in the FLA, please specify a proposed mode of operation, the type of turbines you propose to install, and the number, type, and location of fishway(s) you propose to install at the project. If a license is issued for the project, potential future changes to the operation or design of the project (e.g., changing to the Natel turbines or coordinating project operation with Reusens) could be addressed through the Commission's license amendment process.

FERC-8

8. On page A-2 you state that a 2-foot-high concrete cap would be added to the main spillway, which is 735 feet in length, to help divert water to the opposite side of the river (river right[1]) where the arch dam (140 feet in length) is currently located. However, throughout the consultation record in Appendix A, flashboards, rather than a permanent concrete cap, are presented as an option for diverting flow to the proposed powerhouse. Therefore, please clarify whether you propose to add a 2-foot-high concrete cap to the main spillway, or the flashboards described in Appendix A.

FERC-9

9. When you file the FLA, please specify in Table A-2, the minimum and maximum capacity of each individual turbine unit as well as the minimum and maximum hydraulic capacities of the plant, as required by section 4.61(c)(1) of the Commission's regulations.

FERC-10

10. In Table A-3 you indicate that the plant would be shut down at a flow of 25,100 cubic feet per second (cfs). However, the flow range over which the plant would operate is not specified. Therefore, in the FLA, please indicate the lowest flow at which the plant would start operating (brought online) and the high flow at which the plant would shut down.

FERC-11

11. Section 4.61(c)(9) of the Commission's regulations requires a statement of measures taken or planned to ensure safe management, operation, and maintenance of the project. In the FLA, please provide a more detailed statement of measures taken or planned to ensure the safe management, operation, and maintenance of the proposed

[1] River orientations (left and right) reference the side of the river when looking downstream.

project.

FERC-12 12. On page A-6, you state that the project will be operated "…by an experienced company that operates four other hydropower project on the James River." In the FLA, please specify the company that would operate the project.

FERC-13 13. The map provided in Figure A-1 is small and the text is difficult to read. Please provide a more legible map in the FLA; also indicate on the map, which of the dams on the James River are breached, notched, and/or have fish passage facilities (if so, what type) as this would aid staff's analysis of the need for fish passage in our NEPA document.

FERC-14 14. In the FLA, please include a legend for Figure A-19 that indicates what the two blue lines and set of dots represent.

FERC-15 15. Section 4.61(c)(8) of the Commission's regulations requires a detailed single-line electrical diagram. You state that a detailed single-line electrical diagram will be provided in the FLA. Please provide a detailed single-line electrical diagram in the FLA.

Exhibit E – Environmental Resources

Need for Power

FERC-16 16. On page E-5, you state a need for power. However, your statement is insufficient to prepare a NEPA document. In the FLA, please provide more details regarding the need for power.

Environmental Measures

FERC-17 17. On page E-8, you list as a proposed environmental measure to "…provide up to a ½-inch veil of water over the dam, to preserve downstream environmental water quality." In the FLA, please explain how this measure could be achieved given that the proposed project would involve two uncontrolled spillways (the main spillway and the arch dam), neither of which currently, or are proposed to contain, gates or water control structures.

FERC-18 18. As stated on page E-52, you indicate that about 50 percent of the turbine discharge would be directed towards the east side of the river (river left) below the main spillway. If this is a proposed environmental measure, please list it as such in the *Environmental Measures* section of the FLA (currently section 4.2.2 in the DLA) and provide further details on how this measure would be implemented (i.e., how turbine flow would be directed towards the left side of the river below the main spillway).

Geology and Soils

FERC-19 19. Throughout the DLA, you indicate that "best management practices" would be used to mitigate erosion and control sediment during the construction of the project. However, given the extent of proposed construction and excavation activities, please provide a more detailed explanation of the actual measures you would take to control erosion, sediment mobilization, and turbidity during each of the following activities: (1) the removal of up to 0.25 acre of land from the southern tip of Daniel Island to increase flow to the powerhouse, (2) the removal and dismantling of the top 4 to 10 feet of the existing arch dam, (3) construction of the new powerhouse, and (4) excavation of a tailrace channel to accommodate the turbine units.

Sediment Chemical Analyses

FERC-20 20. Please explain in the FLA why no sediment samples were taken from the proposed downstream tailrace excavation area as proposed in study plan 4. On page E-132, you state there may not be enough sediment in this downstream area for a deeper composite sample, but that a surficial sample would still be taken.

Monthly Flow Duration Table

FERC-21 21. The period of record for the flow data presented in table E-6-1 is from 1928-2002, for the Holcomb Rock gage. However, more recent data is also available from this gage for years 2003-present. Therefore, please re-calculate the statistics in this table using the entire flow record for the Holcomb Rock gage (i.e., from years 1928-present); provide the updated table in the FLA. Also, please ensure that the flow duration curves (annual and monthly) presented in figures A-6 through A-18 of the DLA are based on the entire flow record for the Holcomb Rock gage (i.e., 1928-present).

Pre- and Post-Project Water Elevations

FERC-22 22. In applying the weir equation to predict changes in upstream water elevations resulting from the addition of a 2-foot-high concrete cap on the main spillway, you assumed a constant discharge coefficient (C) of 3.5 across flows of 700 cfs to 255,000 cfs. However, it appears that the discharge coefficient varies considerably across flows and is not constant, which could affect your estimates and assessment of post-project changes in upstream headpond elevations. As a case in point, staff used the weir equation to calculate the discharge coefficient for each flow (table A-3) at which you

measured headpond elevations. Staff used the equation $C=[Q/(L*H^{1.5})]$ where C is the discharge coefficient, Q is flow, L is the length of the main spillway (735 feet), and H is the height of water above the existing dam crest. Based on these calculations, the discharge coefficient ranged from 1.3 to 4.3 across the flow range of 700 cfs to 25,100 cfs. Therefore, please provide in the FLA your rationale for assuming a constant discharge coefficient across the flow range of 700 cfs to 255,000 cfs; or, if you opt to utilize a flow-specific discharge coefficient (which appears more appropriate in this case), then please re-calculate and provide new estimates of post-project headpond elevations.

FERC-23 23. In applying the weir equation to estimate post-project headpond elevations, it appears that you have assumed that when the project would be operating, there would be no flow over the main spillway and that all flow (up to 4,500 cfs, or the maximum hydraulic capacity of the project) would be diverted through the powerhouse. In the FLA, please confirm this assumption and provide a more detailed explanation of all calculations involving the weir equation.

FERC-24 24. Staff were not able to locate, on the web, a copy of the 2008 FEMA Flood Insurance Study for the City of Lynchburg that you used, in part, to estimate potential changes in water elevations due to construction and operation of the proposed project. Please include a copy of this FEMA report with the FLA filing.

Bathymetry Survey

FERC-25 25. During first-stage consultation, Virginia Department of Game and Inland Fisheries (Virginia DGIF) recommended that the bathymetry survey extend upstream (from Scott's Mill Dam) to the base of Reusens Dam and downstream to the mouth of Blackwater Creek. Although neither of these features are labeled on figures E-6-1 or E-6-2, it appears the survey did not cover the stretch of river (especially downstream) that Virginia DGIF recommended for sampling. Please explain this discrepancy in the FLA.

FERC-26 26. The figure legends in figures E-6-1 and E-6-2 are cut off and not readable. Please ensure these legends are readable in the FLA.

Water Quality

FERC-27 27. The water quality data provided in the DLA are insufficient to characterize existing baseline conditions at the project and evaluate the potential effects of project operation on upstream and downstream water quality. Only two days of water quality

sampling were conducted in the reservoir—one day of continuous monitoring with a sonde (September 9, 2016) and one day of vertical profile collections (September 12, 2016). This level of effort is insufficient to capture daily variations in water quality (e.g., temperature, DO) that occur due to weather changes and/or peaking operations of the Reusens Project which is immediately upstream of the proposed Scott's Mill Project. Furthermore, it is unlikely that the existing water quality data from nearly 1 mile downstream of the project (at Percival's Island) is representative of conditions immediately downstream of Scott's Mill Dam, as noted by Virginia DGIF. Accordingly, please provide in the FLA, any available water quality data that is based on longer-term sampling and is representative of existing conditions at the proposed project site. If such data are not readily available, then Commission staff may request, during our review of the FLA, a water quality monitoring study be conducted during the low-flow, high-temperature season.

Fisheries Data

FERC-28 28. On page E-54 you note that American eel catch-per-unit effort (CPUE) data are available for locations immediately upstream and downstream of Scott's Mill Dam. In the FLA, please provide these site-specific catch data (i.e., for the reservoir and immediately downstream of Scott's Mill Dam) for eels and any other key migratory or resident fish species (e.g., American shad, smallmouth bass) along with any available size distribution data. This information will aid staff's assessment of entrainment mortality and the need for fish passage at the project.

Entrainment Mortality

FERC-29 29. Please re-calculate your turbine survival estimates based on the characteristics of the specific turbine units (rotational speed, runner diameter, etc.) that you intend to install at the proposed project. Please include these project-specific estimates of turbine survival in the entrainment report that is submitted with the FLA.

Fish Passage

FERC-30 30. On page E-160, you state that a "Hydro Fish Passage Initial Assessment Report" was prepared for the proposed Scott's Mill Project by Alden. Please include a copy of this report in the FLA.

Terrestrial Resources

FERC-31

31. On page E-7 of the DLA, you state that you intend to dredge an existing channel at the southern end of Daniel Island, just upstream of the dam, to allow flow from the main channel to the proposed powerhouse. You state that dredging dimensions have yet to be finalized, but the width of the channel is expected to be about 130 feet with a length of about 100 feet. So that staff can better understand the effects this dredging will have on terrestrial resources and wetlands, please provide, in the FLA, a map that labels the existing channel, the vegetation around the channel, and the location of any wetlands near the channel. Also, please describe how the dredging will occur and where the dredged material will be disposed.

FERC-32

32. In study plan 10 (pages 34-38), you state that a Wetland Assessment will be completed and that includes wetland maps and an impact assessment. In section 6.3.4.1.1, *Wetlands*, of the DLA, you state that the U.S. Army Corps of Engineers has verified the presence of a jurisdictional wetland area on Daniel Island and that some portions of the alluvial island downstream of Scott's Mill Dam may be potentially jurisdictional wetlands (though much of the island is rocky).[2] However, the DLA does not include the results of the proposed Wetland Assessment, including the wetland maps and impact assessment. So that staff can analyze the effects of the proposed project on the identified wetlands, please provide, in the Wetlands Study Report filed as part of the FLA, the results of the Wetland Assessment, including the described wetland maps for wetlands located both upstream and downstream of Scott's Mill Dam.

FERC-33

33. On page-360, you state how much shoreline upstream of the dam would experience increased inundation if 3-foot-high flashboards were added to the main spillway and that the amount of inundation would decrease or 'taper' with increased distance (upstream) from the dam. If your final proposal is to add a 2-foot-high concrete cap to the main spillway rather than flashboards, please re-calculate the inundation levels upstream of the dam based on the 2-foot-cap and also provide an accompanying map, as part of your Wetlands Study Report in the FLA, that illustrates how shoreline inundation would decrease as a function of distance upstream from the dam.

Threatened and Endangered Species

FERC-34

34. In section 6.3.5 of the FLA, *Threatened and Endangered Species*, you state that the northern long-eared bat, a species listed as threatened under the Endangered Species Act, has the potential to occur in the vicinity of the project.[3] However, while you state on page E-62 that the project should not significantly reduce the extent of mature forest or

[2] Draft License Application, page E-60.
[3] *Ibid.*, page E-61.

alter natural hibernacula for bat species, you provide no information to support this claim, nor do you describe whether any northern long-eared bat habitat exists in the vicinity of the project. As required by section 4.61(d)(2) of the Commission's regulations, please provide, in the FLA, a description of any northern long-eared bat habitat located within the area studied for the terrestrial resources assessment. Also, please provide, in the FLA, any information on consultation with the U.S. Fish and Wildlife Service about the northern long-eared bat.

Recreation

FERC-35

35. On page E-66, you referenced studies of recreation use on the James River that were published in 1991 and 2000. However, recreation use and needs on this stretch of river may have changed in the past 20 years and the results of those studies may be obsolete. In your study plan, you indicated that you would conduct a recreation resources study in 2016 to assess the need for recreation enhancements, however, that study report was not included in the DLA. If you did complete the study please provide the final report in the FLA as requested in item 5 above.

If you did not complete the study, please provide your rationale. At a minimum, you should include in the FLA (1) a map and description of all regional recreation and existing recreation in relation to the project boundary, including who operates and maintains each site or facility; (2) recreation capacity and use at all project recreation sites and facilities, if available; (3) any agency-recommended recreation enhancements; (4) any proposed enhancements to existing recreation sites or facilities or new sites and facilities; (5) information on who would own and operate any proposed recreation sites; (6) the capital and annual cost of ongoing and proposed recreation operation and maintenance; and (7) an anticipated construction schedule. Please be advised that if staff is unable to describe the recreation sites and facilities and recreation use within the proposed project boundary and vicinity of the proposed project and assess potential project-related effects on existing and future recreation use and capacity at the project, staff may require a recreation assessment after review of the FLA. Typically, such an assessment would: (1) identify the condition of all informal and formal recreation sites and facilities within and or adjacent to the project boundary, including any erosion that may exist due to recreational use; (2) determine the current and projected capacity at each recreation site and/or facility; (3) identify who owns, operates, and maintains each recreation site and/or facility; (4) describe each recreation site and or facility in relation to the project boundary; and (5) conduct visitor surveys during the recreation season to determine the adequacy of project recreation facilities and if changes or upgrades are needed.

Further, on pages E-108 to E-111, the James River Association provides comments for enhancing public boating and fishing access, as well as providing trails,

camping, and historical interpretation. Please indicate if you propose to include any of these comments as proposed protection, mitigation, or enhancement measures in the FLA.

FERC 36. In the FLA, please describe how the construction of the project, and consequent removal of dam structures, would affect recreation access to the dam.

FERC 37. On pages E-67 and E-68, you describe boat access and other recreation sites along the stretch of river upstream of the project. Please provide a map in the FLA that indicates where these sites are located and where the public has access to the river.

FERC 38. On page E-68, you describe a private shoreline that the public uses as a popular shoreline fishing area. You further state that there is an informal parking area along River Road, adjacent to the dam. Is this parking area used to access the shoreline fishing described above? In the FLA, please indicate on a map where the shoreline fishing occurs, any facilities used to support fishing, and where the informal parking area is in relation to the shoreline fishing. Further, please describe who owns and maintains these sites and if you propose to own and maintain these properties during the term of any license issued for the project.

FERC 39. Similarly, on page E-70, you propose to "work with the private boat ramp owner" to provide public boat access. Is this the same land used for shoreline fishing? In the FLA, please indicate where this boat ramp is located and describe how you intend to acquire, or obtain the property rights to this land, and maintain the site during the term of any license issued for the project.

FERC 40. On page E-69, you state that landowners would be adversely affected by up to a 2-foot increase in elevation, relative to existing conditions, 5 percent of the time during high-flow conditions. However, you state that this would be mitigated by the steep shoreline. Please describe how landowners would be adversely affected by an increase in water elevation.

FERC 41. Please provide in the FLA a map indicating where the proposed fishing pier and canoe portage route, put-in, take-out, and parking areas, described on page E-70, are located in relation to proposed project facilities, and the river, within a clearly delineated proposed project boundary. Also, please provide in the FLA, an anticipated construction schedule for the proposed recreation sites, in the event a license is issued for the project.

Further, please describe the existing parking areas (i.e., paved, gravel, etc.) and how many vehicles and trailers they can accommodate. Please describe who owns and maintains the parking areas and who would own and maintain each proposed and existing recreation site throughout the term of any license issued for the project. You state that

you propose "to enter into an arrangement with Virginia DGIF and Virginia Marine Resources Commission (Virginia MRC) so that these facilities are managed by the state agencies." However, please note that because there is no guarantee that the state would maintain these sites during the term of any license issued for the project, the licensee would be ultimately responsible for maintaining any project recreation sites and facilities approved for the project.

FERC-42 42. In the FLA, please indicate if you propose to install any directional or informational signage at the existing parking areas and proposed portage and fishing pier, and indicate if there are any existing access paths, or if you propose to install any access paths connecting the parking areas with the proposed recreation sites.

FERC-43 43. On page E-70, you state that you propose to use metal for the take-out and put-in locations; however, this is unclear. In the FLA, please describe how metal would be used at these sites.

Land Use and Aesthetic Resources

FERC-44 44. On page E-71, you categorized the land use surrounding the project as a mixture of riparian, forested, and recreational. The descriptions are vague and do not provide enough detail to identify the land use within the proposed project boundary. Please include in the FLA the types of land use within the project boundary (i.e., industrial, urban, rural, forested, riparian, undeveloped, recreational, residential, etc.); the amount, in acres, for each category; and a map depicting land use categories. Also, please identify the percentage of lands within each category that is applicant-owned and privately owned.

FERC-45 45. On page E-69, you state that there would be a veil of water flowing over the dam 73 percent of the time that would be visible to private boat docks along River Road. However, on page E-70, you state that there would be a "small flow" over the dam 73 percent of the time and on page E-73, you state that there will be flow over the dam 22 percent of the time. In the FLA, please clarify, according to various flow levels, what percentage of the dam would be covered with overflow and how frequently that would occur. You further state that the reduced veil covering the dam 22 percent of the time would be more visually appealing than the veil flow. Please clarify how a limited flow would be preferred by viewers.

FERC-46 46. In the FLA, please elaborate on how you would construct the powerhouse to blend with the surrounding landscape, as stated on page E-73.

FERC-47 47. Construction of project facilities and partial removal of the arch dam have the potential for adverse effects on land use, aesthetic resources, and public safety especially

in developed areas. Specific areas of concern include the effects of construction-related traffic on: (1) road degradation; (2) property damage (i.e., residences located along any access roads); and (3) public safety, including residents and recreationists. So that staff can analyze these potential issues, the FLA should include a description of public road segments that could be affected by construction, including temporary road closures; the expected duration and frequency of such road closures; an assessment of potential construction noise; and any measures you propose to avoid or minimize disruptions to public use or access, particularly during busier public use periods (e.g., informational or warning signs, posted notices, limited hours or days of construction, alternate routes, location of staging areas, etc.). Further, please provide a map showing the location(s) of any temporary or extended road closures, sign locations, alternate routes, or staging areas that may affect public access to cabins or recreation sites near the project.

Cultural Resources

PBRC-48

48. On page E-114, the Virginia Department of Historic Resources (Virginia SHPO) concurred with the cultural resources study plan, filed with the revised study plan on February 8, 2018, which identifies a preliminary area of potential effects (APE) for the project. The results of the architectural portion of the cultural resources survey were included in the DLA and indicated that you surveyed only three known historic properties within the proposed APE, rather than surveying for any additional historic properties that could exist within the proposed APE.

Further, the proposed methodology that was/will be implemented to assess presence and eligibility of archaeological resources is vague. For example, the study plan states that you would conduct an archival review and reconnaissance survey, but it is unclear what sources you would reference for the archival review or if the reconnaissance survey would include a field inventory, soil tests, etc. In the FLA, please be specific about the methodology used/to be used to help staff best assess any effects on historic and archaeological resources.

Lastly, in your revised study plan, you indicate that the proposed APE is preliminary and that you would finalize the APE with the Virginia SHPO. Please be sure to also include the Delaware Nation in your consultation for determining the APE and appropriate survey methodology, and provide any documentation of consultation with both parties. Typically, you would ask the Virginia SHPO and Delaware Nation to agree, pursuant to section 106 of the National Historic Preservation Act, with the: (1) proposed project's APE, (2) results of any architectural and archaeological surveys, and (3) any potential effects that may occur to National Register-eligible historic properties. If the Virginia SHPO and Delaware Nation disagree with any of the proposed documents or effects, or if you do not agree with any of the correspondence that you receive, please

explain why in the FLA.

FERC-49

49. On page E-76, you state that you would conduct an archaeological inventory and assessment in late 2017 and early 2018. Please include this report in the FLA to help staff assess any adverse effects of the project on any cultural resources eligible for listing on the National Register. If this information is not available in the FLA, then staff may request that you: (1) identify the project site's APE;[4] (2) after consultation with the Virginia SHPO and Delaware Nation, conduct a Phase I pedestrian field inventory within the APE to locate any historic or archeological resources; (3) assess the National Register-eligibility of historic resources, including the project itself, or archaeological resources within the APE; (4) evaluate the potential effects the project would have on historic properties; (5) assess the condition of the area where any historic and archaeological sites are located for shoreline stability and evidence of erosion; and (6) ask the Virginia SHPO and Delaware Nation for concurrence with the results of the archaeological survey and any potential effects that may occur to any National Register-eligible archaeological resources.

FERC-50

50. The proposed project would include the Water Works Dam and Canal and James River Dam, which are eligible for listing on the National Register. The Water Works Dam and Canal is also a contributing feature of the James River and Kanawha Canal Sites, which was listed on the National Register in 1984. Please provide a copy of the architectural rendering provided in figure A-5 of the DLA to the Virginia SHPO and Delaware Nation for comments. Please include any comments you receive from the Virginia SHPO and Delaware Nation in the FLA and file a copy of the architectural rendering separately with the Secretary of the Commission. Label the first page of the filing "Privileged Information."

Exhibit F – General Design Drawings, Supporting Design Report

FERC-51

51. Section 4.41(g)(1) of the Commission's regulations requires that the drawings of Exhibit F show all major project structures in sufficient detail to provide a full understanding of the project, including: (1) plans (overhead view); (2) elevations (front

[4] The APE should, at a minimum, include the lands enclosed by the proposed project boundary including both in-water and on-shore project lands and facilities, and lands or properties outside the project boundary where project operation or other project-related activities may cause changes in the character or use of historic properties, if any historic properties exist. The APE should be developed after consultation with the Virginia SHPO and Delaware Nation. Once the APE is defined, please request that the Virginia SHPO and Delaware Nation concur with the APE prior to conducting any field surveys within the APE.

view); (3) profiles (side view); and (4) sections. In the FLA, please provide all Exhibit F maps according to section 4.41(g)(1).

FERC-52 52. An applicant must furnish a supporting design report that complies with section 4.41(g)(3) of the Commission's regulations and demonstrates that existing and proposed structures are safe and adequate to fulfill their stated functions. No supporting design report was filed with the DLA. Therefore, please provide the supporting design report in the FLA. Please note that section 4.41(g)(4) of the Commission's regulations requires the applicant to submit two copies of the supporting design report, described in paragraph (g)(3) of section 4.41, at the time preliminary and final design drawings are submitted to the Commission for review. If the report contains preliminary drawings, it must be designated a "Preliminary Supporting Design Report."

Exhibit G – Project Boundary Maps

FERC-53 53. Section 4.61(f) of the Commission's regulations requires, in part, that an application includes an Exhibit G with a map or series of maps that complies with section 4.41(h) that clearly shows the location of the project, relative locations and physical interrelationships of the principal project features, and a proposed project boundary that encloses all project works and features identified in Exhibit A. Pursuant to section 4.41(h)(2) of the Commission's regulations, the map(s) must show a project boundary enclosing all project works and other features described under paragraph (b) of Exhibit A that are to be licensed. In the FLA, please provide maps showing the principal features and project boundary including impoundments, continuous features (e.g., transmission lines, access roads), and non-continuous features (e.g., dams, powerhouses).

FERC-54 54. Section 4.39(a) of the Commission's regulations requires that Exhibit G maps and drawings be stamped by a registered land surveyor. There is no registered land surveyor's stamp on the G-1 map in the DLA. Therefore, all Exhibit G maps and drawings in the FLA must contain a stamp from a registered land surveyor.

FERC-55 55. Section 4.41(h) of the Commission's regulations requires an applicant to provide the project boundary data in a geo-referenced electronic format. Please provide this information in the FLA. In addition, each map and drawing must conform to section 4.39 of the Commission's regulations. Please review section 4.39 and make adjustments as necessary.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

March 7, 2018

Kimberly Bose
Secretary Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Draft Application For Original License For Major Water Power Projects 5 Megawatts Or Less Scott's Mill Dam Hydroelectric Project, FERC P-14867-000

Dear Secretary Bose:

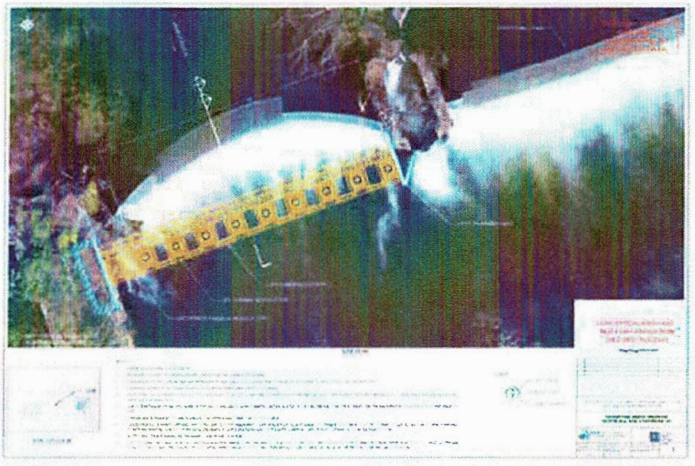
The U.S. Fish and Wildlife Service (Service) is pleased to submit comments to the Federal Energy Regulatory Commission (Commission) on the enclosed Draft License Application (DLA) for Scott's Mill Hydro, LLC (Applicant) No. 14867 (Project). This letter is submitted under the following statutory authorities; Fish and Wildlife Coordination Act as amended; Federal Power Act as amended; and Endangered Species Act as amended.

GENERAL COMMENTS

Project Description

The Applicant owns the Scott's Mill Dam on the James River along the borders of Amherst and Bedford Counties, Virginia. The Applicant also owns lands on both sides of the river necessary for constructing the power plant, fishway facilities and recreation enhancements. The Applicant proposes to install nine 54-inch turbine/generator units provided by Littoral Power Systems Inc. (LPS) and Rickly Hydrological Co., Inc. (Rickly). LPS is the provider of the Project's modular civil works and related subassemblies. The power plant will be constructed immediately downstream of the existing arch section of the dam on the right side of the river After construction of the power plant, a 2 to 3 foot high concrete cap was described in the studies that could be added to the existing dam. The turbines chosen for the proposed project includes nine 54-inch 0.5 MW LPS/Rickly axial flow turbine units (see photo of proposed turbines from DLA). The units rotate in the range of 60-400 revolutions per minute (rpm), where only the lowest rpm range would improve entrained fish survival.

Headpond water levels at a median flow of 2,000 cubic feet per second (cfs) are slightly greater than the normal 1-foot veil over the spillway crest, which is at elevation 514 feet. During low flows, the tail water elevation is approximately 499 feet, resulting in a potential gross head of about 15 feet. Construction of the Project is planned to start within 1 year of license issuance.



The proposed facilities would include the following: a new modular powerhouse containing nine generating units; a new 1,200-foot long underground transmission line; and three (3) appurtenant facilities, which include the addition of a 2 to 3 foot high concrete cap onto the existing spillway and raising the headpond elevation to about 517 feet.

Native American Tribe Consultation

On September 17, 2015, Jody Callihan, staff at the Commission, issued a letter initiating tribal consultation for the licensing process for the original Liberty Falls Hydroelectric Project No. 14425-000), and on December 20, 2017, Chelsea Hudock, from the Commission contacted Kimberly Penrod, the Director of Cultural Resources for the Delaware Nation (Nation). Ms. Penrod stated that the Nation would be interested in consulting on the project. In addition, the Tribal Historic Preservation Officers (THPO) at the Bureau of Indian Affairs comments on the draft license application are still pending. The Service supports the Applicant's efforts to contact the Native American tribes and the THPO as this can avoid any misunderstandings in the future.

USFWS #1. The Service supports the early drafting of license articles regarding the "Protection of Previously Undiscovered Cultural Resources." If the Applicant discovers previously unidentified cultural resources during the course of maintaining or developing project works or other facilities at the Project, the Applicant would stop all land-clearing and land-disturbing activities in the vicinity of the resource and consult with the Virginia State Historic Preservation Officer (VA SHPO) and potentially affected Native American tribes to determine the need for any cultural resource studies or measures. If no studies or measures are needed, the Applicant must file with the Commission documentation of its consultation with the VA SHPO and potentially affected Native American tribes.

SPECIFIC COMMENTS

Project Operations

USFWS #2. The Applicant proposes to place a 2 to 3 foot high concrete cap on the existing dam to maintain approximately the same water elevation as occurs during flow conditions comparable to the hydraulic capacity of the turbines (4,500 cfs). It is asserted that "the Project will not have any appreciable effect on pre- vs. post-construction water levels during a 100-year flood; this is because at very high flow rates, the Scott's Mill Dam is no longer a control point" (FEMA, 2008). There are no formal hydraulic studies that support this conclusion, as the increase in water

elevation will likely have an effect on the entire area in the impoundment. The islands located within the Scott's Mill Dam headpond include Daniel Island, Treasure Island and Woodruff Island. Harris Creek enters the James River from the north near Treasure Island, which will be partially or totally submerged. Native species noted in the DLA along the James River include canopy trees such as hackberry, red maple, tulip tree, American beech, eastern cottonwood, American sycamore, river birch, black walnut, box elder and silver maple. Vegetation in understory strata are shrubs, herbs, and vines that include spicebush, paw paw, pokeweed, sunflower, wood nettle, trumpet creeper, poison ivy, round leaf greenbrier, muscadine and Virginia creeper. These islands provide a diverse plant species mix and habitat for mammal, avian and invertebrate species. In addition, once the powerhouse is completed, portions of the islands upstream and downstream of the powerhouse section will be removed without coffer dams. These impacts on wetland and island habitats could amount to 100 acres or more in the total project area and potentially affect sensitive species in the area.

Recreational Fishing

USFWS #3.

The Service commends the Applicant for proposing to create additional recreational fishing opportunities by creating a canoe portage around Scott's Mill Dam on the left side of the James River and a fishing pier on the left side of the river downstream of the dam. In addition to these two items, if a nature-like fishway was created in the canal near the U.S. Pipe Company, this would also enhance recreational fishing, as well as provide ecological benefits and an educational opportunity. In the DLA, it is noted the Scott's Mill headpond offers little public opportunity for boating and fishing, because of the limited access and lack of public boat ramps. Limited angling takes place in the 316-acre headpond due to the lack of public access. To improve public boating access to the Scott's Mill headpond, the Service supports the Applicant's plan to work with the private boat ramp owner to determine how they could assist in providing additional public use of their boat ramps.

The DLA notes that fishing opportunities are available in the high quality habitat downstream of Scott's Mill Dam, near the Middle River and is characterized by high catfish abundance and migratory species that includes American eel, American shad and largemouth and spotted bass. Flathead and channel catfish abundance are also high. In October 2011, Virginia Department of Game and Inland Fisheries sampled the fish community in the James River at six locations between Columbia and Watkins Landings. Twenty-three species were collected. American eel was the most abundant species collected, followed by smallmouth bass, sunfish and channel catfish. Smallmouth bass were present at all six sampling sites. Redbreast sunfish and bluegill comprised the bulk of sunfish collected. Fish passage for American eel, sea lamprey and all other riverine fish will enhance fishing opportunities and improve river ecology.

USFWS #4.

The existing recreational fishing opportunities should be maintained and enhanced in the Scott's Mill headpond. The DLA states the project will continue to be run-of-river, with a possible future option to operate Scott's Mill in conjunction upstream with the Reusens Dam hydroelectric project with peaking operation. This condition would reduce or eliminate any natural downstream flows in Scott's Mill headpond. The Scott's Mill headpond would be controlled by the peaking flows from Reusens and only during power demand would water flow

through the Scott's Mill headpond. These low flow conditions can reduce the fishing opportunities to local anglers, as fish are less likely to feed during low flow periods. In addition, the DLA states a water level veil of least 0.5 inches will provide water quality benefits, so more analysis is likely needed regarding water level conditions in the headpond. If the veil is not properly calculated, dissolved oxygen could decrease by more than 0.5 mg/l, because of the reduced flows and reduced aeration. In addition, the DLA states the low flow effects will be more pronounced for the 50 to 100 feet immediately downstream from the dam. The DLA states, "downstream of the Scotts Mill Dam during certain low flow periods the velocities may decrease during project operations and it is difficult to predict exactly what effect the reduction in flows over the dam will be on fish habitat." In an effort to avoid and minimize the impacts to fishing and fish habitat, additional analysis is needed to better predict the flow conditions at the dam.

USFWS #5.

Fish Passage

In the DLA, the Applicant pledges to cooperate with resource agencies to expedite diadromous and resident fish restoration. The resource agencies, including the Service and VDGIF agree the priority is for American eel and sea lamprey passage into Scott's Mill headpond. This can be achieved by several methods and the agencies agree that passage is needed on both sides of the river. On the right side of the river in the former water canal system, the opportunity exists for a by-pass or nature-like fishway that would provide multi-species passage. Even though the DLA states the area is heavily impacted by U.S. Pipe Company, this option would likely be a low cost alternative. If the canal is used for fish passage, any discharge from the turbines should be directed to the downstream entrance to the canal as attraction flow. If a nature-like fishway is constructed using the water works canal, it is noted in the DLA that the Applicant will consult with the SHPO to determine the best approach for adaptive reuse of the historic canal.

USFWS #6.

The safe, timely and effective downstream migration of silver eels is the most important life stage for the American eel. The silver eel phase includes only female eels that carry an average of 9 million eggs. During downstream river migration, silver eels typically move at night during the darker moon phases, high water flows and decreasing water temperatures. The Service embraces the Applicant's vision to place guide vanes, as appropriate upstream of the turbine entrances to guide all fish to an overflow area where they can safely pass downstream.

USFWS #7.

The anadromous sea lamprey is among the 20 species of fish passed downstream at Bosher Dam. Adults can reach up to 4 feet in length and weigh up to 5 pounds. Sea lamprey migrate up rivers to spawn. After several years in freshwater habitats, the larvae undergo a metamorphosis that allows young lampreys to migrate to the ocean. After attaching on larger fish at sea, the adult lampreys migrate up the rivers to spawn, where they quickly die of natural causes and decompose, thus providing a food source for the native freshwater fish species.

Fish passage conditions and flows for upstream and downstream fish migration at the Scott's Mill Dam was reviewed by the Service's Fish Passage Engineers. Their initial comments are provided in the bullets below:

Upstream Fish Passage

USFWS #8.

The zone of passage (ZOP) for upstream migration encompasses a far-field attraction zone, a near-field attraction zone, the fish passage facility and the impoundment upstream of the barrier. A calibrated computational fluid dynamics (CFD) model can be used to inform fish passage solutions with a specific focus on assessing tailrace hydraulics to inform the design of a fish passage facility. It is recommended at this site that focus is placed on the tailrace (downstream of the proposed turbine units) as well as the bypass reach (downstream of the spillway) to ensure there is a fully connected (i.e., provides the appropriate depth and velocity) zone that allows fish passage to the toe of the dam post alterations. This information is critical to siting the fishway location in an area with the highest probability of functioning effectively.

USFWS #9.

A siting study to identify the location of highest density of migrating American eels and Sea lamprey is recommended for the proper site placement once project is constructed.

USFWS #10

For hydropower sites, Engineering expresses the attraction flow requirement as a fraction of the competing flows (e.g., turbine discharge). Specifically, engineering recommends that fishways be designed for a minimum attraction flow per fishway equal to 5 percent of the total station hydraulic capacity. In addition, Engineering's preference is that the entirety of the attraction flow be discharged through, or at, the fishway entrance(s). While adjacent turbine units can often be sequenced to attract fish to the fishway entrance, the discharge from the turbine is not generally used to meet, in whole or in part, the Service's attraction flow requirement. For the proposed Scott's Mill Dam hydropower facility, the Applicant states there will be a station hydraulic capacity of 4,500 cfs. Therefore, Engineering recommends a minimum of 225 cfs for attraction water flow. The location of the attraction flow, allocation (i.e., entirety through the fishway or partitioned differently) and orientation relative to the river is recommended to be integrated within the CFD model in order to determine the ideal means of supplying the attraction water flow. The Applicant anticipates approximately 25 to 50 cfs needed to operate such a facility, but as described above, additional attraction flow will be needed to meet current fish passage criteria.

Downstream Fish Passage

USFWS #11.

The ZOP for downstream migration encompasses a far-field attraction zone, a near-field attraction zone (within the impoundment and/or power canal), the fish bypass system and the tailrace (or surrounding river channel) downstream of the barrier. The islands located upstream of Scott's Mill Dam, including Daniel Island, Treasure Island and Woodruff Island, will have to be considered in the design of downstream passage in relation to ZOP. The current configuration does not allow downstream migrating fish to traverse the entirety of the length of the existing dam due to the island, which connects to the dam near the proposed turbine units.

USFWS #12.

The Service's Engineering Fish Passage Design Criteria does not consider fish moving through a turbine as an acceptable route, hence the need to prevent entrainment. The Applicant proposed 2 inch trash rack spacing. This spacing will not prevent downstream migrating American eel from traveling through the turbine units. Service Criteria recommends 3/4 inch spacing for full exclusion. Engineering also recommends that normal velocities should not exceed 2 feet per second (fps) measured at an upstream location where velocities are not influenced by the local acceleration around the guidance structural

members. Ancillary to the normal velocity, it is critical to the safe, timely and effective operation of the downstream bypass that the sweeping velocity (parallel to the intake racks) is equal to or greater than the normal velocity in order to guide the downstream migrants to the entrance of the downstream bypass.

USFWS #13.

- Engineering recommends the downstream bypass should be designed to pass a minimum of 5 percent of station capacity. Therefore, Engineering recommends a minimum downstream bypass flow of at least 225 cfs.

USFWS #14

- Nine 54-inch 0.5 MW Littoral Power Systems Inc. (originally manufactured by Rickly Hydrological Co., Inc.) axial flow turbine units that operate 60-400 rpm are proposed but not finalized. Engineering recommends a study be conducted to determine survival through the selected turbines, if full exclusion is not the chosen solution. A desktop analysis is not adequate.

Additional comments

USFWS #15.

- Reference is made to multiple vertical datums throughout the draft license application including Mean Sea Level (MSL), which is an obsolete datum and no longer supported. Engineering recommends that all elevations are referenced to North American Vertical Datum of 1988 (NAVD 88).

USFWS #16.

- The Scott's Mill flow duration curve was developed using 89 years of streamflow data (1927-2016). Engineering recommends that the period of record be no longer than 30 years and post-1970 due to climate change as stated in the Service's Fish Passage Engineering Design Criteria.

USFWS #17.

- The target species biological goals (sustained population) are to be determined by the resource agencies and will have a direct effect on the recommended fishway type as well as numerous design features.

USFWS #18.

- The operating range for which safe, timely and effective passage can be achieved is bounded by the low and high design flows. Engineering defines the design low and high flow as the mean daily average river flow that is equaled or exceeded 95 percent and 5 percent, respectively, of the time during the migratory period of record (MPOR) for target species normally present in the river basin and at the fish passage site. The MPOR is to be determined by resource agencies.

USFWS #19

- Engineering recommends that adjustable spillway gates be considered rather than the permanent 2 foot high concrete cap that is proposed. Adjustable gates offer many advantages for fish passage, including independent operation of gate sections, which would offer a potential downstream passage route and allow for adaptive management.

USFWS #20.

- The study plan reports should be separated and clearly labeled. The report titles and numbers do not match.

Endangered Species Act and Species of State Concern

USFWS #21

The DLA lists the protected species that occur within the Project area that includes the threatened northern long-eared bat (*Myotis septentrionalis*) and the James River spinymussel (*Pleurobema collina*). The Applicant conducted a mussel survey upstream and downstream of the dam and no federally endangered or State listed species were found.

The Applicant stated the proposed action will not result in clearing or damage to existing forested habitat. The Applicant intended to conduct a bat study, but following the Terrestrial Habitat Assessment determined that raising the dam height to 3 feet would essentially maintain existing water levels, and no bat habitat would be affected by the dam alteration and abandoned plans for the bat study. The Applicant concluded no further Section 7 consultation under the Endangered Species Act is required, even though the Terrestrial Habitat Assessment lacks any hydrologic study or modeling, and relies only on visual determinations and estimates of inundation impacts to the nearly 2.5 miles of island habitats that includes wetlands. The habitat loss from raising the dam and flooding could amount to a significant amount of wetland and forested acres. The Service generally agrees with the Applicant's northern long-eared bat assessment. While the flooding may slowly kill trees on the islands, this is not likely to affect northern long-eared bats, because no felling of trees will occur during the breeding season.

USFWS # 22.

Protected Species List

James River spinymussel (*Pleurobema collina*), federally Endangered (FE) and State Endangered (SE)
Northern long-eared bat (*Myotis septentrionalis*), federally Threatened (FT) and State Threatened (ST)
Little brown bat (*Myotis lucifugus lucifugus*), SE
Tri-colored bat (*Perimyotis subflavus*), SE
Peregrine falcon (*Falco peregrinus*), (ST
Loggerhead shrike (*Lanius ludovicianus*), ST
Atlantic pigtoe (*Fusconaia masoni*), ST
Green floater (*Lasmigona subviridis*), ST
Migrant loggerhead shrike (*Lanius ludovicianus migran*), ST

USFWS # 23.

The mussel survey documented the presence of three freshwater mussel species; the eastern elliptio, northern lance, and eastern floater. The highest quality habitats and greatest relative abundances were observed in the lower tailrace reach near the John Lynch Bridge, and the upstream results indicated the Scott's Mill headpond supports a very low mussel density in the observed habitat data. The difference in mussel abundance between the downstream versus upstream sites was a startling 500 percent more abundant downstream, as calculated by catch per unit effort. The eastern elliptio mussel is the most abundant mussel on the East Coast and the American eel is believed to be the primary host fish of the eastern elliptio. In a unique interaction between eastern elliptio larvae and eels, the larvae attach to the eel gill arches for a few days during the eel migration. The host fish (eels) are responsible for the upstream distribution of larval mussels during the eel migrations. The lack of eel passage into the Scotts Mill Dam headpond is the likely cause for the low mussel abundance upstream. The restored natural mussel beds in the headpond could provide water quality benefits from the mussel filtration of the water column and improved habitat from the colonization of mussels.

USFWS # 24.

The green floater was not found during these survey efforts or any live protected species of freshwater mussels. Project effects on the endangered James River spinymussel, as stated in the in the environmental assessment, that "…changes associated with inundation adversely affect both adult and juvenile mussels as well as fish community structure, which could eliminate possible fish hosts for glochidia (Fuller 1974)". The Applicant anticipates that the Service will issue a biological determination after the Commission has issued its draft environmental assessment and biological assessment. In anticipation of the draft environmental assessment, the Applicant should contact the U.S. Fish and Wildlife Service, Virginia Field Office for coordination on threatened and endangered species findings.

USFWS # 25.

Cumulative Impacts

The DLA states, "Since the project is proposed to remain run-of-river, the Applicant proposes to exclude most lands around the shoreline and the three islands (Daniel, Treasure, and Woodruff) from the project boundary except for the southern tip of Daniel Island. Applicant proposes to include in the project boundary only those lands necessary for project construction, operations, maintenance, and environmental enhancements. The Applicant owns the lands on both sides of the river necessary for constructing the power plant, fishway facilities and recreation enhancements." The Service believes raising the headpond level 2 to 3 feet will likely inundate some or all of the island wetland habitats and accelerate the shoreline erosion along both the natural and armored headpond shorelines, as waves overtop the structures and erode from behind the structures.

USFWS # 26.

The DLA does not quantify the cumulative impacts or how all the habitat impacts were avoided and/or minimized. In addition to the cap proposed for Scotts Mill Dam, there are no cumulative values provided to assess the entire project impacts. The Service suggests providing an estimate of total habitat impact that includes these actions:

- Applicant intends to dredge an existing channel at the southern end of Daniel Island just upstream of the dam to allow flow from the main channel to the powerhouse.
- Applicant plans to excavate about 5 feet of rock to elevation 493 feet at the power plant site and about 10 feet downstream. It may also be necessary to excavate the riffle area downstream of the arch dam and an area immediately downstream of the old fishway to the left of the arch section.

We appreciate the opportunity to provide comments and recommendations on the DLA. If you have any questions regarding this letter please contact David Sutherland at 410-573-4535 or david_sutherland@fws.gov.

Sincerely,

Genevieve LaRouche
Field Supervisor

cc: Scotts Mill Service List
Cindy Schultz, Virginia Field Office

COMMONWEALTH of VIRGINIA
Department of Game and Inland Fisheries

Matthew J. Strickler
Secretary of Natural Resources

Robert W. Duncan
Executive Director

March 7, 2018

Kimberly Bose
Secretary Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Draft Application For Original License For Major Water Power Projects 5 Megawatts Or Less Scott's Mill Dam Hydroelectric Project, FERC P-14867-000

Dear Secretary Bose:

The Virginia Dept. of Game and Inland Fisheries (VDGIF) appreciates the opportunity to comment on the Draft License Application for the Scott's Mill Hydroelectric Project (P-14867).

To begin, we fully concur with the comprehensive suite of comments submitted by the U.S. Fish and Wildlife Service. The only additional comments we have to offer are listed below.

- Recreation – We would prefer to see contingency alternatives should the applicant be unable (through no fault of their own) to provide a boat access facility in the headpond of Scott's Mill Dam. The draft license application states that the applicant will attempt to coordinate boating access facility improvements with a private landowner in the headpond. Since no agreement has currently been reached, it is possible that upstream landowners may not support this proposal. As such, we would like to see alternatives listed for improving boating access on the James River at alternative locations, should access options to the headpond prove to be impractical.

VDGIF-1

- Fish Passage – As stated above, we fully support the USFWS comments. Additionally, we are fully supportive of the applicant's initiative to provide immediate passage for American Eel and Sea Lamprey, as well as consideration of installing a fish passage facility for resident and migratory species. As outlined by the USFWS, we would prefer to see a nature-like fishway if this proves to be a practical option. Should a nature-like

VDGIF-2

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fishway prove to be impracticable, we would appreciate the opportunity to work with the applicant on alternative designs.

- Downstream Flows – Given the high quality of habitat on the north side of the James River immediately below Scott's Mill Dam, we do have concerns regarding habitat alterations resulting from the siting of the powerhouse. We encourage the applicant to consider aligning some or all of the turbines to direct flows toward the center of the river (corresponding with current conditions) as much as possible. This would be particularly important during periods of lower stream discharge.

VDGIF-3

We have nothing further to add beyond these additional comments, but simply reiterate our support of the comments provided by USFWS. Thank you again for the opportunity to provide input. Should you have any questions, or need additional information, please contact Scott Smith at (434) 525-7522 or scott.smith@dgif.virginia.gov .

Sincerely,

Scott M. Smith
Regional Fisheries Manager
Virginia Dept. of Game and Inland Fisheries

CC: George Palmer
Ernie Aschenbach
Alan Weaver
Brian Watson
David Sutherland – USFWS
Jessica Pica – USFWS
Troy Andersen - USFWS

Matthew J. Strickler
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Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

MEMORANDUM

DATE: March 6, 2018

TO: Wayne Dyok, FERC

FROM: Roberta Rhur, Environmental Impact Review Coordinator

SUBJECT: DCR 17-033, SCOTTS MILL DAM RECREATION COMMENTS

Division of Planning and Recreation Resources

The Department of Conservation and Recreation (DCR), Division of Planning and Recreational Resources (PRR), develops the *Virginia Outdoors Plan* and coordinates a broad range of recreational and environmental programs throughout Virginia. These include the Virginia Scenic Rivers program; Trails, Greenways, and Blueways; Virginia State Park Master Planning and State Park Design and Construction.

We reviewed to project and agree that public water access may be complicated downstream of the dam due to the road proximity to the river bank and steep slopes to the water. However, there is a park less than ½ mile downstream on the river left; therefore, we recommend that the applicant investigate the opportunity to create water access at the park for a non-motorize launch and fishing nodes

DCR #1.

Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

DCR #2.

According to the information currently in our files, the James River – Blackwater Creek Stream Conservation Unit (SCU) is within the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of 1-5, 1 being most significant. The James River – Blackwater Creek SCU has been given a biodiversity significance ranking of B5, which represents a site of general significance. The natural heritage resource of concern associated with this SCU is:

Polanisia dodecandra ssp. dodecandra Common clammy-weed G5T5?/S2/NL/NL

Common clammy-weed is extremely rare in Virginia. This plant has only been found on cobble bars and within disturbed riverine habitats along the James River (Ludwig, 1998). It is currently known from 12 occurrences and historically known from 1 occurrence in Virginia.

DCR #3.

In addition, the Green floater (*Lasmigona subviridis*, G3/S2/NL/LT) has been historically documented immediately downstream of the dam. The Green floater is a rare freshwater mussel that ranges from New York to North Carolina in the Atlantic Slope drainages, as well as the New and Kanawha River systems in Virginia and West Virginia (NatureServe, 2009). In Virginia, there are records from the New, Roanoke, Chowan, James, York, Rappahannock, and Potomac River drainages. Throughout its range, the Green floater appears to prefer the pools and eddies with gravel and sand bottoms of smaller rivers and creeks, smaller channels of large rivers (Ortman, 1919) or small to medium-sized streams (Riddick, 1973). Please note that this species has been listed as state threatened by the Virginia Department of Game and Inland Fisheries (VDGIF).

DCR #4.

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations. Due to the legal status of the Green floater, DCR recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

DCR #5.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

DCR #6.

New and updated information is continually added to Biotics. Please re-submit project information and map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

The Virginia Department of Game and Inland Fisheries (VDGIF) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dgif.virginia.gov.

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

CC: Ernie Aschenbach, VDGIF

Literature Cited

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COMMONWEALTH of VIRGINIA

Matt Strickler
Secretary of Natural Resources

Department of Historic Resources
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Julie V. Langan
Director

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April 9, 2018

Mr. Wayne M. Dyok
Scott's Mill Hydro, LLC
P.O. Box 13
Coleman Falls, VA 24536

Re: *Phase II Architectural Survey of the Water Works Dam and Canal (118-0209-0002), James River Dam (118-0209-0003), and Scott's Mill Ruin (118-5497), City of Lynchburg, Virginia*
DHR File No. 2009-0521

Dear Mr. Dyok:

The Department of Historic Resources (DHR) has received for review and comment the report referenced above prepared by Hurt & Proffitt, Inc. The architectural field investigation and resulting report are in partial compliance of Section 106 of the National Historic Preservation Act, as amended, and its implementing regulation 36 CFR Part 800, and in support of an application to the Federal Energy Regulatory Commission (FERC) for a license to operate the Scott's Mill Dam Hydroelectric Project (FERC Project No. 14425).

The purpose of the architectural Phase II survey and report is to evaluate the Water Works Dam and Canal (DHR ID #118-0209-0002), James River Dam (DHR ID #118-0209-0003), and Scott's Mill Ruin (DHR ID #118-5497) for individual eligibility for listing in the National Register of Historic Places (NRHP). As pointed out by the consultant in the report, the Water Works Dam and Canal and the James River Dam are already listed in the NRHP since 1984 as contributing resources to the James River and Kanawha Canal Sites in Lynchburg (DHR ID #118-0209), and; therefore, are considered "historic properties" as defined in 36 CFR § 800.16(l)(1). The Scott's Mill Ruin is not associated with 118-0209 and was assigned a unique DHR inventory number. All three of these properties, Water Works Dam and Canal, the James River Dam, and the Scott's Mill Ruin fall within the undertaking's Area of Potential Effects (APE).

The consultant recommends the Water Works Dam and Canal (DHR ID #118-0209-0002) and the James River Dam (DHR ID #118-0209-0003) warrant individual listing to the NRHP under Criterion A for their trends in history related to the establishment of waterways in the United States, and Criterion C for as works of engineering. DHR concurs with this recommendation and also with the proposed NRHP boundaries for these two resources. The consultant also recommends that the James River Dam no longer be considered as contributing to the James River and Kanawha Canal Sites in Lynchburg (DHR ID #118-0209) as its research concluded that the dam structure was constructed outside the period of significance identified in the James River and Kanawha Canal Sites in Lynchburg nomination, and that the James River Dam was built independently of the Canal system. Because the James River Dam is recommended as individually eligible,

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thereby identifying it as an historic property for the purposes of Section 106 consultation, and due to the time consuming and laborious administrative process with the National Park Service to have a property currently on the NRHP taken off the NRHP, DHR believes commenting on the James River Dam's contributing status to the James River and Kanawha Canal Sites in Lynchburg is unnecessary. However, it may be appropriate to address this question when we discuss potential mitigation measures for any possible adverse effect.

VDHR-1

With respect to the Scott's Mill Ruin (DHR ID #118-5497), the consultant recommends that this property is not eligible for the NRHP as an architectural resource due to a lack of historic integrity. The DHR agrees with this opinion.

We understand that the project design may be revised based on comments from other agencies. DHR recommends that the project attempt to minimize impacts to the NRHP eligible resources by preserving as much of the Water Works Dam as possible and avoiding alterations to the Canal. That said, removal of the upper portions of the Water Works Dam would likely constitute an adverse effect on historic properties.

VDHR-2

Thank you for the opportunity to review this document. If you have any questions about these comments, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Hurt & Proffitt, Inc.

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RESPONSES TO FEDERAL ENERGY REGULATORY COMMISSION COMMENTS

FERC-1 The newspaper notice was published in the Lynchburg News and Advance on November 18, 2015 15 days in advance of the Joint Meeting. The proof of publication is presented at the end of the FERC comment responses.

FERC-2 The agenda for the December 2, 2015 joint agency meeting is included at the end of the FERC comment responses.

FERC-3 Virginia DEQ was contacted regarding the effect of the project on the Coastal Zone Management Area. It was determined that no steps were necessary for the project to comply with the state's coastal zone management program. A copy of the correspondence with Virginia DEQ regarding this matter has been included in the consultation record of the Final Exemption Application (FEA).

FERC-4. FEA has been amended to include project number P-14867 throughout the application, including appendices.

FERC-5 The following studies have been included in Appendix J of the FEA except where noted:
(1) Assessment of Pre-and Post-Project water levels upstream and downstream of Scott's Mill Dam,
(2) Bathymetric Survey,
(3) Water Quality Study, **Appendix J, detail results in Appendix E**
(4) Sediment Chemical Analysis, **Appendix F**
(5) Impoundment Fish Species Presence,
(6) Evaluation of Entrainment Potential and Turbine Passage Survival,
(7) Project Effects on Fish Habitat,
(8) Evaluation of Fish Passage,
(9) Mussel Survey, **Appendix H**
(10) Wetlands Assessment,
(11) Terrestrial Habitat, **Appendix G**
(12) Protected Species
(13) Bat Study
(14) Recreation Resources Study
(15) Cultural Resources Study **Appendix I**, and
(16) Visual Resources Study

FERC-6 Water quality standards/parameters pertaining to the Scott's Mill Project have been consolidated in the FEA to include only relevant sections.

FERC-7 The proposed mode of operation, type of proposed turbines, and type and location of the fishway has been clarified in the FEA. The

proposed mode of operation is run-of-river. However, the upstream Reusens Project is undergoing relicensing. Should the project be allowed to peak, Scott's Mill operations will need to be coordinated with to ensure that project operations remain as run-of-river. Applicant is proposing Rickly axial flow units.

FERC-8 The 2-foot high permanent concrete cap will be added to the main spillway rather than flashboards. The word "flashboards" has been deleted from the FEA.

FERC-9 The minimum and maximum capacities of the individual turbines and the minimum and maximum hydraulic capacity of the plant have been specified in Table A-2 of the FEA. The minimum hydraulic capacity of unit 1 is 100 cfs. Maximum capacity of all turbine units is 500 cfs. Minimum capacity of the plant is 100 cfs and maximum capacity of the plant is 4,500 cfs.

FERC-10 Applicant estimates that the plant would be shut down at flows greater than 25,100 cfs because the head would be too low to operate and because of concern for debris. The lowest recorded flow is greater than the minimum operating flow. Accordingly, the plant should only be shut down for high flows and forced and scheduled maintenance outages.

FERC-11 Applicant has provided additional detail in the FEA to ensure safe management, operation, and maintenance of the project.

FERC-12 The owner of Scott's Mill Hydro operates three upstream hydropower projects on the James River and another plant in the western part of Virginia. The operators at the three upstream plants will also operate Scott's Mill. Although the owner is the same for all projects, each project is its own company: Holcomb Rock, Coleman Falls, and Cushaw.

FERC-13 Figure A-1 has been revised to make it more legible and a note has been placed to indicate which projects have been breached. The downstream Bosher's Dam has a vertical slot fishway. There are no impediments to fish moving upstream to Scott's Mill.

FERC-14 The legend for Figure A-19 (now Figure A-22) is more clearly indicated on the figure.

FERC-15 A detailed single line electrical diagram has been provided as Figure A-23 in the FEA.

FERC-16 The FEA has been updated to provide a more detailed statement regarding the need for power.

FERC-17 FEA has been revised to better explain how a ½ inch veil of water will be maintained over the dam. Essentially a water level gauge upstream of the dam and knowledge of the inflow will be used to match turbine operation to inflow. Applicant anticipates that more than a ½ inch veil will be provided most times to ensure water constantly flows over the dam. The upstream Cushaw plant operates in a similar fashion.

FERC-18 The FEA has been revised to add a statement that about 50 percent of the turbine flow will be directed to the main river as a proposed environmental measure. This will be accomplished by orienting the powerhouse such that discharge from the upstream units will discharge directly into the main portion of the river. See Section 4.2.2 of the FEA.

FERC-19 The Geology and Soils section of the FEA has been expanded to provide a more detailed description of the measures to be taken to control erosion, sediment mobilization, and turbidity during removal of the area at the southern tip of Daniel Island, removal of the upper portion of the existing arch dam, during construction of the powerhouse and during excavation of the tailrace channel. The latter three items will be done within the coffer dams.

FERC-20 Sediment samples were not taken in the tailrace area because this area is comprised of very coarse gravel and bedrock.

FERC-21 All flow duration curves include the entire flow records through 2016. Applicant conducted an analysis of the last 30 years and determined there was little statistical difference between the past 30 years and the previous 50 years.

FERC-22 Applicant concurs that the discharge coefficient ranges from 1.3 to 4.3 for very low flows to very high flows. This is more fully explained in Study Report 1 in Appendix J. However, to simplify the analysis for high flows, a constant (and conservative) discharge coefficient of 3.5 was used. For low flows, actual headpond elevations were used for existing conditions (i.e., water levels at low flows are higher than predicted by the weir equation and thus water levels under existing conditions would be closer to the proposed new water elevation of 516.4 feet for flow conditions less than the hydraulic capacity of the powerhouse).

Above 4,500 cfs, the hydraulic capacity of the powerhouse, the coefficient of discharge is close to 3.5 and for higher flows it could

approach 4. However, for existing conditions, FEMA produced water levels were used for flood flows during pre-project conditions.

For post-project flows, a coefficient of 3.5 was used along with a smaller dam width (i.e., only the straight section of the dam). This likely underpredicts the post-project water levels for low flows, but there is not a significant difference for flows between 4,500 cfs and 10,000. For larger post-project flows (i.e., flood flows), the discharge coefficient would be greater than 3.5, so the analysis is conservative.

At very high flows, the dam is no longer the hydraulic control and differences between pre-and post-project conditions become less. Further at high flood flows like the 100-year flood, water will flow over the powerhouse which is designed to be submerged, thereby enabling water levels to rise slower than predicted with the weir equation.

FERC-23 Although there would be water flowing over the dam, the flows would be on the order of 10 to 20 cfs depending upon the veil height (i.e., ½ inch to 1 inch) and using a low weir coefficient. Since the drainage area at the upstream gauge (Holcomb Rock) is about 99 percent of the drainage area at Scott's Mill, the additional flow from the drainage area downstream more than makes up for the flow discharged over the spillway, so the effect of water flowing over the dam was ignored.

FERC-24 The 2008 FEMA Flood insurance study is included at the end of the response comments (i.e., after responses to VDHR).

FERC-25 The bathymetry survey did extend from the base of Reusens dam (as close as safely possible) down to the mouth of Backwater Creek. The figures have been expanded in the FEA. Also see the Bathymetry Survey Report in Appendix J.

FERC-26. The legends in figures E-6-1 and E-6-2 have been shifted to be more legible in the FEA.

FERC-27 In discussions with VDEQ and VDGIF, it was determined that ample water quality data exists at the VDEQ monitoring station one mile downstream of Scott's Mill dam. Accordingly, the plan was to collect dissolved oxygen (DO) and water temperature data during the critical portion of the year. These conditions did not occur until late summer. (Please refer to the Water Quality Study Report in Appendix J for more detail.)

Unfortunately, the battery for the DO meter died during the continuous monitoring effort and data collection stopped. However,

the results indicate that DO and water temperatures are within water quality standards. They also indicate the DO diurnal pattern.

Applicant has no control over the DO and water temperatures coming from Reusens into the Scott's Mill headpond. That is the main driver of water quality in the headpond. Applicant understands that Reusens is undergoing relicensing and will be collecting water quality data during the summer of 2020. Should the Commission determine that more baseline data would be useful, the Reusens data will aid in supplementing the baseline data.

Applicant is committed to meeting water quality standards, particularly during hot, low flow conditions. Applicant has developed a plan to ensure water quality downstream of Scott's Mill dam will be preserved during project operations. During hot, low flow conditions, as necessary, Applicant can divert more water over the dam to maintain and improve DO. Secondly, about half the flow through the turbines will come from the main portion of the James River. Given that the retention times in the river are low, even at low flows (e.g., about one day for a flow of 1,000 cfs), water quality changes from the Reusens project to Scott's Mill dam are not expected to change significantly.

While Applicant agrees that water quality at the Percival Island one mile downstream may not be indicative of DO at the Scott's Mill dam, water temperature and other measured parameters should be indicative because of the short time it takes for water to travel that one mile stretch. Applicant will monitor DO during critical times and take corrective action as necessary to ensure DO water quality standards are met.

FERC-28 Site specific catch-per-unit effort (CPUE) data is available for the Scott's Mill Dam pool and immediately downstream for American Eel and other key migratory species and is presented in the FEA.

FERC-29 Applicant has taken a significant step to avoid entrainment by reorienting the powerhouse such that downstream migrants would need to turn about 90 degrees to enter the turbine intakes. Based on results at the Willamette Falls hydropower project in Oregon, where a similar approach was taken, entrainment was determined to be incidental and avoidance highly successful. Applicant expects similar results here. This will be verified with CFD modeling studies during the design phase. Accordingly, the need for turbine survival estimates using the characteristics of the turbines and indicator species, is of lesser importance. Applicant has not conducted modeling studies of entrainment. Rather Applicant has used survival information at the

upstream Resusens and Cushaw projects, which have similar species of interest. to estimate survival for the Rickly turbines. Although survival would be less because of the smaller units and higher rotational speeds, Applicant estimates that the survival of any fish that might be entrained will be on the order of 90 percent. Further information is presented in Exhibit E.

FERC-30 The Hydro Fish Passage Initial Assessment Report prepared by Alden is included in Appendix J of the FEA.

FERC-31 The FEA in the Soils and Geology section explains how dredging will occur. Cofferdams will be constructed upstream and downstream of the arch section of the dam. When the powerhouse is completed, the area within the cofferdams will be dredged. After that is done, the 130-foot wide channel will be dredged. Since this area is outside the upstream cofferdam, best management practices will be implemented to enclose the dredged area. Since the upstream cofferdam will contain flow in the channel immediately upstream of the arch section, no additional measures will be needed for the south side of the channel dredging. However, for the north side of Daniel Island, a silt curtain will be installed outside of the area to be dredged adjacent to the main section of the James River to isolate the dredging from the river. The last step will be to remove the cofferdams. Dredged material will be disposed either on the upland portion of Daniel Island or at a nearby landfill.

A map of the wetlands near the channel is presented in Appendix J, Terrestrial Habitat Study Report.

FERC-32 The Wetland Assessment including wetland maps for the area upstream of the Scott's Mill Dam are presented in Appendices J and G of the FEA.

FERC-33 Please refer to the analysis of upstream water levels in Section 6.3.2.1.1, Exhibit A of the FEA and Study Plan 1 Report in Appendix J. The 2-foot concrete cap will result in an increase in water levels immediately upstream of the dam at flows below 4,500 cfs, the hydraulic capacity of the dam. For a low flow of about 900 cfs, the water level is about 0.9 feet above the existing dam crest elevation based on measurements under existing conditions. Thus, the differential between pre-and post-project flows is about 1.1 feet during low flows. Erosion is not likely a problem during low flow and would not likely affect wetlands significantly.

At a mean flow of 3,600 cfs, there would be about a 0.3 to 0.4 feet differential between pre- and post-project conditions based on

measurements during existing conditions at 3,200 cfs (i.e., 515.9 feet), and then allowing for a slight increase in post-project water levels because of the reduction in spillway length. Perhaps this flow is a more meaningful indicator of wetlands impacts. Because the shoreline and river banks are steep, this water level difference is not expected to have a significant effect on wetlands on the islands.

The water level differential is generally projected to propagate upstream. Because the river velocities are low during average flow conditions (see **Appendix J**), the head loss per mile is likewise low. Even though there could be about a one-foot differential during very low flows, most of the differential would persist upstream. Because of the higher water level under post-project conditions and greater cross-sectional area, there will be some minor reduction in water level differences with distance upstream.

FERC-34 Because the water level changes are not likely to affect the riverbank and shoreline trees, there should be no effect on the northern long-eared bat which uses that habitat. The James River is a very flashy river system and large water level changes can occur quickly. In the spring of 2020, there were four instances where flows increased within a day or two from about 3,000 cfs to over 40,0000 cfs. This resulted in about a 4 to 5-foot change in water level upstream of Scott's Mill dam. These larger fluctuations likely have a greater effect on bat habitat. Please also see the USFWS comment USFWS-22 on the long-eared bat. The primary concern is the felling of trees and that would not occur during normal operations.

FERC-35 Consultation with local recreation experts from the adjacent counties and resource agencies (e.g., VDCR and VDGIF), indicated the local recreation needs. Although the 1991 and 2000 studies are dated, similar recreation needs exist today. Therefore, Applicant focused on providing access to the headpond, a canoe portage around the dam and fishing immediately downstream of the dam. For further information please refer to the Recreation Study Plan Report in Appendix J.

Regarding the James River Association comments on public boating and fishing access, Applicant intends to provide those facilities. However, as discussed in the FEA, there is simply no opportunity to provide trails or camping. However, historical interpretation will be provided.

FERC-36 The effects of project construction and removal of dam features on recreation access to the dam are described in the FEA.

FERC-37 Exhibit G has been prepared to include the proposed public boating access location. This parcel is adjacent to Harris Creek on the left bank downstream of Reusens Dam. The FEA contains new figures indicating current recreation access (**Figures E-6-4 and E-6-5**).

FERC-38 Yes, the informal parking area adjacent to the dam is used to access the shoreline fishing. As described in the FEA, the fishing is located immediately downstream of the dam. Applicant owns the area where fishing occurs. This area is marked as private property. However, Applicant does not police it and it is used frequently by anglers. Applicant proposes to make this a recreation feature of the project and work with state agencies to limit Applicant's liability for use of the facilities. Applicant may make arrangements with a state agency or private entity to manage the proposed recreation facilities.

FERC-39 The private boat ramp is not the same land used for shoreline fishing. Applicant concluded that it would be preferable to identify a new site for public access and has included this in the FEA. The parcel under consideration is owned by Liberty University. Preliminary discussions have been held with Liberty University and Applicant believes that Liberty would be willing to allow Applicant to develop the recreation facilities. Similarly, Liberty has granted Applicant use of lands on the islands in the headpond.

FERC-40 The FEA describes the effects that the higher water would have on adjacent lands. Erosion is not expected to be a problem and more constant water levels at flows below 4,500 cfs would likely be considered a benefit because boat ramp access at lower flows would not be a problem. However, the higher water levels would decrease the land width of the shoreline and this could be looked at as an adverse effect.

FERC-41 Exhibit G includes a project boundary that includes the proposed fishing pier and canoe portage route. Figure F-10 in Exhibit F shows the location of the American Eel and Sea Lamprey fish passage facility. The portage route would be adjacent to the fishway but further from the river. The portage would extend a couple of hundred feet upstream of the dam for safety reasons and extend downstream of the fish passage entry way. The fishing pier would be downstream of the fishway entrance. Exact locations of the recreation facilities cannot be determined until after the fishway design is finalized. However, it will be developed in recognition that recreation facilities will be constructed nearby.

The existing parking areas are informal gravel/sandy areas adjacent to the road. Approximately 10 cars can be accommodated in these

informal parking areas. Since these areas are not owned by Applicant, it would be up to the County/State to provide additional parking.

Applicant understands that Applicant would have ultimate responsibility for maintaining any project recreation facilities approved for the project.

FERC-42 Applicant would provide appropriate signage for the portage and recreation al facilities. There is an informal existing path that anglers use to access the river. This path would be improved as part of the recreation improvements. Similarly, a path adjacent to the guard rail would be developed for those portaging around the dam. This will ensure the safety of the recreationists.

FERC-43 Applicant has observed the canoe portage around Big Island Dam. Applicant proposes a similar strategy for the river portion of the portage at the upstream and downstream ends. The pathway itself may be a gravel or wooden walkway. However, to minimize maintenance, the portion of the portage in and immediately adjacent to the water will be a lightweight metal.

FERC-44 The land use adjacent to the powerhouse is industrial. Upstream of the U.S. Pipe location, access is limited because of the steep banks and railroad. Between the railroad and the river, the land is forested with riparian habitat adjacent to the river. On the north shore, the land is rural with homes scattered along River Road (see Photographs in **Appendix G**). Applicant owns all lands where the powerhouse would be located, the Scott's Mill Dam, and all property on the north shore where the recreation and fish passage facilities would be located. Applicant does not own lands upstream. However, the project boundary upstream of the facilities is along the James River and would not infringe upon land owner property. The one exception is the parcel upstream that will be used for public access.

FERC-45 The FEA has been clarified to indicate that 77 percent of the time there would be a small flow over the dam (i.e., the veil). The rest of the time there would be a larger flow over the dam. Visual observers would find the larger flows over the dam more appealing. However, during the summer, views of water flowing over the dam would be partially obstructed by the vegetation along River Road (see **Exhibit E** and Visual Resources Study Report in **Appendix J**).

FERC-46 The powerhouse would generally not be observable from the south side of the James River and views from the north side of the river would be at a distance. However, Applicant intends to make the powerhouse aesthetically pleasing and blend it in with the

surrounding area. First it will not be a high structure. It will be designed to be submerged during high flow conditions. Second the color scheme will be such that it will blend in with the existing dam. If necessary, vegetation screening may be used.

FERC-47 Most of the heavy construction will be undertaken on the south side of the river adjacent to the U.S. Pipe industrial facility. Access to this area is industrial with both road and railway access. Road degradation and public safety will not be issues. However, for the fish passage and recreation facilities on the north side of the dam, special precautions will be necessary to protect public safety. Some heavy equipment may be needed, but road degradation should not be a problem. Temporary stoppages of traffic may be needed to off load equipment. Because there is not much of a laydown area, material storage may need to be off-site across the river on Applicant's property. Off-site pre-construction will be used to the extent possible to minimize the schedule duration and protect public safety. The duration of any road closures will be kept to a minimum. Because River Road is a key artery, there will be no long-term closures of the road.

Construction of the upstream boat ramp should not be disruptive as it will be similar to the effort required for house construction.

Construction noise is more likely on the south side adjacent to the U.S. Pipe facility. Ambient nose was not measured, but heavy equipment is extensively used there. The nearest sensitive receptors are up on the hill. However, noise should not be a problem because of the distance to these receptors and much of the project will be constructed off site using modular technology. On the north bank, construction will be completed within one season. There are no close-by sensitive noise receptors along River Road. Additional details will be provided as part of the detailed design. At this time, it is not possible to identify the exact length of construction and the need for road closures, although Applicant expects construction to be completed within one year.

FERC-48 The FEA describes the cultural resources survey effort. This survey was done in conjunction with the VDHR. A windshield site reconnaissance of the construction area was conducted. The area adjacent to U.S. Pipe has been heavily disturbed and unlikely to contain archeological resources. There is less disturbance on the north bank in the vicinity of the dam. There may be some elements of the old grist mill present, but generally that area is disturbed.

Applicant has consulted with eight Native American tribes including the Delaware Nation and has had no response. In working with the Virginia SHPO, they have identified the project boundary as the APE. The Applicant had intended to have a smaller project boundary, but FERC required the Applicant to include the entire headpond. Accordingly, the APE now extends up-river to include the entire James River from Scott's Mill dam to Reusens dam. At this point, Applicant and the Virginia SHPO are in full agreement on the mitigation approach. More work will be needed during preparation of the Historic Properties Management Plan committed to by Applicant.

FERC-49 The APE is the area within the project boundary. Since the project boundary upstream is along the shoreline, a Phase I pedestrian survey was not conducted along this area. The areas adjacent to the dam are highly disturbed and no archeological resources were identified during the initial site reconnaissance and the Phase II Architectural Survey of the Water Works Dam and Canal. The Virginia SHPO has suggested that the James River Dam be addressed when "we discuss potential mitigation measures for any possible adverse effects" (see April 9, 2018 letter from Department of Historic Resources commenting on the draft license application above in Appendix B).

FERC-50. Applicant provided a copy of the DLA to the Virginia SHPO.

FERC-51 Exhibit F – drawings F1 through F9 provide plans (overhead view), elevations, profiles and sections consistent with Section 4.41(g)(1). Drawings F10, F11 and F12 provide preliminary design information on the fishway.

FERC-52 A Supporting Design Report is submitted as part of Exhibit F.

FERC-53 Exhibit G provides a map of the project location and proposed boundary that encloses all project features.

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FERC-54 Comment noted.

FERC-55 Comment noted.

The News & Advance

Advertising Affidavit

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Date
November 25, 2015

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Date	Category	Description	Ad Size	Total Cost
11/25/2015	Meetings and Events	JOINT AGENCY AND PUBLIC MEETINGS SCOTTS	1 x 59 L	263.70

JOINT AGENCY AND PUBLIC MEETINGS
SCOTTS MILL HYDROELECTRIC PROJECT
FERC PROJECT NUMBER 14425
LIBERTY UNIVERSITY

OFFICE OF HURT AND PROFFITT
2524 LANGHORNE RD.
LYNCHBURG VA 24501
1:30 PM DECEMBER 2, 2015

Liberty University (LU) holder of a Federal Energy Regulatory Commission (FERC) Preliminary Permit for the proposed Scotts Mill Hydroelectric Project located at the existing Scotts Mill dam in Lynchburg Virginia and Bedford and Amherst counties, Virginia will hold a joint agency meeting at 1:30 pm on Wednesday, December 2, 2015 at the offices of Hurt and Proffitt located at 2524 Langhorne Road and a Public Meeting at 6:30 pm December 2, 2015 at the same location. The public is invited to attend either or both meetings. An agenda for the 1:30 pm meeting is presented below. The agenda for the Public Meeting will be the same as for the day meeting except that LU will summarize the results of the joint agency meeting during the public meeting.

Federal and state resource agencies, government officials, affected Indian tribes, NGOs, and other interested members of the public are also invited to attend a site visit from 10 am to noon on December 2, 2015. The site visit will convene at the James River Canoe Ramp at 20 Adams Street, Lynchburg Virginia. Please RSVP to Wayne Dyok at dyok@prodigy.net or contact Kim Stein at (434) 907-0373.
On September 1, 2015 LU filed a Notice of Intent (NOI) and a Pre-application Document (PAD) with FERC. On October 23, 2015 FERC approved LU's request to use the Traditional Licensing Process and directed LU to hold a joint meeting no sooner than 30 days from the date of their letter and no later than 60 days. The NOI and PAD can be found on LU's website at http://www.scottsmillhydro.com or on FERC e-library website at http://www.ferc.gov. LU proposes to construct a 3.8 MW hydropower project at the existing Scotts Mill dam.

Publisher of the
News and Advance

This is to certify that the attached JOINT AGENCY AND PUBLIC M **was published by the News and Advance in the city of Lynchburg, in the State of Virginia, on the following dates:**

11/18/2015

The First insertion being given ... 11/18/2015

Newspaper reference: 0003546872

Given under my hand on

the 4th **day of** Nov. 2015

Mark Bazzo

Classified Manager

Tonya D Davis
NOTARY PUBLIC
Commonwealth of Virginia
Reg. #7506750
My Commission Expires
September 30, 2019

THIS IS NOT A BILL. PLEASE PAY FROM INVOICE. THANK YOU

November 13, 2015

Via Electronic Filing

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

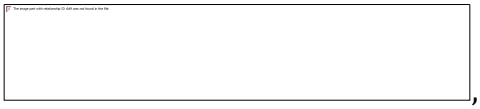
Re: FERC Project No. P14425-000
Scott's Mill Hydroelectric Power Project
Transmittal of Joint Meeting Agenda

Dear Secretary Ms. Bose:

Pursuant to 18 CFR §4.38(b)(3), Liberty University (LU) is hereby providing the Federal Energy Regulatory Commission (Commission) with written notice of the Joint Meeting for the proposed Scott's Mill Hydroelectric Project. Attachment 1 provides a written agenda for the meeting. The Joint meeting and an evening public meeting will be held on December 2, 2015 at the offices of Hurt and Proffitt located at 2524 Langhorne Road, Lynchburg Virginia. The Joint meeting will commence at 1:30 pm and the evening meeting will start at 6:30 pm. A site visit will be held from 10 am to noon. Participants interested in attending the site visit will meet at the James River Canoe Ramp at 20 Adams Street, Lynchburg Virginia. Additional information on the Joint meeting can be found on LU's Scott's Mill website at http://www.Scottsmillhydro.com.

If you have any questions, please contact the undersigned at (540) 320-6772.

Respectfully submitted,

 , for

Mark Fendig

ATTACHMENT 1

JOINT AGENCY AND PUBLIC MEETINGS
SCOTT'S MILL HYDROELECTRIC PROJECT
FERC PROJECT NUMBER 14425
LIBERTY UNIVERSITY

OFFICE OF HURT AND PROFFITT
2524 LANGHORNE RD.
LYNCHBURG VA 24501
1:30 PM DECEMBER 2, 2015

Liberty University (LU) holder of a Federal Energy Regulatory Commission (FERC) Preliminary Permit for the proposed Scott's Mill Hydroelectric Project located at the existing Scott's Mill dam in Lynchburg Virginia and Bedford and Amherst counties, Virginia will hold a joint agency meeting at 1:30 pm on Wednesday, December 2, 2015 at the offices of Hurt and Proffitt located at 2524 Langhorne Road and a Public Meeting at 6:30 pm December 2, 2015 at the same location. The public is invited to attend either or both meetings. An agenda for the 1:30 pm meeting is presented below. The agenda for the Public Meeting will be the same as for the day meeting except that LU will summarize the results of the joint agency meeting during the public meeting.

Federal and state resource agencies, government officials, affected Indian tribes, NGOs, and other interested members of the public are also invited to attend a site visit from 10 am to noon on December 2, 2015. The site visit will convene at the James River Canoe Ramp at 20 Adams Street, Lynchburg Virginia. Please RSVP to Wayne Dyok at dyok@prodigy.net or contact Mark Fendig at (540) 320-6762.
On September 1, 2015 LU filed a Notice of Intent (NOI) and a Pre-application Document (PAD) with FERC. On October 23, 2015 FERC approved LU's request to use the Traditional Licensing Process and directed LU to hold a joint meeting no sooner than 30 days from the date of their letter and no later than 60 days. The NOI and PAD can be found on LU's website at http://www.scottsmillhydro.com or on FERC e-library website at http://www.ferc.gov. LU proposes to construct a 3.8 MW hydropower project at the existing Scotts Mill dam.

MEETING AGENDA

1. Introductions and Welcome
2. Scott's Mill Hydropower Project Background
3. FERC Licensing Process , Plan and Schedule
4. Description of Existing Facilities, Proposed Project, and Purpose
5. Environmental Resources, Issues and Information Needs
    a. Geology and Soils
    b. Water Resources (Water Quality and Quantity)

c. Fish and Aquatic Resources
d. Wildlife and Botanical Resources
e. Wetlands, Riparian, and Littoral Habitat
f. Rare, Threatened and Endangered Species
g. Recreation and Land Use
h. Aesthetic Resources
i. Cultural Resources
j. Socioeconomic Resources
k. Tribal Resources

6. Study Plan Development
7. Conclusions and Action Items

RESPONSES TO U.S. FISH AND WILDLIFE SERVICE COMMENTS

Applicant appreciates the comments of the USFWS. Applicant has worked well with the USFWS and VDGIF to develop an Agreement in Principle (AIP) for fish passage and other environmental protection and enhancement measures (see Appendix A).

USFSW-1 Applicant concurs with the USFWS comment that if previously unidentified cultural resources are found, the Applicant would stop all land clearing and land-disturbing activities in the vicinity of the cultural resources and consult with the Virginia SHPO.

USFWS-2 Applicant has conducted a study that supports its conclusion on water level changes between pre- and post-project operations. The study report on pre-and post-project water levels in **Appendix J**, as well as the exemption application itself describe the analyses conducted. The terrestrial resources section of the exemption application notes the steepness of the islands and the potential effect that short-term floods would have on vegetation. Applicant disagrees that 100 acres of wetland and island habitats could be affected.

USFWS-3 Applicant appreciates the USFWS comment on the nature-like fishway. When American shad and resident fish passage is prescribed by the USFWS, the nature-like fishway will be fully examined as a potential fish passage medium. Any recreational use of that facility would need to be carefully coordinated because of safety concerns with the adjacent U.S. Pipe Company operations.

As for the public boating access, Exhibit G, Project boundary identifies the potential location for adding a public boat ramp. Applicant will work with the owner of that parcel to obtain rights to develop that recreational facility.

USFWS-4 Applicant concurs with the USFWS that peaking operations at Reusens could affect recreational opportunities in the Scott's Mill headpond. Reusens is undergoing FERC relicensing and is proposing to have peaking operations. Scott's Mill could continue to operate as a run-of-river facility maintaining constant water levels until the flow exceeds the hydraulic capacity of the project (i.e., 4500 cfs). However, that would translate to variable flows downstream of Scott's Mill dam. Accordingly, it is important that operations between Scott's Mill and Reusens be coordinated to protect downstream recreation and downstream habitat.

USFWS-5 Providing the 0.5 inch veil over the Scott's Mill dam will need to monitored during initial operations to ensure that Virginia water

quality standards are maintained. If Applicant identifies a potential problem, the veil height can be increased. However, because about half the powerhouse flow will be oriented to the main channel, water quality and fish habitat in that section should be protected.

USFWS-6 We agree with the USFWS that if the former water canal is used as a nature-like fishway, discharge from the turbines should be directed to the downstream entrance to the canal as attraction flow. During the detail design phase, Applicant will work with resource agencies to develop a plan for future fish passage that includes the nature-like fishway, a vertical slot fishway and a trap and haul program. That is, the powerhouse will be located and designed with the assumption that additional fish passage will be provided in the future. Applicant will conduct Computation Fluid Dynamics (CFD) modeling to properly site the proposed and future facilities. Since there is a concern that has been voiced by the SHPO on using the canal, the SHPO will be integrally involved in a nature-like fishway design to protect the integrity of this historic canal.

USFWS-7 We concur with the USFWS comment to provide guide vanes to avoid entrainment of the downstream migrating silver eels. Applicant has oriented to the powerhouse to avoid or minimize entrainment.

USFWS-8 We concur with the USFWS on the importance of CFD modeling to inform fish passage solutions. The CFD modeling will consider the hydraulic conditions in both the headpond and downstream of the proposed turbine units.

USFWS-9 Applicant will work with the USFWS and VDGIF to properly site fish passage facilities. This will include identifying the location of the highest density of migrating American Eels and Sea Lamprey.

USFWS-10 Focus will be placed on the Bypass and Tailrace to ensure there is a fully connected zone (appropriate depth and velocity) that allows fish passage to the toe of the dam. Applicant notes the USFWS recommendation of 225 cfs attraction flow based on the powerhouse hydraulic capacity of 4,500 cfs (5%). The furthest downstream turbine and the downstream fish passage facility will be oriented to achieve the attraction goals.

USFWS-11 Applicant intends to connect the main river channel with the headpond, drawing in about half the flow up to the hydraulic capacity of the powerhouse. This should facilitate passage of downstream migrants in the far-field attraction zone. The powerhouse and headpond will be designed and located to facilitate downstream

migration within the headpond until the fish reach the downstream fish passage facility.

USFWS-12 We agree with the USFWS that moving fish through a turbine is an unacceptable route and have developed a plan based upon the successful downstream migration of salmon, steelhead, and lamprey at the Sullivan powerhouse on the Willamette River in Oregon. During the CFD modeling, Applicant will work with the USFWS to ensure that the trash rack spacing plus guide vanes will be sufficient to prevent downstream migrating eel from entering the turbine intake. Applicant notes USFWS recommendation for ¾" trash rack spacing, normal velocities not exceeding 2 fps and sweeping velocities being equal to or greater than normal velocities in order to guide fish to the entrance of the downstream bypass. The turbine intakes have been designed to maintain flow velocities at 2 feet per second or less.

USFWS – 13 Applicant notes USFWS recommendation for the downstream bypass to pass a minimum of 5% station capacity (minimum bypass flow of 225 CFS at hydraulic capacity of 4,500 cfs). Please refer to response to comment USFWS-10.

USFWS-14 Applicant proposes to work with Rickly to determine fish survival through the turbines if CFD modeling indicates that there is potential for more than incidental entrainment of downstream migrating fish.

USFWS-15 All reference to vertical datums in the FEA reference the North American Vertical Datum of 1988 (NAVD 88).

USFWS-16 Applicant notes the USFWS recommendation to use a period of record no longer than 30 years for streamflow data. Applicant examined both the last 30 years of record and the entire historic flow record and did not observe any discernable difference in flow statistics. Accordingly, Applicant has elected to use the entire record for the flow duration curves.

USFWS-17 Target species biological goals for the Scott's Mill fishway (sustained population) are identified in the FEA. Applicant concurs that the agencies should determine these target species.

USFWS-18 Applicant agrees that the migratory period of record (MPOR) for target species should be determined by resource agencies. Applicant will work with resource agencies to ensure safe, timely, and effective passage 90 percent of the time, excluding the lowest and highest 5 percent of the flow duration curve.

USFWS-19 Applicant has considered the USFWS recommendation for adjustable spillway gates rather than a permanent two-foot high concrete cap for the entire length of the dam. Because of the high cost of adjustable spillway gates, Applicant has excluded them from the design. However, during the design phase, Applicant is willing to discuss adding simple adjustable gates at either end of the Scott's Mill dam.

USFWS-20 Study plan reports are included in **Appendix J** of the FEA. **Appendix J** also references the appendices where study report results can be found.

USFWS -21 Comment noted.

USFWS-22 Applicant determined that detailed hydrologic modeling was unnecessary to determine effects on Terrestrial habitat. Applicant calculated potential water level changes based on the new capacity of the powerhouse for flows below 25,000 cfs, and used existing upstream water level data and the weir equation to determine water level differences.

For low flows, the post-project water levels will generally be slightly higher at just over 2 feet over the existing dam crest of 514.4 feet. During existing low flow conditions, water levels are above the dam crest and below the proposed post project water level of 516.4 feet. For example, under existing conditions, a one-foot head over the dam crest equates to a flow of about 1800 cfs based on water level gauge monitoring. The post-project water level at that flow would be two feet above the existing crest because of the concrete cap, or one foot higher.

Since the spillway width is reduced by the width of the arch section under post-project conditions, at flows above the hydraulic capacity of the powerhouse, the water level will increase faster. **Exhibit A** of the exemption application illustrates how the water levels increase as flows increase for both pre-and post-project conditions based on spillway width, water level measurements under current conditions, and the weir equation.

For the pre-project condition and a two-foot head (i.e., water level of 516.4), the estimated pre-project flow would be about 5,000 cfs, whereas for the post-project condition, the water level would be about a half foot above that level based on flows through the powerhouse of 4500 cfs and flows over the spillway of 500 cfs. This water level difference would increase to a maximum of about two feet at higher flows. However, as flood flows get even higher, at some point water flows over the powerhouse, which is designed to be

submerged, would occur and the spillway width reverts back to the pre-project width. Further, at the highest flood levels, the dam is no longer a control structure, as the FEMA flood study indicates (see FEMA Flood Study at the end of the comment responses) and water level differences would be less at that point.

Accordingly, because of the steep banks and short-term flooding of upstream areas, Applicant concluded that effects on terrestrial habitat in the headpond would be small.

USFWS-23 Applicant notes the protected species list. Prior to construction, Applicant will again consult with the resource agencies to ensure that protected species will not be affected or undertake mitigation measures if there is a potential for effects.

USFWS-24 Applicant recognizes the relationship between eel and the eastern elliptio mussel and notes the USFWS comment that with eel passage the water quality in the headpond could be improved.

USFWS-25 Applicant notes the USFWS comment that the USFWS will issue a biological determination after the Commission has issued its draft environmental assessment. Per guidance from the USFWS, Applicant will continue to consult with the USFWS on threatened and endangered species findings.

USFWS-26 For the reasons stated above, Applicant does not concur with the USFWS that raising the headpond water level at lower flows and then during higher flows for short periods will affect island wetland habitats. The James River is a very flashy river system. Flows can rise and fall very quickly with rainfall totals of 2 to 3 inches. In the spring of 2020, on 4 occasions water levels increased by 4 to 5 feet during rain events. The changes proposed by Applicant are smaller in comparison.

Applicant assessed cumulative effects primarily for fish passage and recreation.

Applicant has estimated the total aquatic habitat impact from dredging and construction to be less than one acre. This includes enlarging the opening between Daniel Island and the arch section of dam, the area upstream of the arch section which will be dredged, and the area of the powerhouse and the tailrace. Applicant intends to minimize disturbance to aquatic habitat.

RESPONSES TO VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES COMMENTS

VDGIF-1 Applicant has had initial discussions with Liberty University, owner of a parcel of land adjacent to River Road to develop a public boat ramp. Applicant believes that Liberty University will either sell the property or provide rights to use it for recreational access. The parcel has been included in the Exhibit G Project Boundary.

VDGIF-2 Comment noted. Please refer to our responses to the USFWS above. Applicant appreciates VDGIF's cooperative approach to reach agreement on the Agreement in Principle. Applicant will work with the USFWS, VDGIF and the Virginia Department of Historic Resources to fully evaluate using the existing water canal for a nature-like fishway.

VDGIF-3 Applicant concurs with VDGIF and has aligned the powerhouse to direct flow towards the center of the river.

RESPONSES TO VIRGINIA DEPARTMENT OF CONSERVATINO AND RECREATION COMMENTS

DCR-1 We agree that public water access downstream of the dam may be complicated due to the proximity of the road. Nonetheless, Applicant is committed to providing recreation access adjacent to River Road. This access has been incorporated into the development plan. Similarly, Applicant will provide access upstream of the Scott's Mill dam nearer to the Reusens dam.

DCR-2 We concur that the Blackwater Creek Stream Conservation Unit is generally significant. The project should not affect Blackwater Creek. Once approvals have been obtained to start construction, Applicant will consult with VDCR and avoid or mitigate effects to the common clammy weed.

DCR-3 Similarly, Applicant will consult on the Green floater before construction to ensure that the green floater is not affected by construction or operation of the Scott's Mill Project.

DCR-4 Applicant intends to follow best management practices to minimize the potential for erosion. The soils and geology section of the Application has been amended to provide more specifics on erosion control. Note too that an erosion and control plan will be prepared before construction is allowed to begin. Applicant will also coordinate with VDGIF to ensure compliance with the Virginia Endangered Species Act.

DCR-5 Comment noted that the project will not affect any documented state-listed plants or insects.

DCR-6 Applicant intends to re-submit project information prior to construction start to ensure that the natural heritage information is up to date.

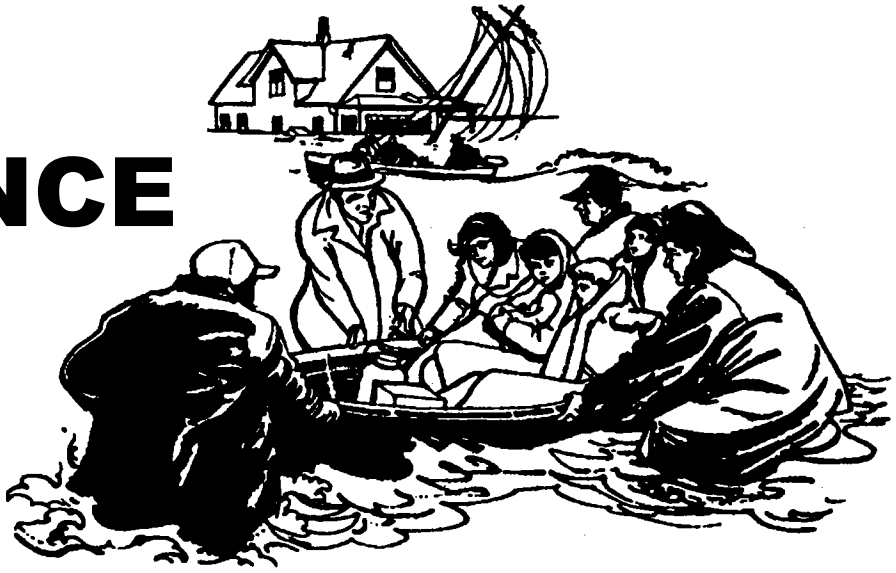
RESPONSES TO VIRGINIA DEPARTMENT OF HISTORIC RESOURCES COMMENTS

The Department of Historic resources comments were limited to the Phase II Architectural Survey of the Water Works Dam and Canal, James River Dam, and Scott's Mill Ruin.

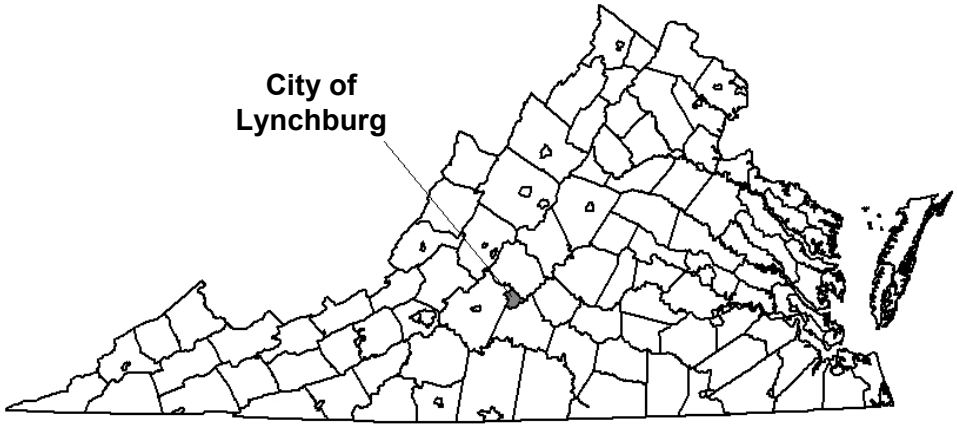
VDHR-1 Applicant will discuss the James River Dam status as an historic property when discussions take place with VDHR on potential mitigation measures in the Historic Properties Management Plan.

VDHR-2 Applicant concurs that the project should minimize impacts to the water Works Dam to the extent possible. Applicant will remove as little as possible of the top half of the dam. To obtain the necessary hydraulic characteristics in the headpond, approximately the top 6.4 feet of the dam will be removed.

FLOOD INSURANCE STUDY



CITY OF LYNCHBURG, VIRGINIA (INDEPENDENT CITY)



REVISED:

JUNE 3, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
510093V000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Selected Flood Insurance Rate Map panels for this community contain new flood zone designations. The flood hazard zones have been changed as follows:

Old Zones	New Zones
A1 through A30	AE
B	X
C	X

Initial FIS Effective Date: September 1, 1978

Revised FIS Date: November 16, 1983
June 3, 2008

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FLOOD INSURANCE STUDY
CITY OF LYNCHBURG, VIRGINIA (INDEPENDENT CITY)

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs / Flood Insurance Rate Maps (FIRMs) in the geographic area of the City of Lynchburg.

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by the City of Lynchburg to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the State (or other jurisdictional agency) shall be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for the FIS report dated November 16, 1983, represent a revision of the original analyses performed by CH2M HILL, Inc., for the Federal Emergency Management Agency, under Contract No. H-3833. That work was completed in May 1977. The updated version was conducted by the Wilmington District of the U. S. Army Corps of Engineers (USACE), under agreement with the Federal Emergency Management Agency, and was completed in January 1983.

For this FIS, revised hydrologic and hydraulic analyses were prepared for FEMA by AMEC Earth & Environmental, Inc. under contract with the City of Lynchburg and this work was completed in July 2004. In addition, AMEC Earth & Environmental, Inc. under Contract No. EMP-2001-CO-2411, Task Order 0023, used the existing hydraulic analyses for the City of Lynchburg to redelineate the James River floodplain based on more detailed and up-to-date topographic information. The topographic information

consisted of 2 ft. contours covering the geographic area of the City of Lynchburg. This work was completed in July 2006. The revised analyses and redelineated extents are summarized in Table 4 of Section 3.0 of this report.

Planimetric base map information is provided in digital format for all FIRM panels. These files were compiled at scales of 6000 and 12000 from aerial photography dated 2003. Additional information was derived from U.S. Census Bureau TIGER Line Data. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

The coordinate system used for the production of this FIRM is Universal Transverse Mercator (UTM), Zone 17 North, North American Datum of 1983 (NAD 83), GRS 80 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the UTM projection, NAD 83. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

The Digital Flood Insurance Rate Map (DFIRM) conversion for this study was performed by AMEC, Earth & Environmental, Inc. for FEMA, under Contract No. EMP-2001-CO-2411, Task Order 0023.

1.3 Coordination

An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings attended by officials of the City of Lynchburg and personnel of the Virginia State Water Control Board (SWCB), FEMA, CH2M HILL, Inc., (the study contractor) and the USACE are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 – INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Meeting	Final CCO Meeting
City of Lynchburg	March and October 1975	July 28, 1977

For this revision, the City of Lynchburg was notified by correspondence from FEMA on August 11, 2005, that the FIS would be updated.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of the independent City of Lynchburg, Virginia.

All or portions of the flooding sources listed in Table 2 "Flooding Sources Studied by Detailed Methods" were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRMs (Exhibit 2).

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS

Blackwater Creek
Burton Creek
Burton Creek Tributary No.1
Burton Creek Tributary No.2
Burton Creek Tributary No.3
Burton Creek Tributary No.4
Burton Creek Tributary No.5
Burton Creek Tributary No.6
Cheese Creek
Dreaming Creek
Ivy Creek
James River
Judith Creek
Rock Castle Creek
Rock Castle Creek Tributary No.4
Rock Castle Creek Tributary No.5
Rock Castle Creek Tributary No.6
Tomahawk Creek

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

A portion of the James River between a point approximately 1,500 feet downstream of U.S. Route 29A (Fifth Street) and a point approximately 450 feet upstream of the Lynchburg dam was revised as part of a Letter of Map Revision (LOMR) number 93-03-183P, dated July 22, 1993. The data from the LOMR was used to redelineate this portion of James River based on new and updated topography. The hydrologic and hydraulic methods in support of this letter action represent the best available data for the reach along James River. Additional information and supporting documentation can be obtained at the community map repository.

Fishing Creek and the remaining portions of Blackwater Creek and Ivy Creek were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by FEMA and the City of Lynchburg at the time of the original study.

2.2 Community Description

The City of Lynchburg is located in the midwestern portion of Virginia. It is bordered by Amherst County to the north and northeast, Campbell County to the south and southeast, and Bedford County to the west and northwest.

On January 1, 1976, Lynchburg annexed portions of Bedford and Campbell Counties. In so doing, it doubled its land area from approximately 25 square miles to 50 square miles. The population of the city was estimated at 64,108 in 2005 (www.lynchburgva.gov).

The climate of the city is pleasant except for short periods of weather extremes. It has warm, humid summers, while winters are generally mild but wet. Average temperatures for January and July are 35 degrees Fahrenheit (°F) and 76°F, respectively. The annual precipitation averages 38.27 inches (www.lynchburgva.gov). During the warm season, the precipitation is most often the result of convectional activities; frontal activity is more pronounced during the winter. Occasionally, tropical storms bring heavy rainfall in late summer and early fall.

The topography of Lynchburg is mainly rolling hills with a maximum elevation at Chandler Mountain of 1,336 feet. The minimum elevation of approximately 500 feet is located near the James River flood plain in the northeastern portion of the city. Typical vegetation in the drainage basins is usually combinations of the following: witch hazel, alder, spice bush, red maple, white oak, red oak, pin oak, box elder, hickory, ash, huckleberry, sassafras, tulip trees, chestnut seedlings, hemlock, hollies, fringe trees, sycamore, beech, yellow birch, scrub pine, dogwood, red bud, black walnut, yellow poplar, viburnum, sourwood, black gum, and persimmon (City of Lynchburg, 1974).

The major soil association for Lynchburg is the Cecil-Appling-Louisburg Association. This association is characterized by deep and shallow well drained soils formed mainly from the weathered products of granites, gneisses, and schists (USDA, SCS, 1977). Blackwater Creek and Ivy Creek, the major streams within Lynchburg, flow northeast and empty into the James River.

The flood plains of the James River near Lynchburg are intensely developed, containing numerous warehouses, factories, businesses, and the necessary rail, highway, and utility services for the city (USACE,

unpublished). Flood plain development for all other streams in the city is mainly residential with some commercial and industrial sites adjacent to the flood plain areas.

2.3 Principal Flood Problems

The highest flood stages on the James River in the vicinity of Lynchburg occurred in 1771, 1870, 1877, 1969, 1972, 1986, 1992 and 1996. Gage heights for these floods were recorded at the National Weather Service stream gaging station at Lynchburg (USACE, unpublished). Recurrence intervals have not been calculated for the floods in 1986, 1992 and 1996. Approximate recurrence intervals of several past floods in the city, estimated from a comparison of recorded flood elevations at the Lynchburg gage to flood elevations for the 10-, 50-, 100-, and 500-year floods, are shown in the following tabulation:

Date of Crest	Recurrence Interval (years)
May 26, 1771	Greater than 100
September 30, 1870	Greater than 100
November 24, 1877	100
August 20, 1969	100
June 21, 1972	50

Flooding on the other streams within Lynchburg most likely occurred on the above-mentioned dates. However, without stream gaging records, it is not possible to estimate dates or frequencies of past floods on the smaller streams.

2.4 Flood Protection Measures

Flood plain management measures in Lynchburg are described in the Virginia Uniform Statewide Building Code (Commonwealth of Virginia, 1975). This building code was adopted and is enforced by the city building inspector. The code states that, where a structure is located in the 100-year flood plain, the lowest floor must be built at or above the 100-year flood elevation, except for non-residential structures which may be flood-proofed to that level.

There are no flood control structures on any of the streams which have a significant effect on flood elevations. Gathright Dam, completed in 1979, is located on the Jackson River, which is a tributary of the James River. It controls runoff of only 344 square miles of the total 3,305-square mile drainage area upstream of Lynchburg. In 1969 and 1972, the area of concentration of rainfall which caused the greatest flooding along the James River was downstream from the area controlled by this dam. It is estimated that if the dam had been in operation during those floods, stages

on the James River at Lynchburg and downstream would have been reduced by less than 1 foot (USACE, 1970; USACE, 1974).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

Prerevised Analysis

Gaging stations used to determine discharges for the James River are listed in the following tabulation (USACE, unpublished).

Location	Gage No.	Length of Record
James River		
At Bent Creek	02026000	1924 to present
At Lynchburg	02025700	Gaging Station not active
At Holcumbs Rock	02025500	1900 to 1915
		1926 to present
At Buchanon	02019500	1898 to present

Values for the 10-, 50-, 100-, and 500-year floods were obtained from a regional frequency study of the James River basin gages, as performed in an earlier USACE study (USACE, unpublished).

Peak discharges for the other streams studied by detailed methods were developed by the Wilmington District of the USACE from a regional study of 114 stream gages in similar hydrologic basins of southwestern Virginia and North Carolina (USACE, 1976). Adjustments were made to discharges at restrictive bridge crossings where restrictions created reservoirs storing significant volumes of runoff. This analysis was performed by the Wilmington District of the USACE in the FISs for Campbell County and Bedford County (HUD, FIA, October 17, 1978; HUD, FIA, September 29, 1978).

Discharges for the 100-year flood for streams studied by approximate methods were estimated by comparing these streams to detailed study area streams having similar basin characteristics.

Revised Analysis

For this revision, all flooding sources designated for restudy are located in the James River Basin.

Effective discharges were computed for Burton Creek and Rock Castle Creek based on hydrologic modeling performed by the USACE. Backup data for these models could not be located by FEMA, USACE, or the City of Lynchburg. Therefore, the hydrologic models were recreated using the best available data.

Peak discharges for the flooding sources studied in detail were computed utilizing the HEC-1 flood hydrograph package. Curve numbers were developed using existing conditions land use data within the corporate limits, provided by the City of Lynchburg (City of Lynchburg, 2001). For areas of the watershed lying within Campbell County, Virginia GAP land cover was used. Soils data for the watershed was obtained from the State Soil Geographic Database (STATSGO) in conjunction with hardcopy Campbell County and City of Lynchburg Soils Reports (1977). Times of concentration were computed using the NRCS Technical Release No. 55 3-segment approach.

Rainfall data was obtained from the National Weather Service (NWS) Technical Paper No. 40 (TP-40), "Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours and Return periods from 1 to 100 Years". The 500-year precipitation was extrapolated using the methodology from TP-40. The NRCS Type II synthetic rainfall distribution was used in the hydrologic modeling.

The computed peak flood discharged were compared to peak flows from the effective FIS and to those computed using the USGS, Water Resources Investigation Report (WRIR) No. 94-4148, "Methods for Estimating Peak Discharges of Rural, Unregulated Streams in Virginia." The flows computed in the HEC-1 models and those in the effective FIS were higher than regression flows; this can be attributed to the fact that the regression equations do not account for urbanization. The increase in flow values

over those in the effective FIS can be attributed to both increased development in the watershed and better data available for preparation of the hydrologic analysis.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 3, "Summary of Discharges."

TABLE 3- SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
BLACKWATER CREEK					
Just upstream of Old Forest Road near its intersection with Hill Street	22.0	2,600	6,100	7,900	17,100
Just downstream of Lakeside Drive (U. S. Route 221) and the College Lake Dam	21.0	2,600	6,100	7,900	17,100
Just upstream of Lakeside Drive (U. S. Route 221) and the College Lake Dam	21.0	3,400	7,700	10,700	22,000
BURTON CREEK					
At confluence with Tomahawk Creek	10.0	6,770	9,730	10,930	14,060
Upstream of Dreaming Creek	5.6	5,030	7,220	8,120	10,440
Downstream of Fort Avenue	5.1	4,670	6,650	7,430	9,470
Upstream of Fort Avenue	4.9	4,490	6,380	7,120	9,170
Just downstream of confluence with Rock Castle Creek	4.7	4,290	6,050	6,730	8,850
Just upstream of confluence with Rock Castle Creek	1.1	1,580	2,380	2,720	3,600
At confluence of Burton Creek Tributary No. 4	1.0	1,470	2,220	2,540	3,360
At confluence with Burton Creek Tributary No. 5	0.8	1,010	1,570	1,810	2,440

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
BURTON CREEK (continued)					
Just downstream of confluence of Burton Creek Tributaries 1 & 2	0.6	790	1,230	1,420	1,910
BURTON CREEK TRIBUTARY NO. 1					
At confluence with Burton Creek	0.3	*	*	600	*
BURTON CREEK TRIBUTARY NO. 2					
At confluence with Burton Creek	0.2	*	*	540	*
BURTON CREEK TRIBUTARY NO. 3					
At confluence with Burton Creek	0.1	*	*	330	*
BURTON CREEK TRIBUTARY NO. 4					
At confluence with Burton Creek	0.2	*	*	720	*
BURTON CREEK TRIBUTARY NO. 5					
At confluence with Burton Creek	0.1	*	*	300	*
BURTON CREEK TRIBUTARY NO. 6					
At confluence with Burton Creek	0.1	*	*	390	*
CHEESE CREEK					
At confluence with Ivy Creek	3.46	1,100	2,600	3,700	6,250
At cross section D	1.50	700	1,750	2,450	4,300
At cross section E	0.82	450	1,100	1,625	2,900
At upper study limit	0.29	200	525	750	1,700
DREAMING CREEK					
At confluence with Burton Creek	4.4	900	2,600	3,500	6,750
Downstream from Norfolk & Western railroad bridge	3.6	600	2,200	2,900	4,700

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
DREAMING CREEK (continued)					
Upstream of Norfolk & Western railroad bridge	3.6	1,250	2,900	4,100	8,800
At U. S. Route 460	2.75	970	2,300	3,230	6,940
Upstream of tributary, approximately 350 feet upstream of U. S. Route 460	2.05	800	1,910	2,680	5,770
At State Route 1413 (Windsor Hill Drive)	1.88	755	1,800	2,530	5,460
Upstream of tributary, approximately 550 feet downstream of State Route 1447 (Buckingham Road)	1.39	620	1,485	2,090	4,520
At State Route 739 (Greenview Road)	0.98	490	1,185	1,670	3,620
Upstream of tributary, approximately 350 feet upstream of State Route 739	0.46	300	730	1,030	2,250
IVY CREEK					
At lower limit of detailed study	33.3	5,000	11,500	15,800	33,500
Above the confluence of Cheese Creek	29.3	4,500	10,500	14,500	31,000
At upper study limit	21.8	3,800	8,700	12,100	25,500
JAMES RIVER					
Upstream of confluence of Wreck Island Creek	3,453	81,900	134,000	164,900	271,900
Downstream of confluence of Blackwater Creek	3,370	81,900	134,000	164,900	271,900
Upstream of confluence of Blackwater Creek	3,305	79,100	129,300	159,000	255,800
JUDITH CREEK					
At confluence with James River	13.0	2,650	6,250	8,700	18,400
At upper study limit	10.0	2,200	5,300	7,300	15,600

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
ROCK CASTLE CREEK					
At confluence with Burton Creek	3.6	2,810	3,970	4,900	6,890
Confluence of Rock Castle Creek Tributary No. 5	3.3	2,530	3,840	4,710	6,520
Upstream of Rock Castle Creek Tributary No. 5	3.2	2,490	3,780	4,620	6,380
At Lynchburg Expressway	3.0	2,640	4,100	4,720	6,370
At confluence of Rock Castle Creek Tributary No. 4	2.6	2,400	3,680	4,230	5,670
Just upstream of Rock Castle Creek Tributary No. 4	2.4	2,330	3,570	4,110	5,500
Approximately 400 feet downstream of Atlanta Avenue	2.2	2,240	3,410	3,910	5,230
Just upstream of Wards Crossing Entrance	1.9	1,940	2,950	3,390	4,530
Approximately 725 feet downstream of Wards Ferry Road	1.7	1,790	2,690	3,080	4,080
Just upstream of Wards Ferry Road	1.0	840	1,300	1,500	2,070
ROCK CASTLE CREEK TRIBUTARY NO. 4					
At confluence with Rock Castle Creek	0.2	*	*	930	*
ROCK CASTLE CREEK TRIBUTARY NO. 5					
At confluence with Rock Castle Creek	0.1	*	*	360	*
ROCK CASTLE CREEK TRIBUTARY NO. 6					
At confluence with Rock Castle Creek	0.2	*	*	530	*
TOMAHAWK CREEK					
At confluence with Blackwater Creek	8.25	1,300	3,400	4,750	9,600

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
TOMAHAWK CREEK (continued)					
Downstream from Norfolk & Western railroad bridge	5.4	400	1,300	1,800	3,400
Upstream of Norfolk & Western railroad bridge	5.4	1,500	3,200	5.200	10,900
At upper study limit	3.17	1,100	2,500	3,600	7,700

* Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to us the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed, and dams and other flood control structures operate properly and do not fail.

All qualifying benchmarks within a given jurisdiction that are catalogued by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Benchmarks catalogued by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation (e.g., mounted in bedrock)

- Stability B: Monuments which generally hold their position/elevation (e.g., concrete bridge abutment)

- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)

- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition to NSRS benchmarks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for benchmarks shown on the FIRM for this jurisdiction, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their Web site at www.ngs.noaa.gov.

It is important to note that temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

Prerevised Analysis

Cross sections for the flooding sources studied by detailed methods were obtained from field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (USACE, 1973). Water-surface profiles for the James River for the 10-, 50-, 100-, and 500-year floods were provided by the Norfolk District of the USACE. The final floodway analysis was performed by CH2M HILL, Inc. Water-surface elevations for the 100-year flood were developed for a Flood Plain Information report prepared by the Norfolk District of the USACE (USACE, unpublished). In cooperation with the SWCB, the USACE also developed the 10-, 50-, and 500-year flood elevations. Values for these floods are on file in the SWCB office in Richmond, Virginia. Water-surface profiles for the same selected

recurrence intervals for all other streams studied, except for Blackwater Creek downstream of and including College Lake, were developed by the Wilmington District of the USACE. Profiles for these streams were prepared for the FISs for Campbell County and Bedford County (HUD, FIA, October 17, 1978; HUD, FIA, September 29, 1978). The profile for Blackwater Creek, downstream of College Lake, was prepared by CH2M HILL, Inc. Starting water-surface elevations for all flooding sources studied in detail were computed using the slope/area method.

Roughness coefficients (Manning's "n") for each flooding source were estimated by field inspection. Roughness values ranged from 0.044 to 0.060 for the main channel and from 0.075 to 0.120 for the overbank areas.

For the streams studied by approximate methods, cross sections were taken from topographic maps at a scale of 1:2,400 (Abrams Aerial Survey Corporation, 1973). Water-surface elevations were computed using the USACE HEC-2 step-backwater computer program (USACE, 1973).

Revised Analysis

All hydraulic modeling was performed using HEC-RAS, version 3.1.1, from the U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC). Basic modeling data for the detailed hydraulic analyses was performed using GeoRAS, a Geographic Information Systems (GIS) interface developed by HEC for the preparation of hydraulic models.

Effective cross section locations were used as a guide for developing new cross-sections based on the updated topographic information. Underwater sections were not field surveyed but were taken from the FEMA effective model where available. Where no effective model was available, underwater sections were obtained from field measurements.

Stream crossing information was incorporated from plans provided by the County and VDOT (where available). Field notes consisting of structure dimensions and channel geometry, as well as the structure material (i.e. corrugated metal pipe), were used to incorporate crossings where plans were not available. Roughness coefficients were assigned based on aerial photography and field reconnaissance. Peak flow values were obtained from the existing conditions HEC-1 model.

The starting water surface elevations were computed using normal depth.

For detailed analyses, flood profiles were computed for the 10-, 50-, 100-, and 500-year recurrence interval flood events. In addition, the floodway was determined using equal reduction of conveyance on opposite sides of the stream while allowing a maximum surcharge of 1.0 ft.

For limited detail analyses, flood profiles were computed for the 100-year recurrence interval flood events. Floodways were not computed.

Floodplains were delineated using GeoRAS. Floodplains were mapped to include backwater effects that govern each flooding source near its downstream extent. Floodplains were reviewed for accuracy and adjusted as necessary.

Roughness coefficients for each flooding source were estimated using digital orthophotos and were verified by field inspection. Roughness values were set to 0.04 for the main channel and ranged from 0.05 to 0.10 for the overbank areas.

For the streams that were not restudied but were redelineated, the FEMA effective models were rerun and the elevations adjusted to NAVD 88 to delineate the boundaries on the city topography.

The 1 percent annual chance flood was digitized for the previously studied approximate streams and adjusted to the City of Lynchburg's topographic mapping and significant changes in topography, stream crossings and other planimetric data were taken into account. The digitized approximate studies were then edgematched to adjoining detailed study areas to provide a smooth transition between detailed and approximate flood zones.

Table 4 list all the streams and the special flood hazard area (SFHA) associated with them.

TABLE 4- STUDIED STREAMS

Stream	SFHA	Length (mi)	Hydrology	Hydraulics	Floodplain	Floodway
Burton Creek	Detailed	2.4	Revised	Revised	Revised	Revised
Burton Creek Tributary No. 1	Limited Detailed	0.9	New	New	New	None
Burton Creek Tributary No. 2	Limited Detailed	0.6	New	New	New	None
Burton Creek Tributary No. 3	Limited Detailed	0.5	New	New	New	None
Burton Creek Tributary No. 4	Limited Detailed	0.6	New	New	New	None
Burton Creek Tributary No. 5	Limited Detailed	0.2	New	New	New	None
Burton Creek Tributary No. 6	Limited Detailed	0.2	New	New	New	None
Rock Castle Creek	Detailed	9.6	Revised	Revised	Revised	Revised
Rock Castle Creek Tributary No. 4	Limited Detailed	0.3	New	New	New	None
Rock Castle Creek Tributary No. 5	Limited Detailed	0.4	New	New	New	None
Rock Castle Creek Tributary No. 6	Limited Detailed	0.8	New	New	New	None

Stream	SFHA	Length (mi)	Hydrology	Hydraulics	Floodplain	Floodway
Blackwater Creek	Detailed	3.5	Effective	Effective	Redelineated	Effective with modifications*
Blackwater Creek	Approximate	7.0	Effective	Effective	Digitized**	None
James River	Detailed	9.0	Effective	Effective	Redelineated	Effective with modifications*
Dreaming Creek	Detailed	4.2	Effective	Effective	Redelineated	Effective with modifications*
Tomahawk Creek	Detailed	4.9	Effective	Effective	Redelineated	Effective with modifications*
Ivy Creek	Detailed	4.8	Effective	Effective	Redelineated	Effective with modifications*
Ivy Creek	Approximate	3.9	Effective	Effective	Digitized**	None
Cheese Creek	Detailed	3.9	Effective	Effective	Redelineated	Effective with modifications*
Judith Creek	Detailed	4.4	Effective	Effective	Redelineated	Effective with modifications*
Fishing Creek	Approximate	4.5	Revised	Revised	Digitized**	None

* Digitized effective floodway and modified to agree with redelineated floodplain

** Adjusted to topographic and planimetric mapping

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the completion of the North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are now prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are now referenced to NAVD 88. In order to perform this conversion, effective NGVD 29 elevation values were adjusted downward by 0.77 foot. Structure and ground elevations in the community must, therefore, be referenced to NAVD 88. It is important to note that adjacent communities may be referenced to NGVD 29. This may result in differences in base flood elevations across the corporate limits between the communities.

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910

(301) 713-3191
http://www.ngs.noaa.gov/

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1 percent annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2 percent annual-chance flood elevations; delineations of the 1 percent and 0.2 percent annual-chance floodplains; and a 1 percent annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the county. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been determined at each cross section. The delineations are based on the best available topographic information.

Prerevised Analysis

For the streams studied in detail, the 1 and 0.2-percent annual chance floodplain boundaries have been determined at each cross section; between cross sections, the boundaries for all streams studied in detail except Blackwater Creek were interpolated using topographic maps at a scale of 1:24,000 enlarged to a scale of 1:12,000, with a contour interval of 20 feet (USDI, USGS, 1965). For Blackwater Creek, the boundaries were delineated using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Abrams Aerial Survey Corporation, 1973).

For the streams studied by approximate methods, the boundary of the 100-year flood was delineated using topographic maps at a scale of 1:2,400 (Abrams Aerial Survey Corporation, 1973).

Revised Analysis

Topographic mapping was provided by the City of Lynchburg to support floodplain mapping efforts. The city provided 2-foot contour data

developed from aerial topographic information. For the streams studied in detail, the 1 percent annual chance floodplains have been delineated using the water-surface elevations determined at each cross section. The delineation was based on the aforementioned topographic mapping. Floodplains were delineated using the GeoRAS extension within ArcGIS on the Triangular Irregular Network (TIN) developed from the provided contour data.

The 1 percent and 0.2 percent annual chance floodplain boundaries are shown on the FIRM. On this map, the 1 percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 0.2 percent annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1 percent and 0.2 percent annual chance floodplain boundaries are close together, only the 1 percent annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied in limited detail or by approximate methods, only the 1 percent annual chance floodplain boundary is shown on the FIRM.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1 percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1 percent annual chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 5). The computed floodways are shown on the FIRM. In cases where the floodway

and 1 percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the James River and Judith Creek extend beyond the corporate limits.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 5 for certain downstream cross sections are lower than the regulatory flood elevations in that area, which must take into account the 1 percent annual chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 5, "Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 1 percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1 percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

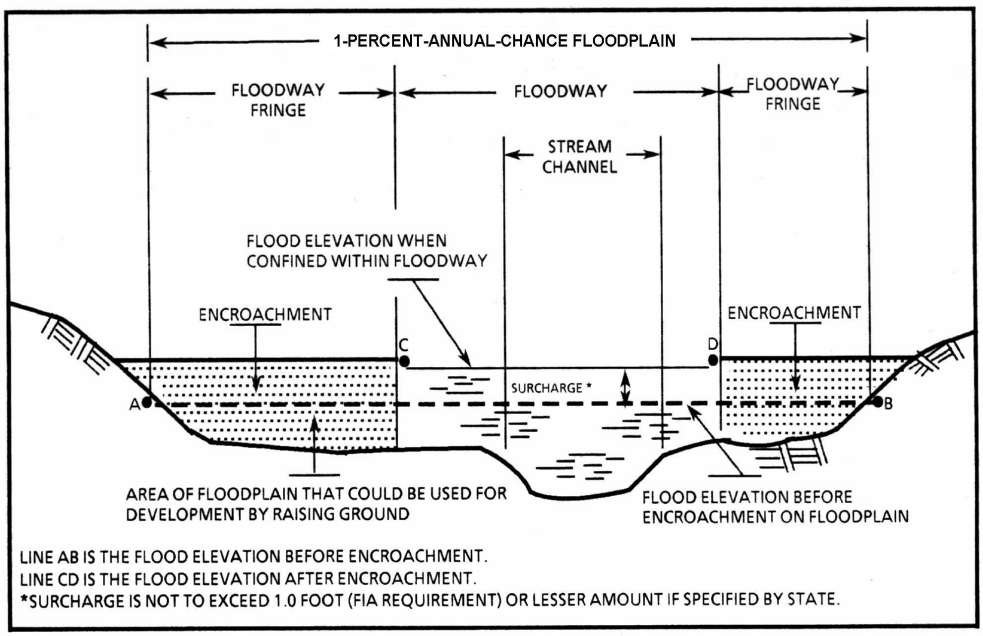

FIGURE 1: FLOODWAY SCHEMATIC

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Blackwater Creek								
A	37,341	112	1,111	7.1	610.0	610.0	610.9	0.9
B	38,041	249	2,005	3.9	612.4	612.4	613.2	0.8
C	38,891	153	1,325	6.0	613.8	613.8	614.7	0.9
D	45,180	255	2,272	4.7	641.2	636.5[2]	637.3	0.8
E	48,580	255	2,625	4.0	645.6	645.6	645.6	0.0
F	52,880	255	2,491	4.3	654.1	654.1	654.2	0.1

[1]Feet above confluence with James River
[2]Elevation computed without consideration of backwater effects from College Lake Dam

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

BLACKWATER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Burton Creek								
A	1,564	105	925	11.9	660.7	660.7	660.7	0.0
B	3,575	166	1,490	5.5	670.5	670.5	671.1	0.6
C	8,174	294	1,982	3.8	705.9	705.9	706.8	0.9
D	8,923	220	3,542	2.1	721.5	721.5	721.5	0.0
E	9,323	122	5,421	2.1	739.9	739.9	740.9	1.0
F	10,989	110	4,496	0.6	755.4	755.4	756.3	0.9
G	12,699	270	4,981	0.4	755.4	755.4	756.3	0.9

[1] Feet above confluence with Blackwater Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

BURTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Cheese Creek								
A	960	245	741	5.0	637.7	631.7[2]	632.7	1.0
B	4,410	260	515	6.4	659.1	659.1	659.1	0.0
C	9,100	90	452	6.4	692.0	692.0	692.0	0.0
D	9,320	90	384	7.6	707.8	707.8	707.8	0.0
E	12,850	140	404	6.1	759.0	759.0	759.0	0.0
F	16,710	105	580	2.8	773.3	773.3	774.3	1.0
G	20,620	50	104	7.2	829.1	829.1	829.1	0.0

[1]Feet above confluence with Ivy Creek
[2]Elevation computed without consideration of backwater effects from Ivy Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

CHEESE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Dreaming Creek								
A	850	170	697	5.0	668.7	666.7[2]	666.1	0.6
B	3,195	146	926	3.8	688.9	688.9	688.9	0.0
C	4,195	65	901	3.9	699.6	699.6	699.6	0.0
D	9,520	107	1,040	3.9	725.4	725.4	725.4	0.0
E	13,845	206	673	4.8	751.6	751.6	751.6	0.0
F	16,720	85	711	3.8	781.0	781.0	781.0	0.0
G	18,495	66	859	2.4	799.2	799.2	799.2	0.0
H	22,020	88	716	2.3	829.9	829.9	829.9	0.0

[1]Feet above confluence with Burton Creek
[2]Elevation computed without consideration of backwater effects from Burton Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

DREAMING CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Ivy Creek								
A	20,400	310	2,810	5.6	626.3	626.3	626.9	0.6
B	27,470	500	5,210	2.8	637.3	637.3	637.3	0.0
C	33,570	215	1,882	7.7	649.5	649.5	649.5	0.0
D	43,520	230	2,312	5.9	670.5	670.5	670.5	0.0

[1]Feet above confluence with James River

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

IVY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
James River								
A	247.59	1,490	31,604	5.2	507.4	507.4	507.8	0.4
B	249.20	660	16,816	9.8	515.5	515.5	515.8	0.3
C	253.43	1,070	23,648	6.7	533.3	533.3	533.5	0.2
D	253.82	1,250	28,239	5.6	535.0	535.0	535.2	0.2

[1]Miles above confluence with Chesapeake Bay
[2]This width extends beyond corporate limits

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

JAMES RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Judith Creek								
A	630	160/60	1,004	8.7	567.0	562.0[3]	562.0	0.0
B	6,880	75/30	625	13.3	611.1	611.1	611.1	0.0
C	10,050	185/110	1,460	5.7	637.8	637.8	637.9	0.1
D	12,800	95/45	940	8.3	648.5	648.5	648.6	0.1
E	17,420	145/15	899	8.1	664.4	664.4	664.5	0.1

[1]Feet above confluence with James River
[2]Width/width within corporate limits
[3]Elevation computed without consideration of backwater effects from James River

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

JUDITH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Rock Castle Creek								
A	990	195	771	6.1	739.7	718.8[2]	719.4	0.6
B	4,152	88	465	10.0	741.5	741.5	741.8	0.3
C	5,052	390	3,838	1.2	756.2	756.2	756.3	0.1
D	5,595	330	3,371	1.4	756.3	756.3	756.5	0.2
E	6,120	190	1,668	2.8	756.8	756.8	757.7	0.9
F	8,461	140	2,283	1.8	779.0	779.0	779.1	0.1
G	9,745	80	1,154	3.6	784.8	784.8	785.1	0.3
H	11,125	322	1,581	2.4	788.1	788.1	788.7	0.6
I	13,712	45	433	3.5	809.7	809.7	809.8	0.1

[1]Feet above confluence with Burton Creek
[2]Elevation computed without consideration of backwater effects from Burton Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

ROCK CASTLE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tomahawk Creek								
A	1,400	90	924	5.1	660.2	660.2	660.8	0.6
B	8,040	120	1,059	4.5	683.3	683.3	683.3	0.0
C	8,850	75	991	4.8	691.4	691.4	691.4	0.0
D	12,200	125	1,120	4.2	702.1	702.1	702.1	0.0
E	13,510	155	977	4.9	706.2	706.2	706.5	0.3
F	17,280	120	1,150	4.5	726.5	726.5	726.5	0.0
G	18,180	105	1,303	4.0	734.4	734.4	734.4	0.0
H	19,500	320	2,367	2.2	734.8	734.8	735.7	0.9

[1]Feet above confluence with Blackwater Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA (INDEPENDENT CITY)

FLOODWAY DATA

TOMAHAWK CREEK

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1 percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1 percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 1 percent annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 1 percent annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 1 percent annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1 percent annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1 percent annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2 percent annual chance floodplain, areas within the 0.2 percent annual chance floodplain, and to areas of 1 percent annual chance flooding where average depths are less than 1 foot, areas of 1 percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1 percent annual chance flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0. In the 1 percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1 percent and 0.2 percent annual chance floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The current FIRM presents flooding information for the entire geographic area of the City of Lynchburg. This FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable.

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for the City of Lynchburg has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FIRMs, FBFMs, and FHBMs for the City of Lynchburg.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, Federal Emergency Management Agency, One Independence Mall, Sixth Floor, 615 Chestnut Street, Philadelphia, Pennsylvania 19106-4404.

9.0 BIBLIOGRAPHY AND REFERENCES

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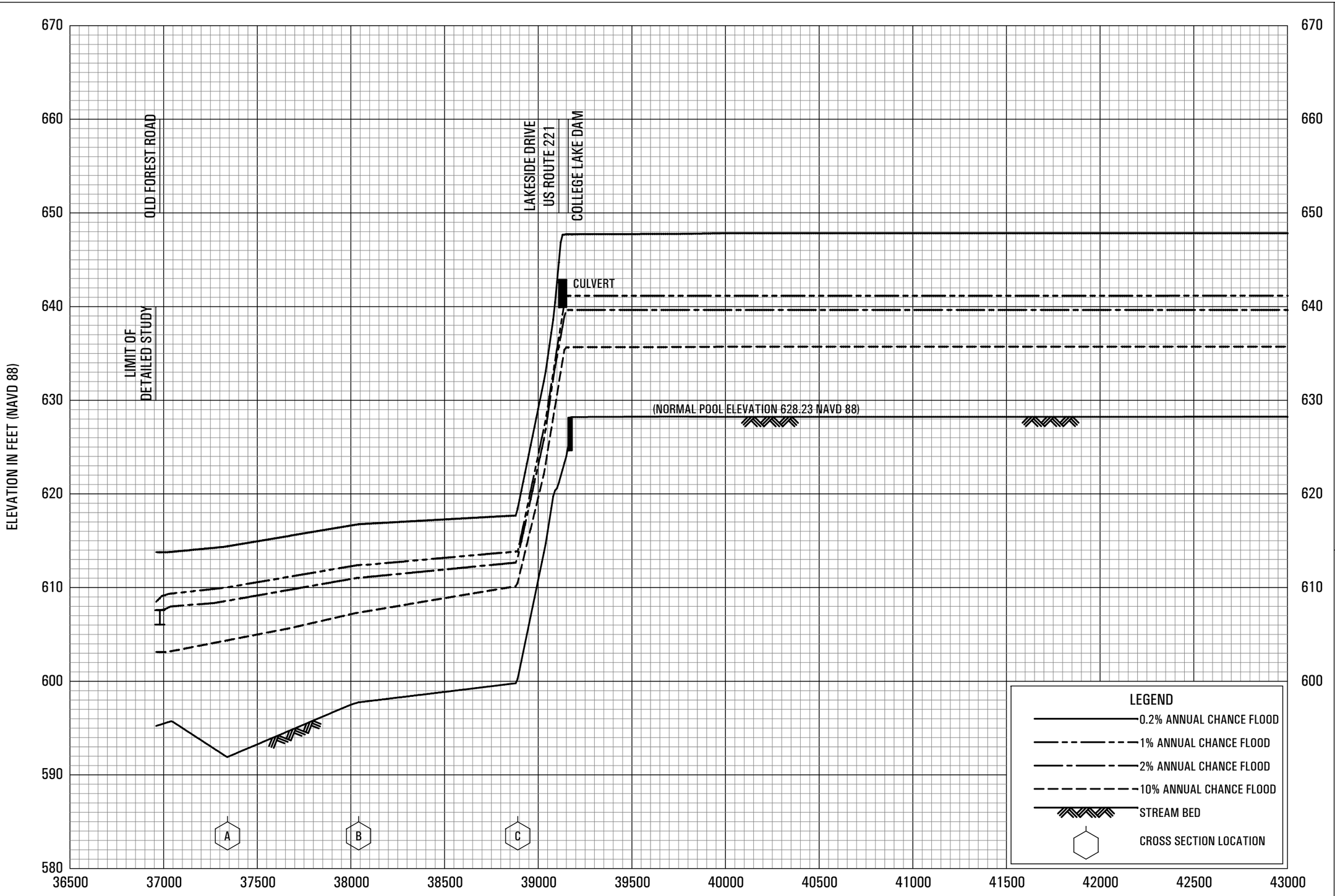


FLOOD PROFILES

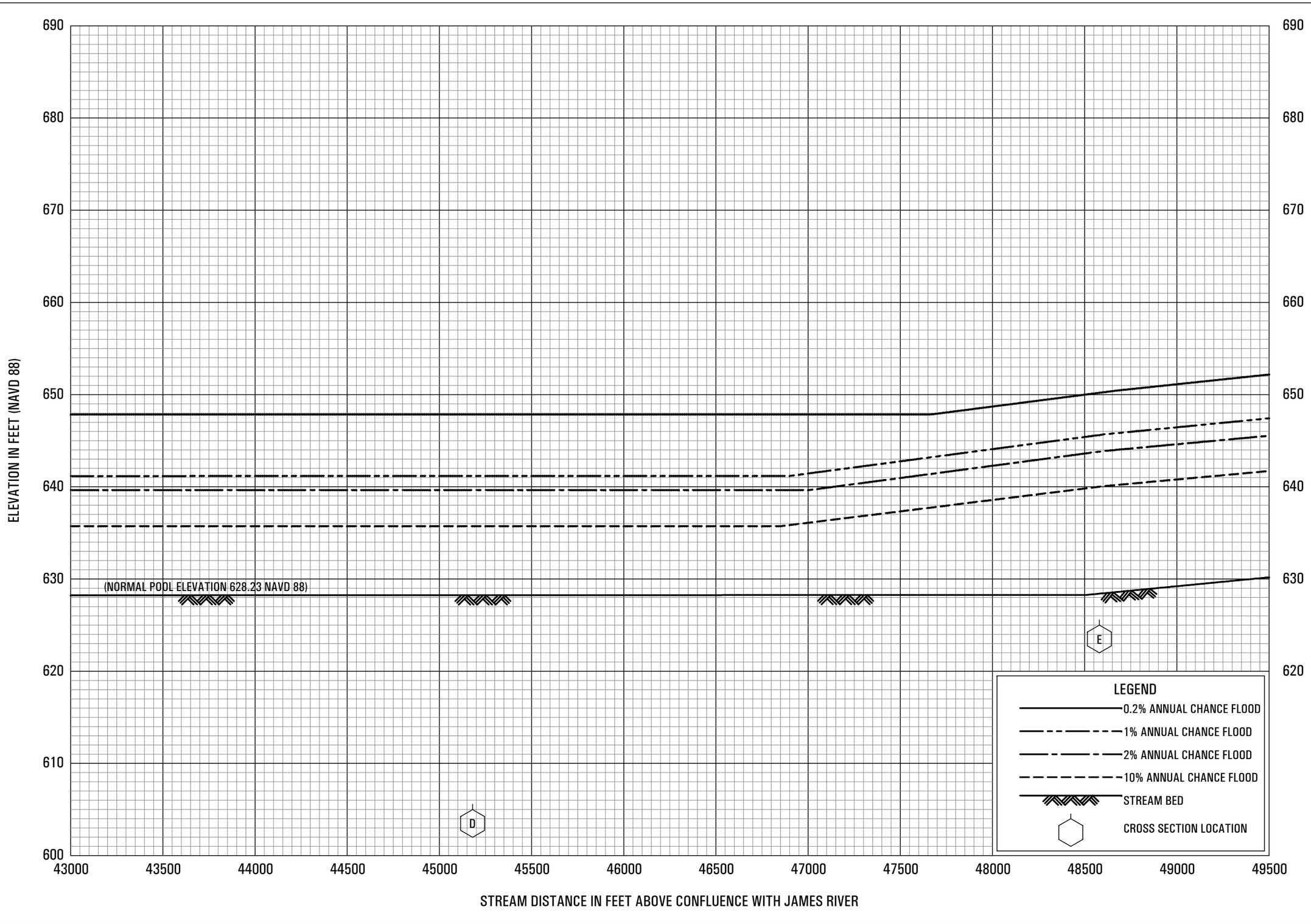
BLACKWATER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

01P



FLOOD PROFILES

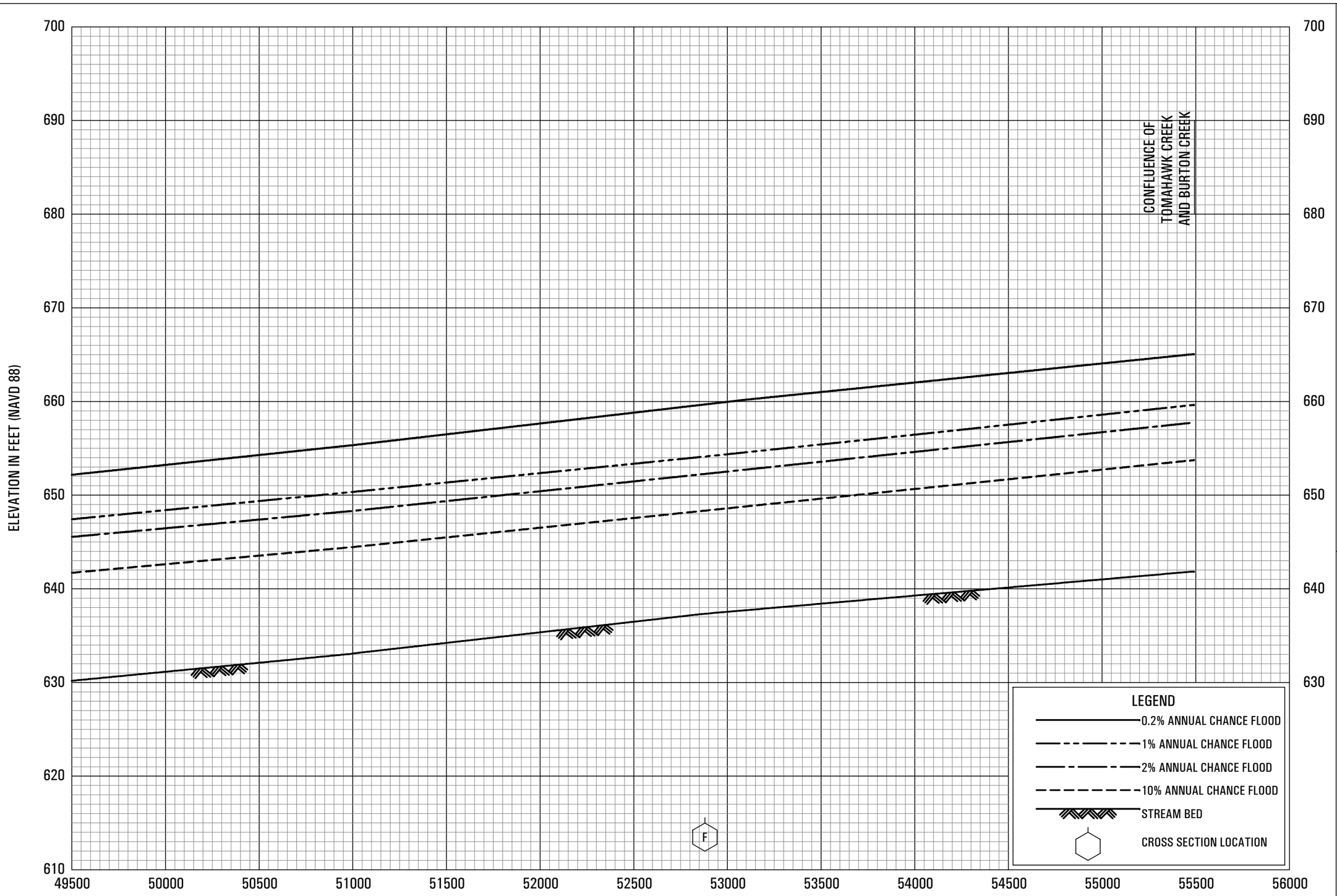
BLACKWATER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

02P



FLOOD PROFILES

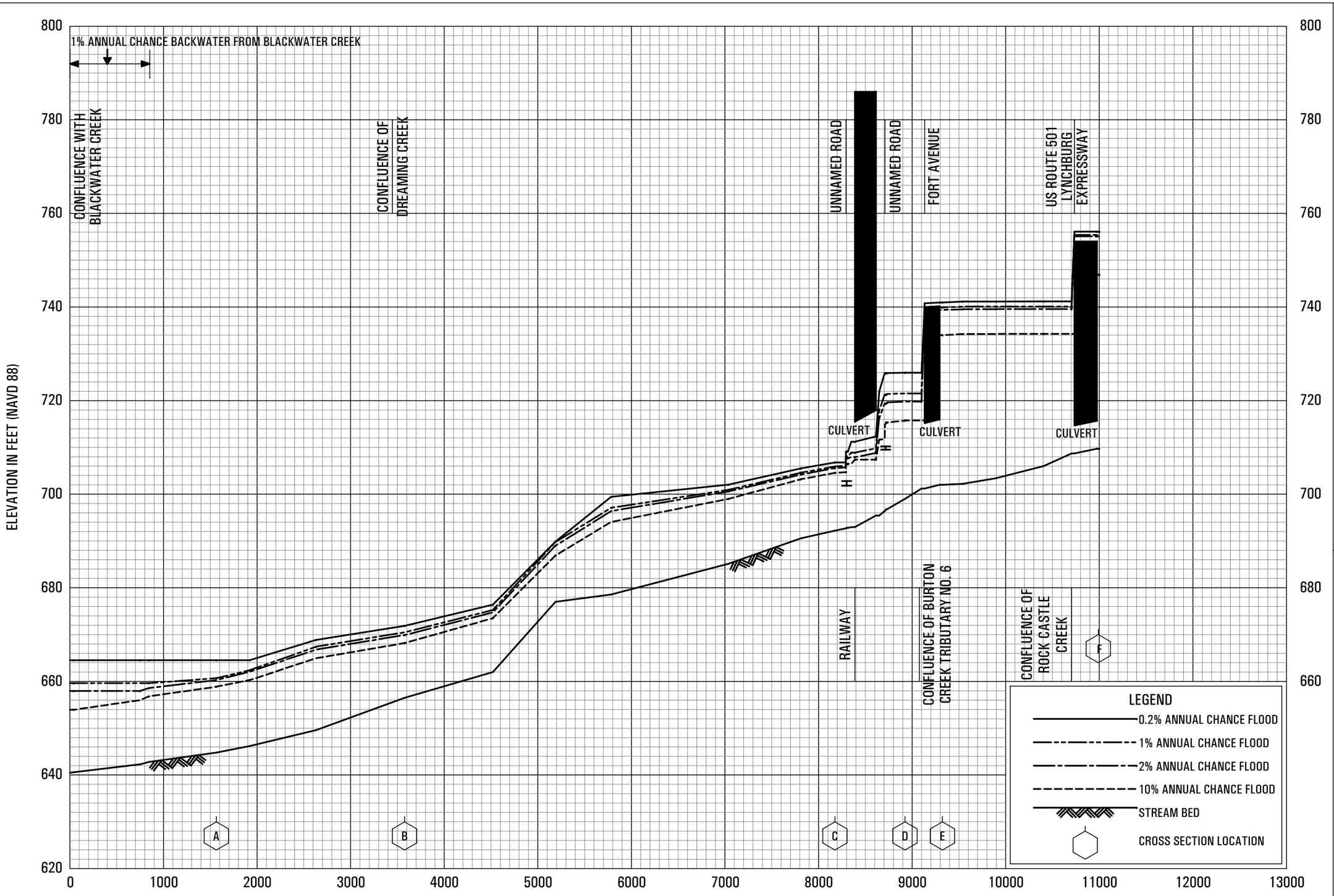
BLACKWATER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

03P



FLOOD PROFILES

BURTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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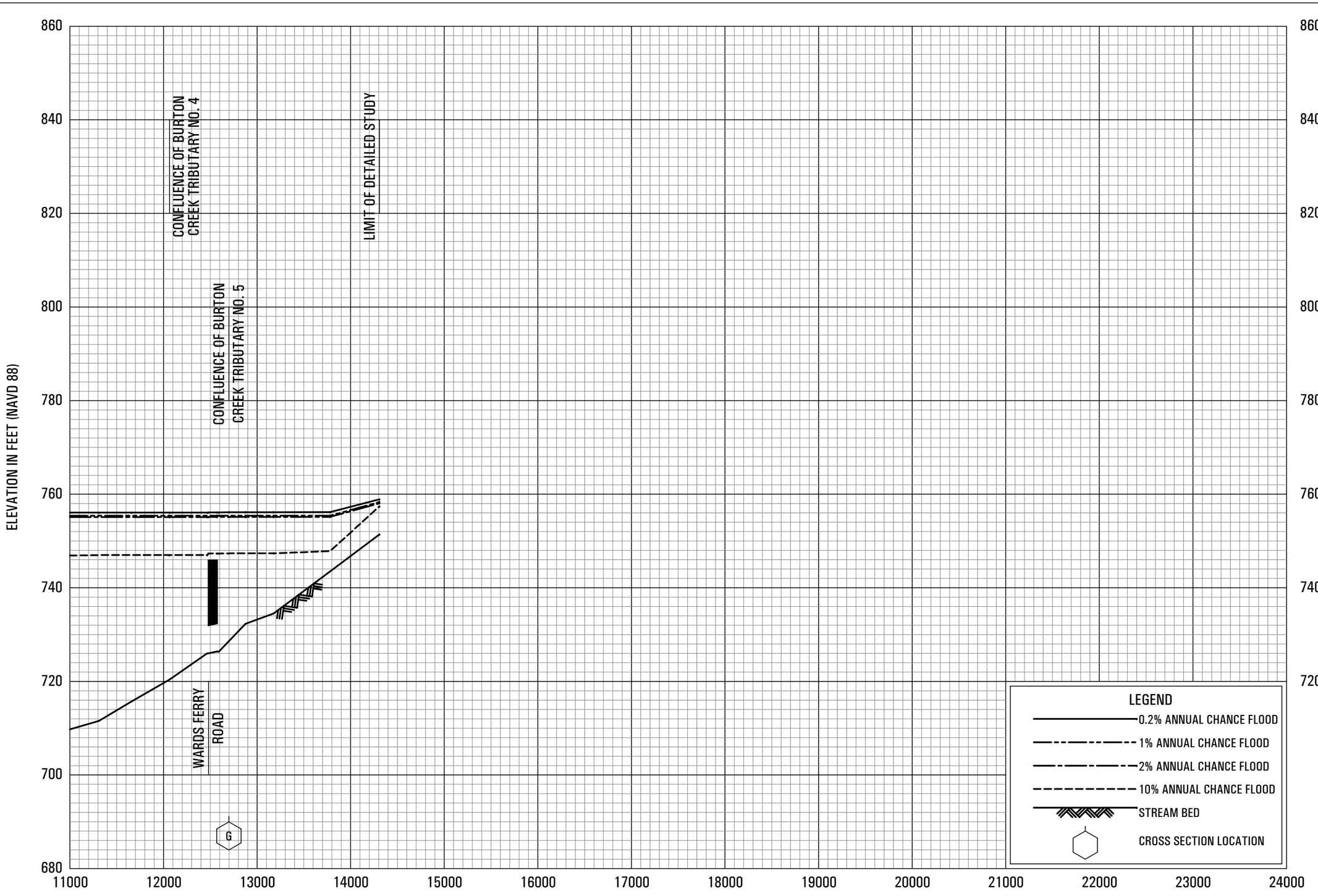

FLOOD PROFILES

BURTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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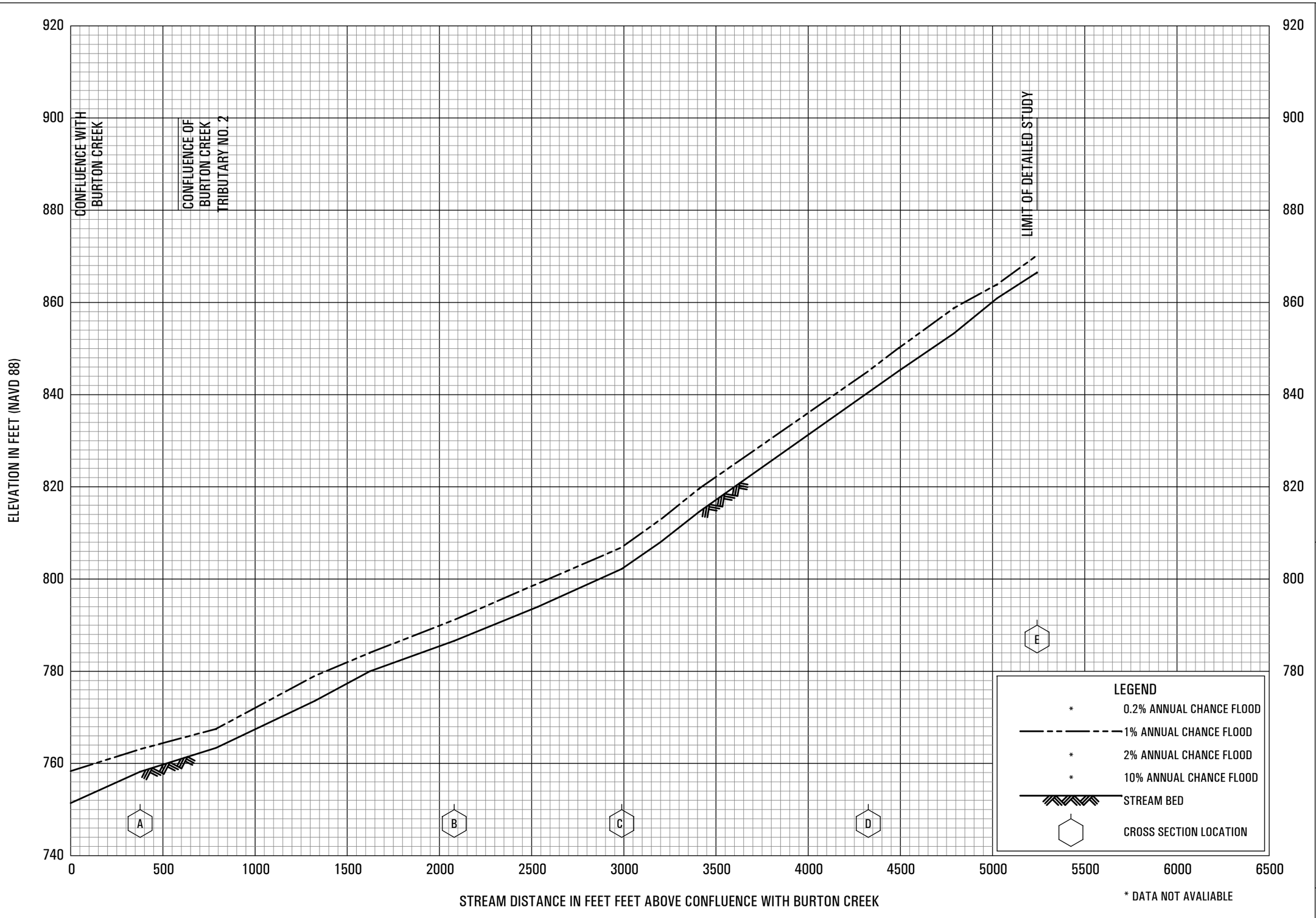

FLOOD PROFILES

BURTON CREEK TRIBUTARY NO.1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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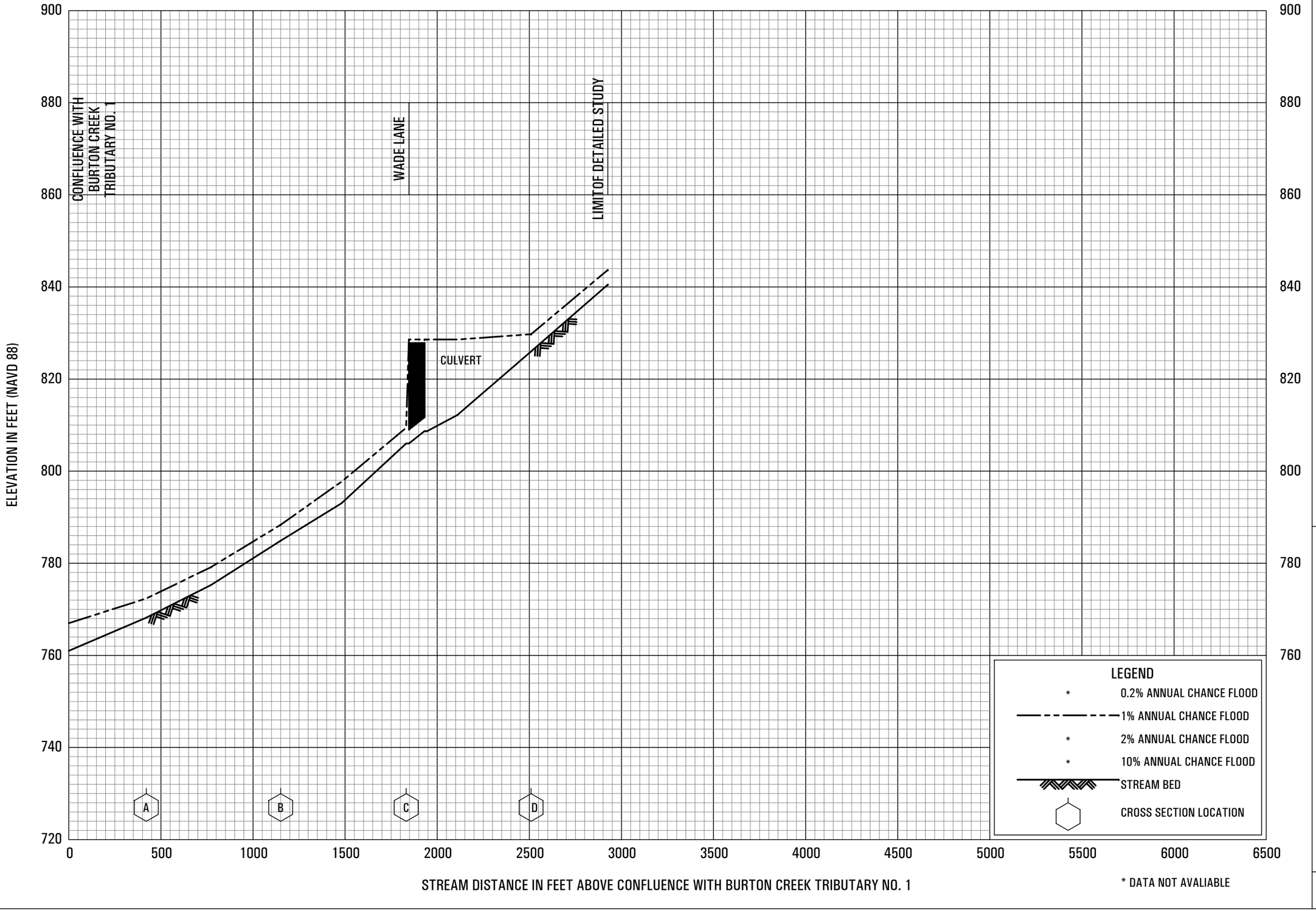

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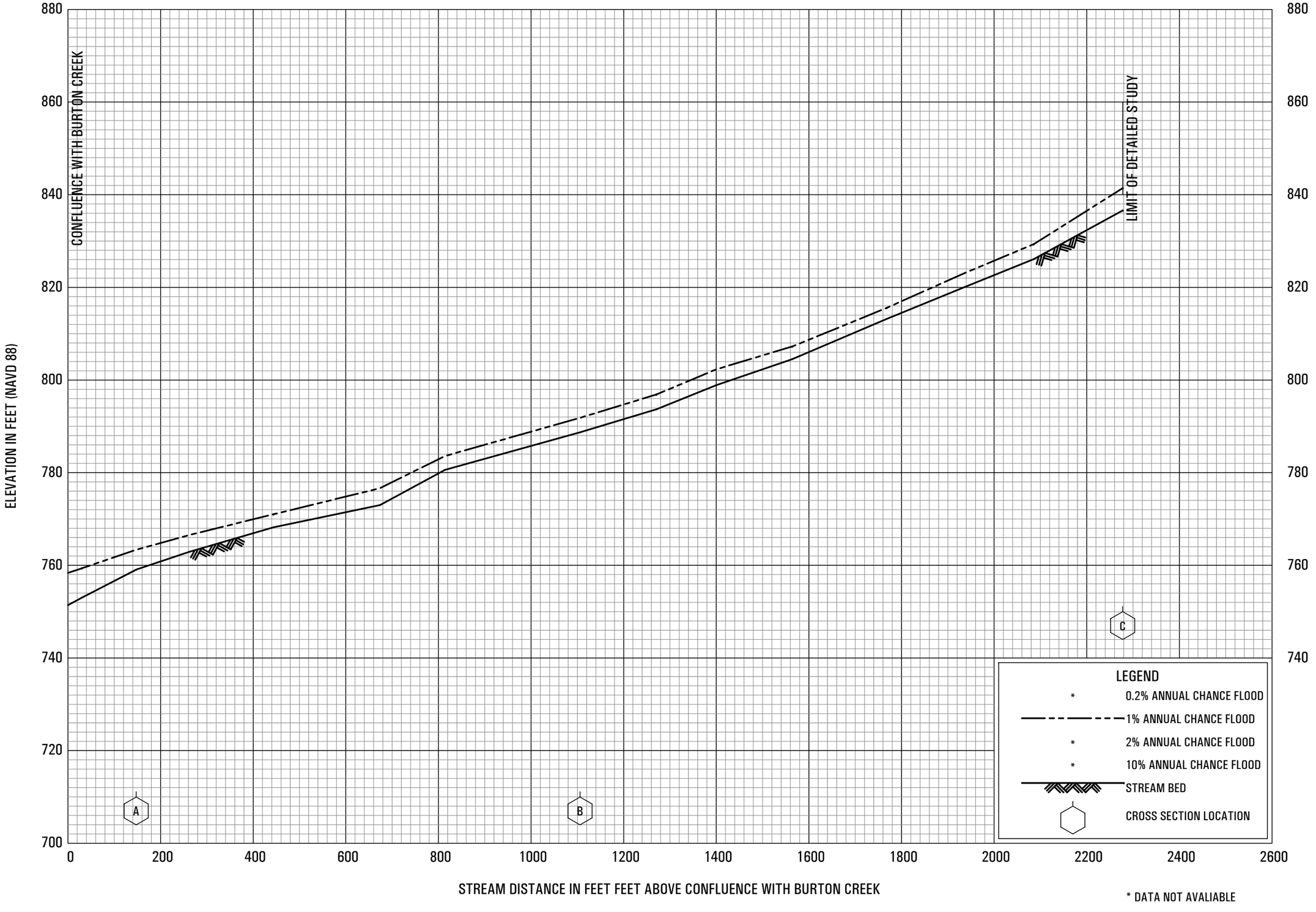
CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



FLOOD PROFILES

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CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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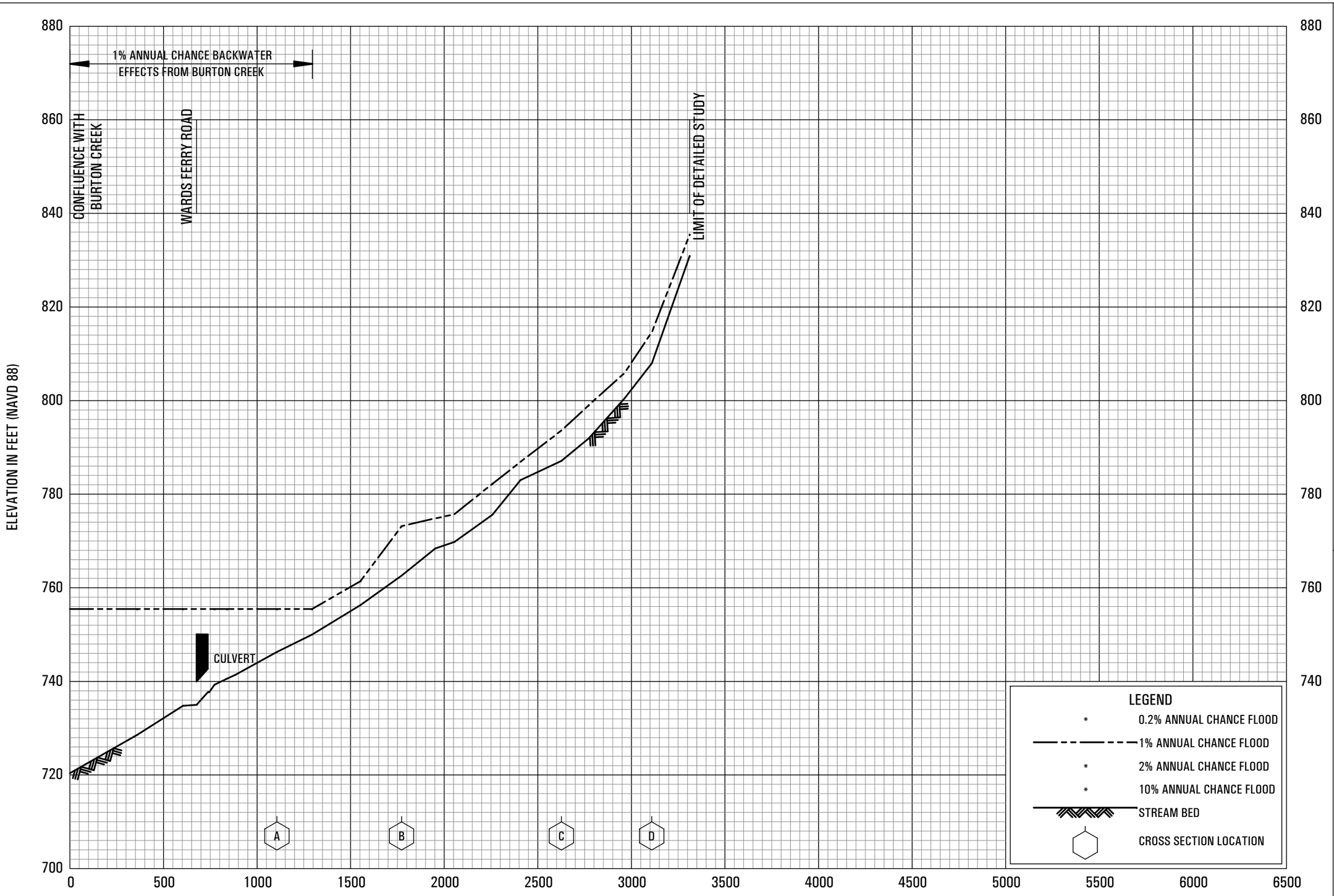

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FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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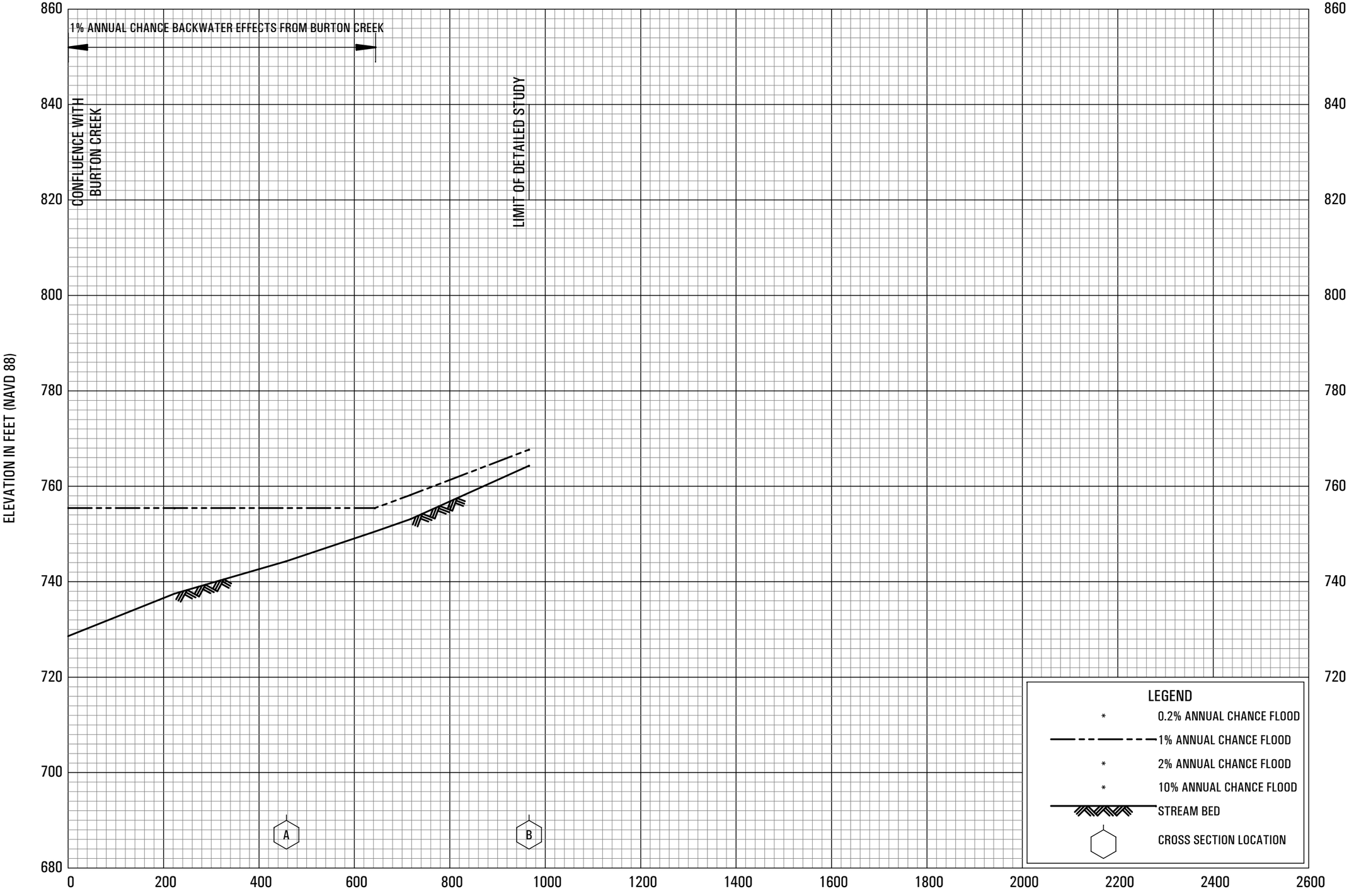

FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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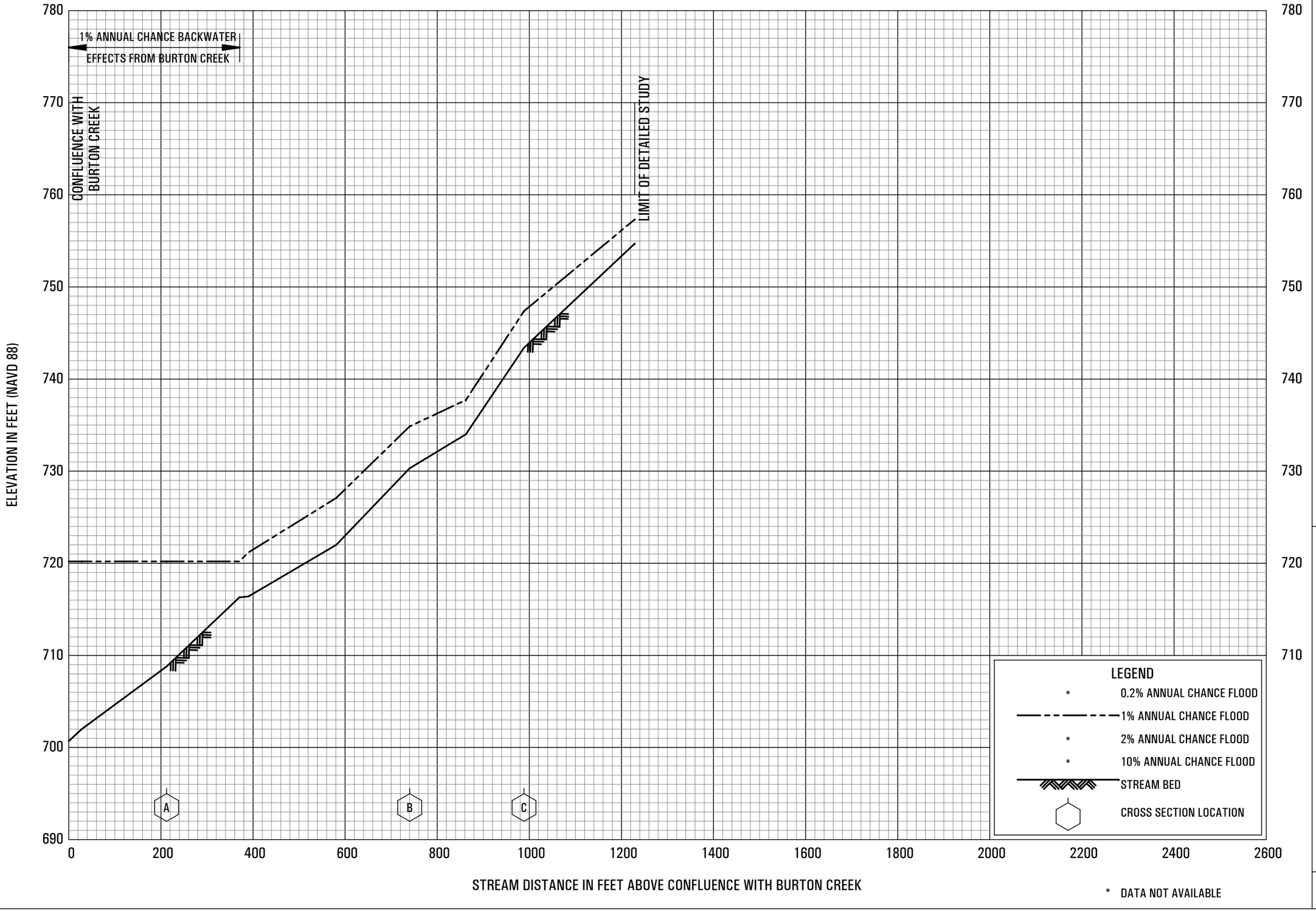


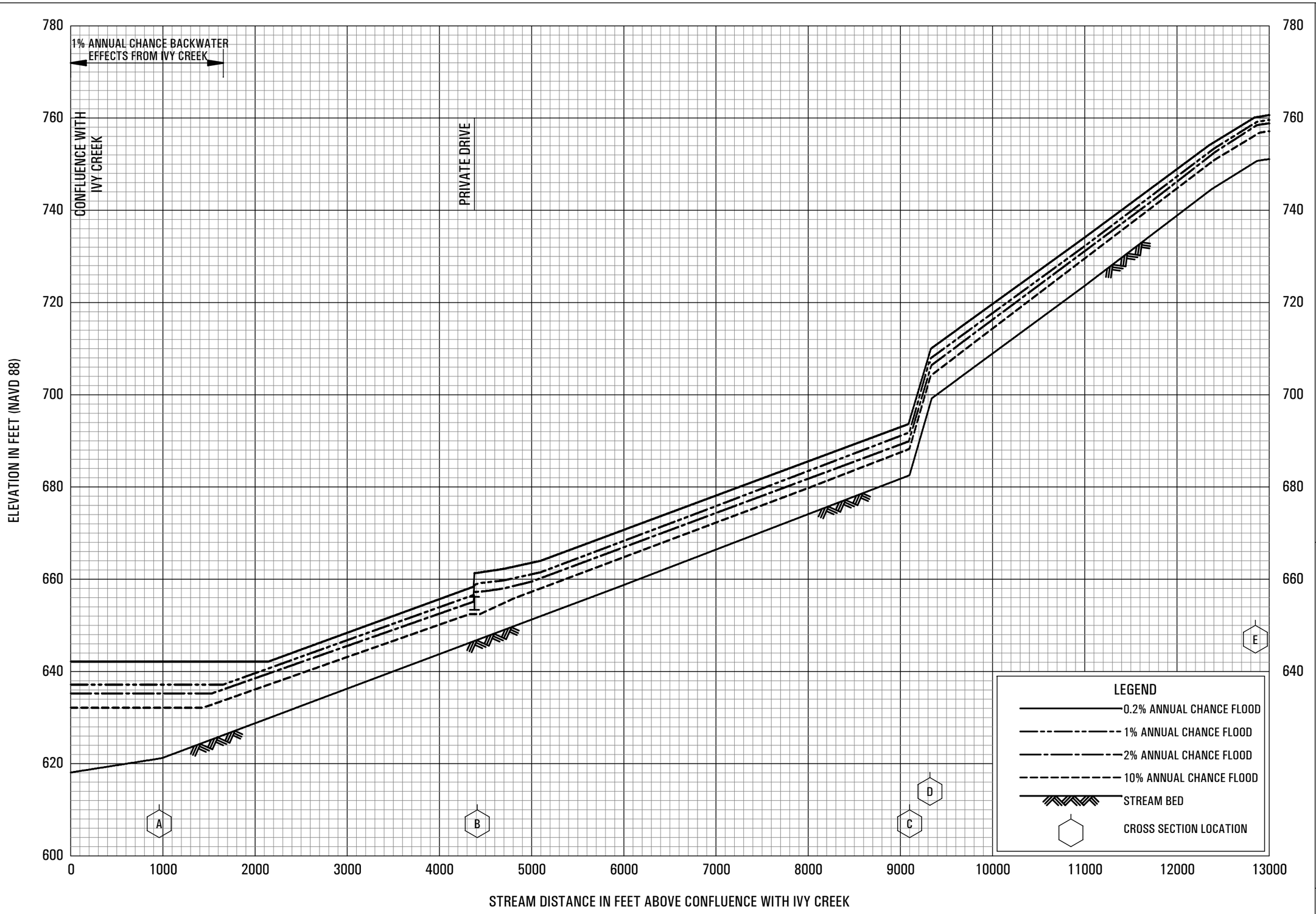
FLOOD PROFILES

BURTON CREEK TRIBUTARY NO. 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



FLOOD PROFILES

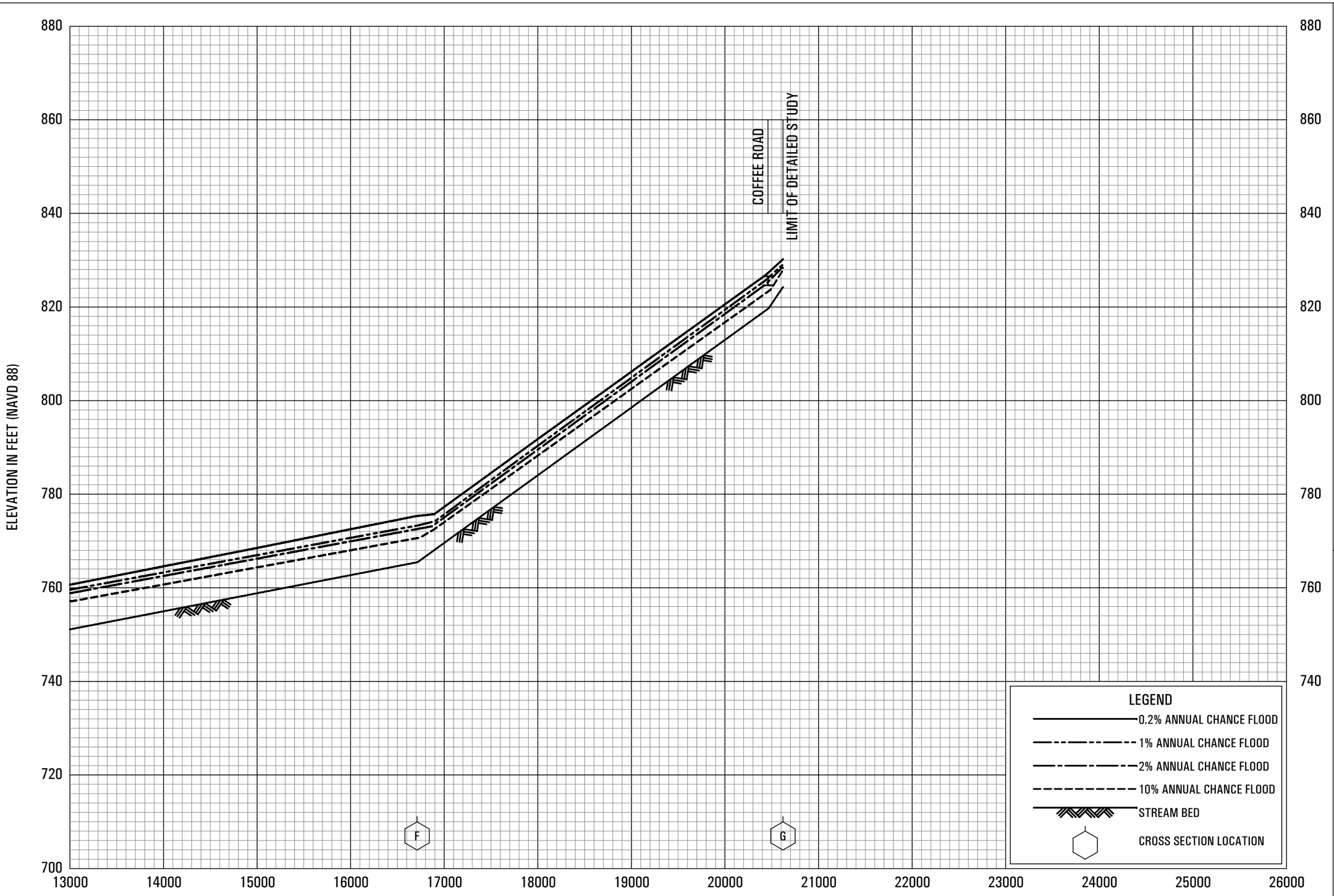
CHEESE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

12P



FLOOD PROFILES

CHEESE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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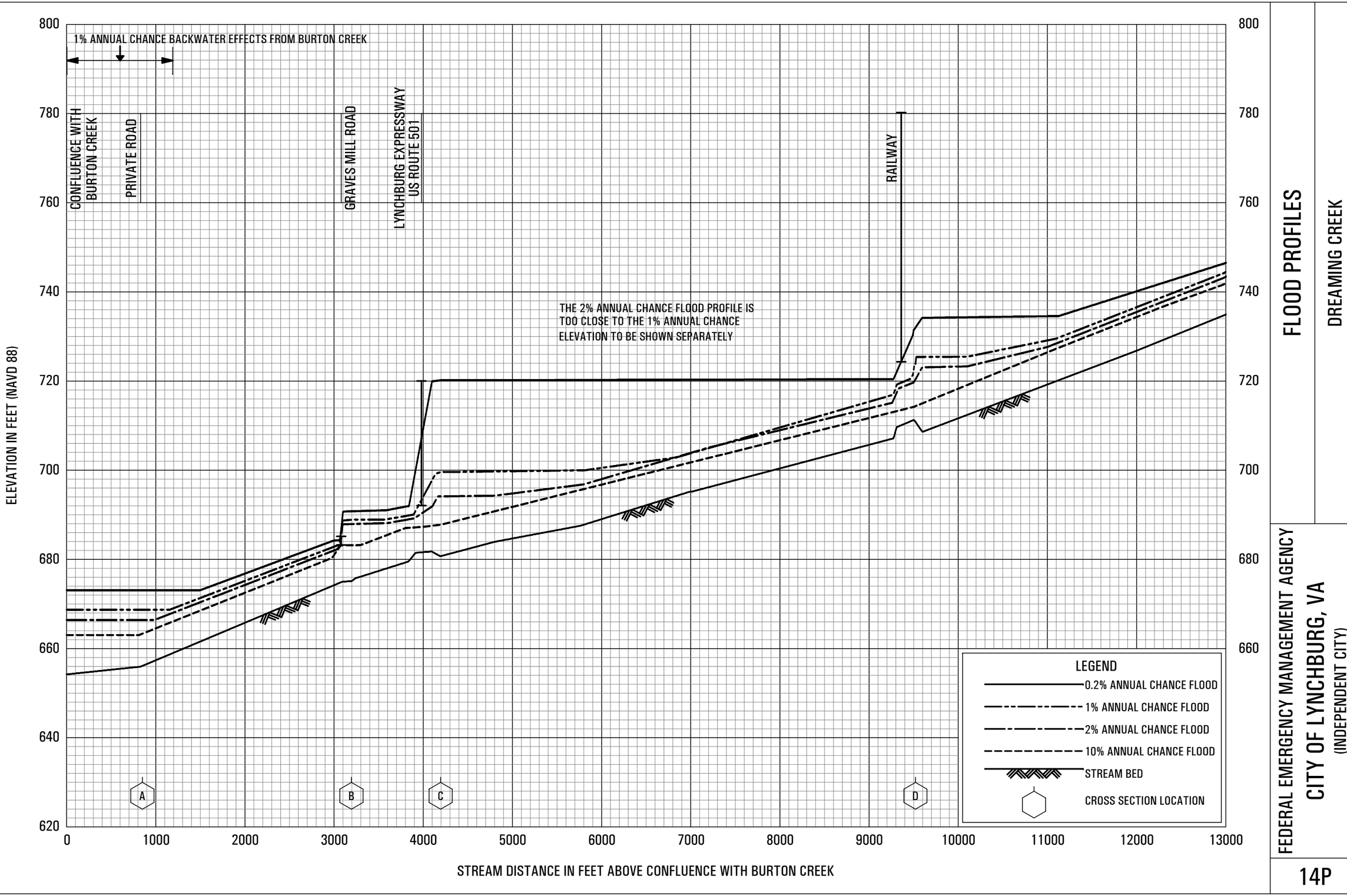

FLOOD PROFILES

DREAMING CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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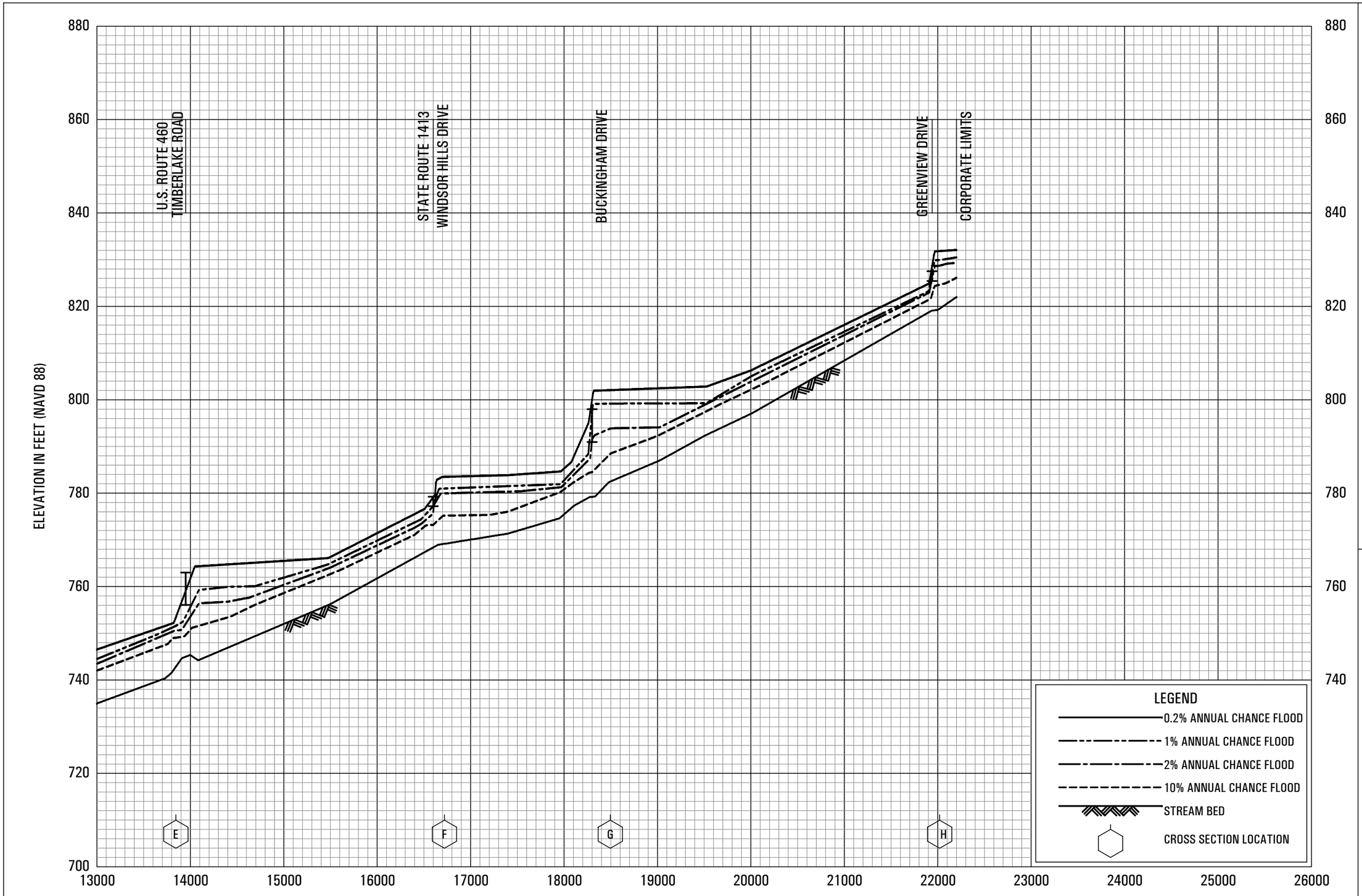

FLOOD PROFILES

DREAMING CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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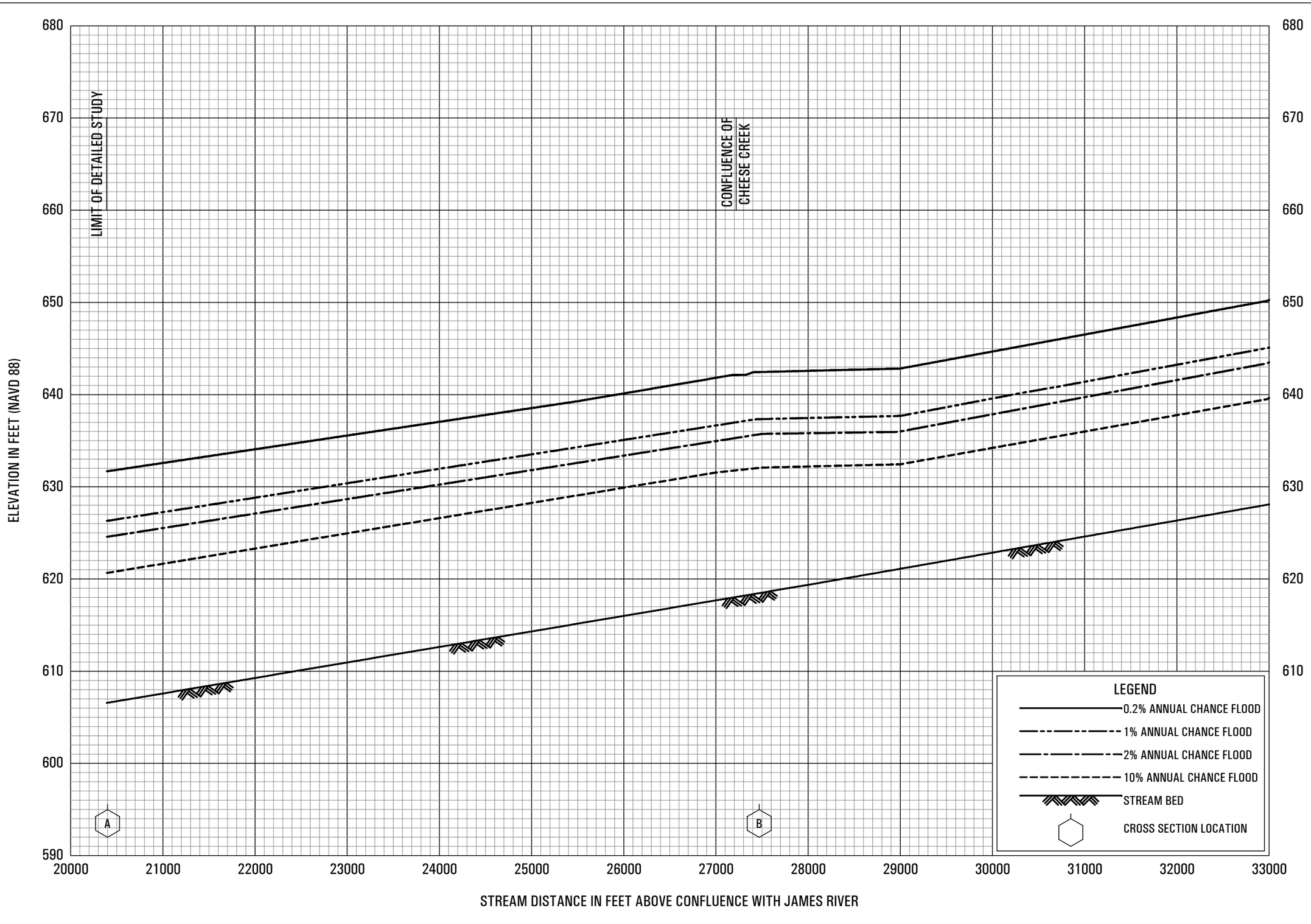

FLOOD PROFILES

IVY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

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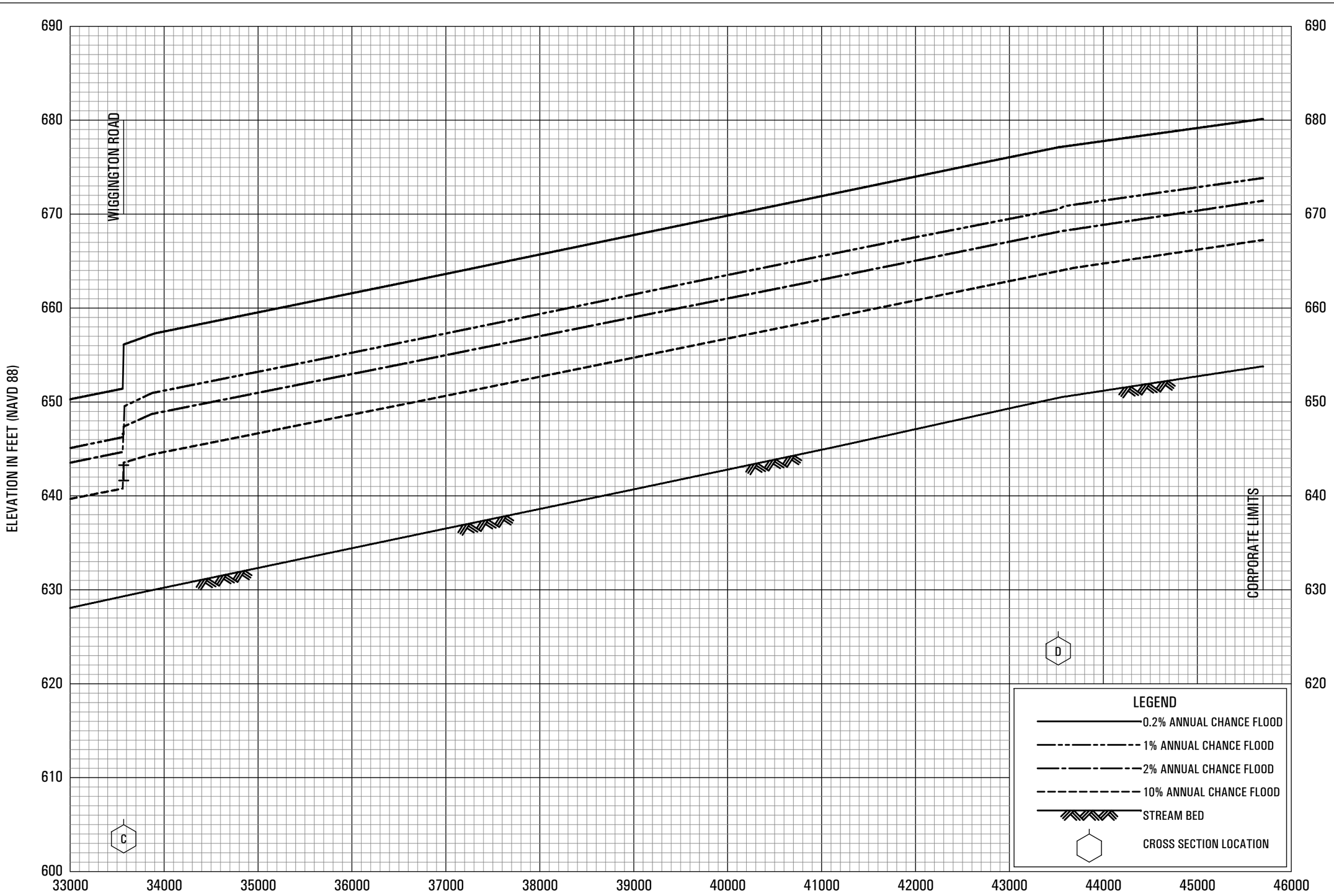


FLOOD PROFILES

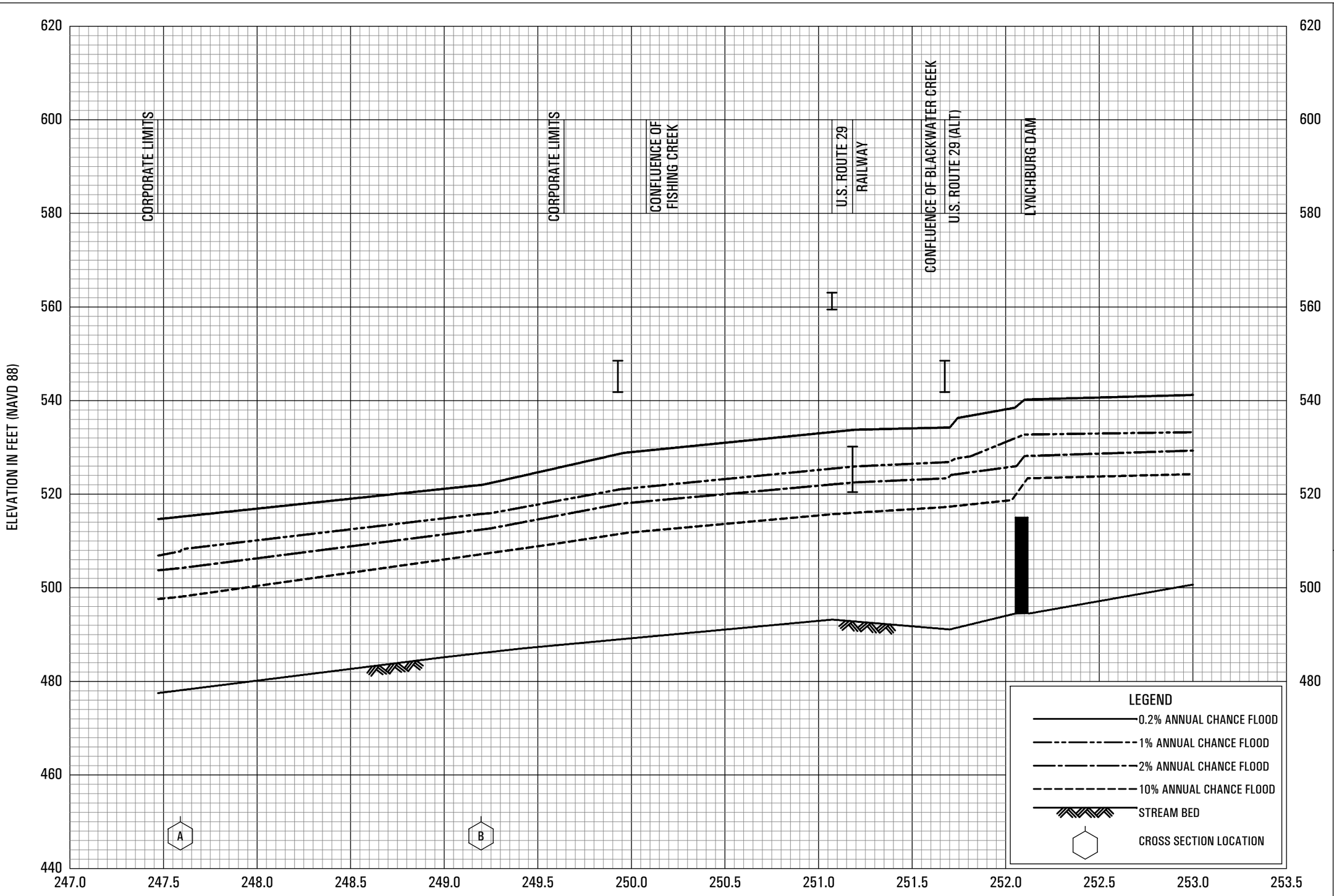
IVY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

17P



FLOOD PROFILES

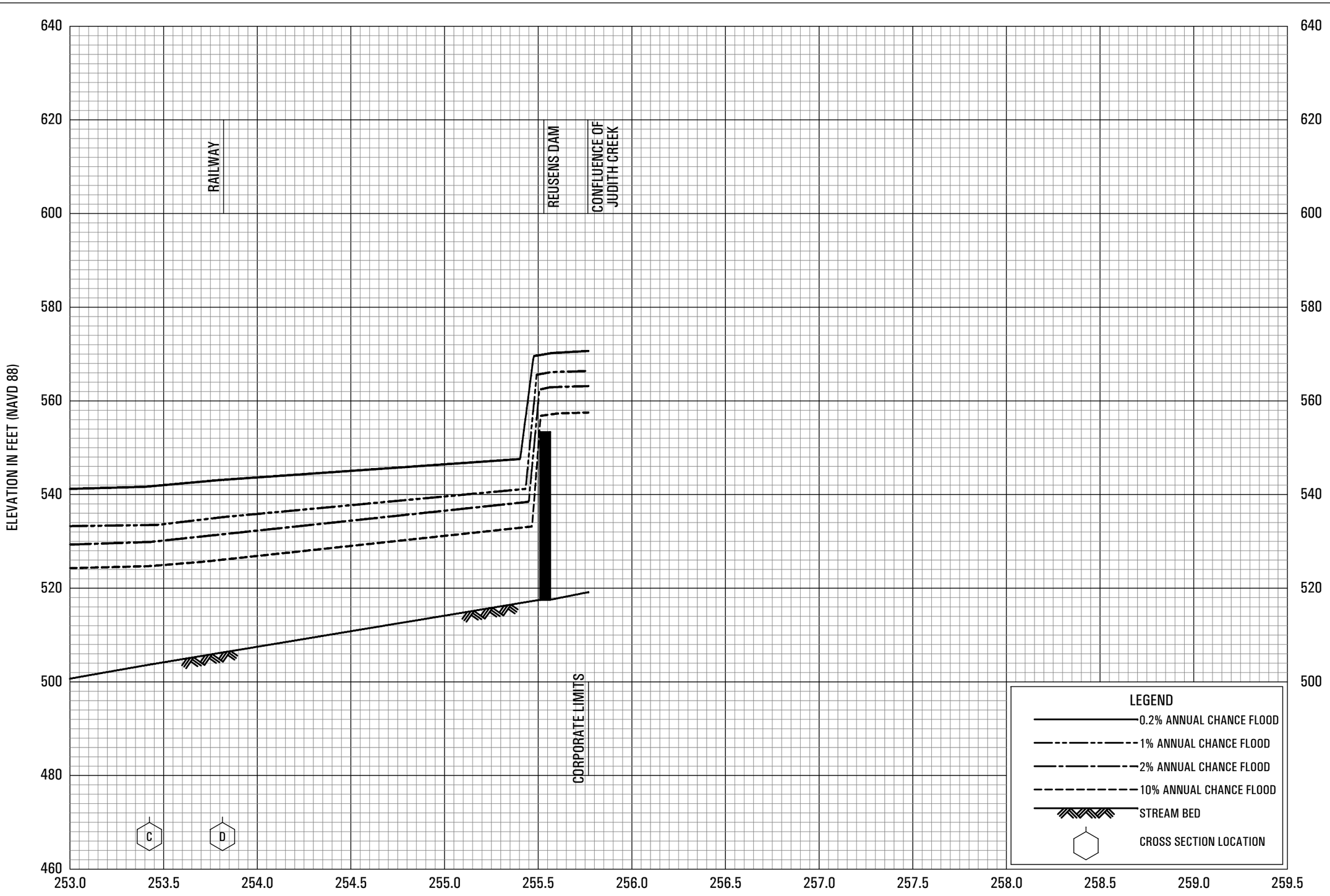
JAMES RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

18P



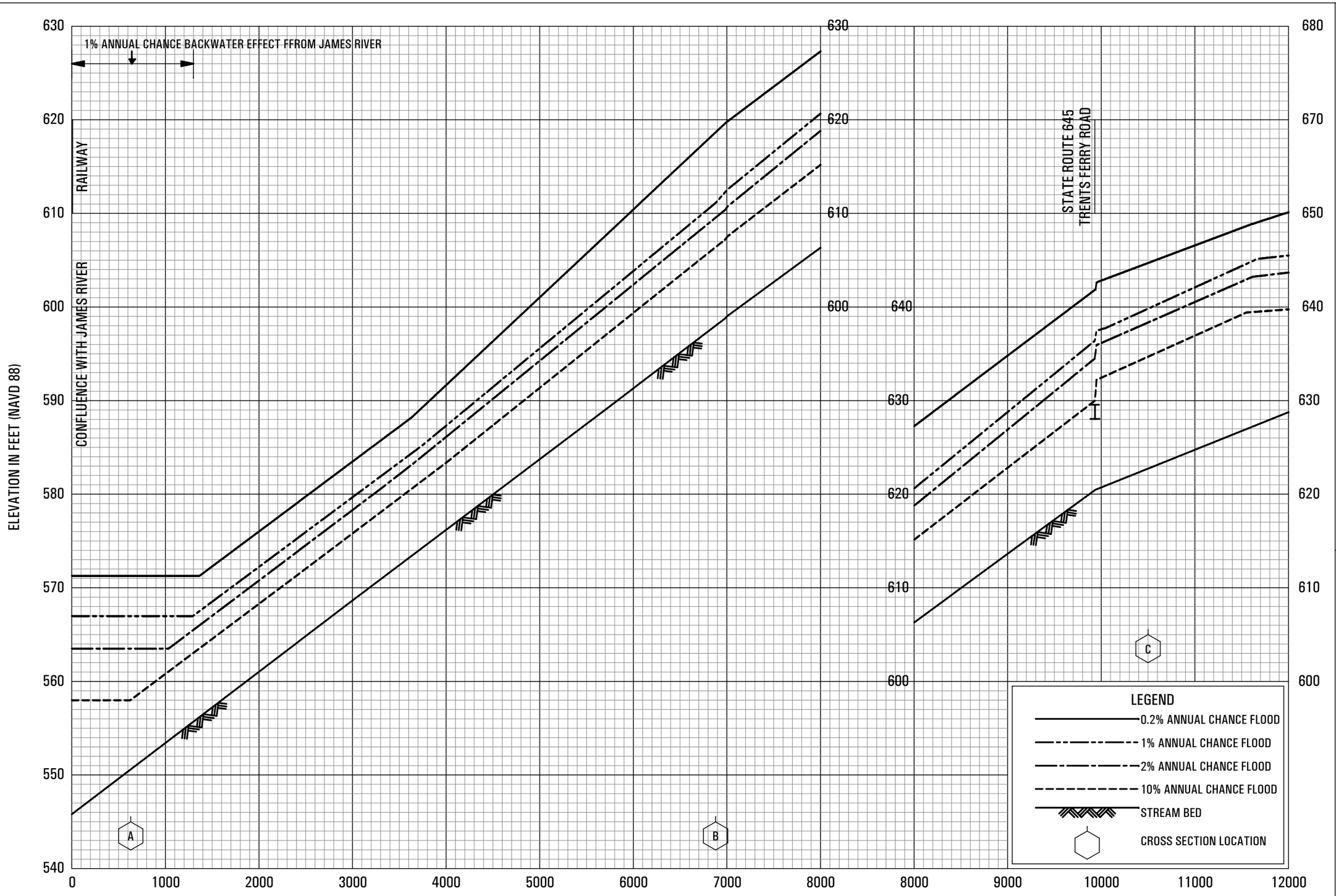
FLOOD PROFILES

JAMES RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



FLOOD PROFILES

JUDITH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG , VA

(INDEPENDENT CITY)

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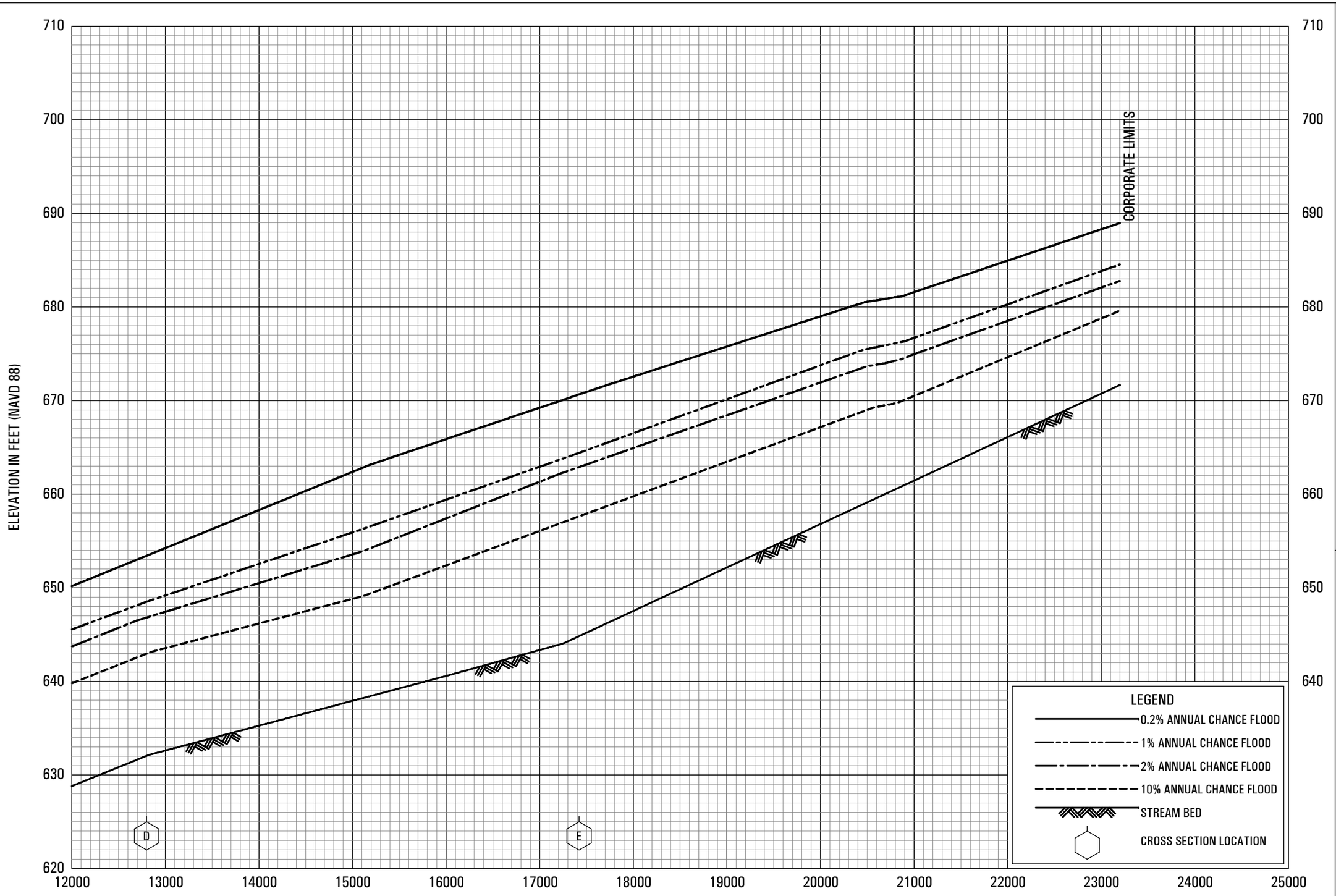


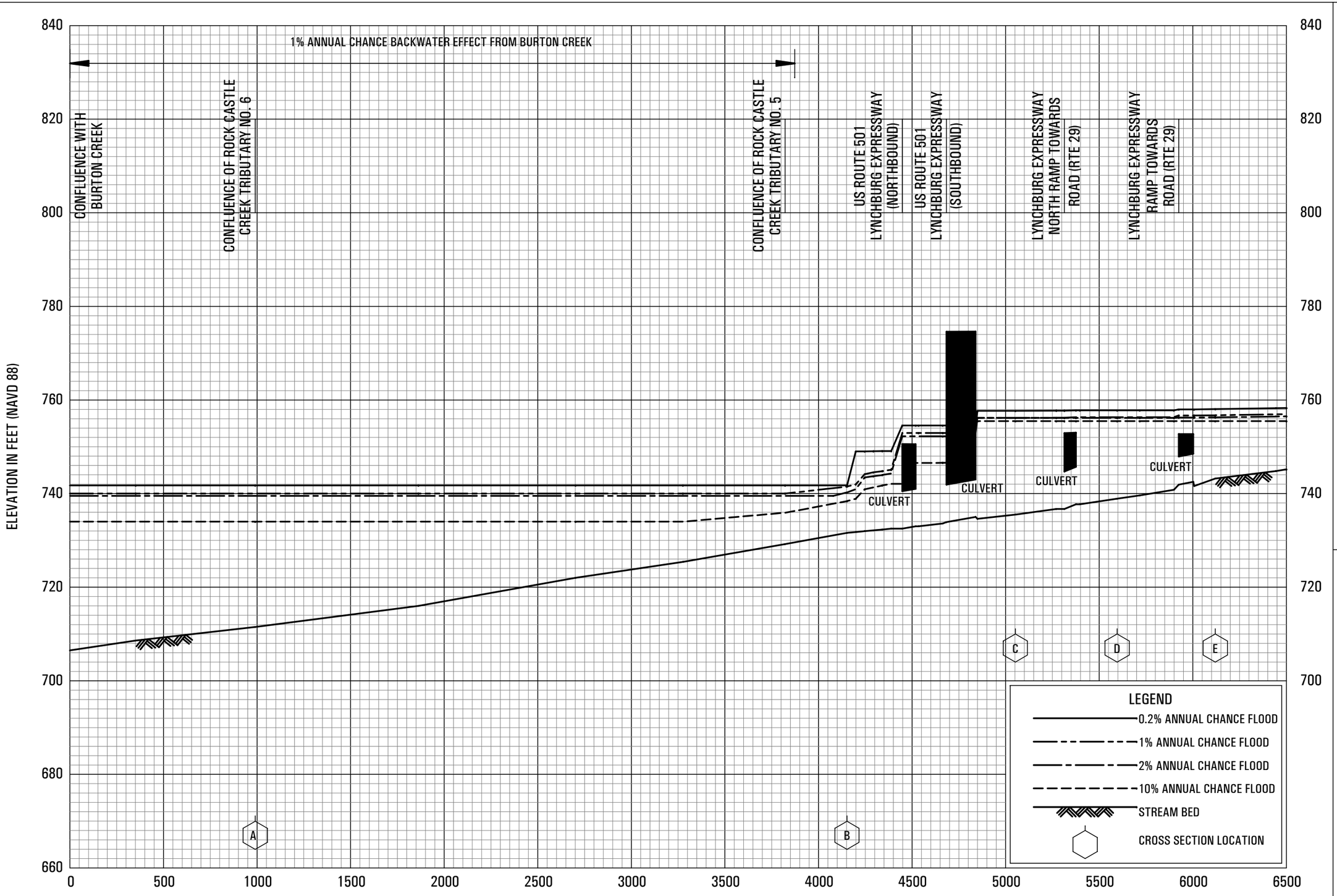
FLOOD PROFILES

JUDITH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG , VA

(INDEPENDENT CITY)



FLOOD PROFILES

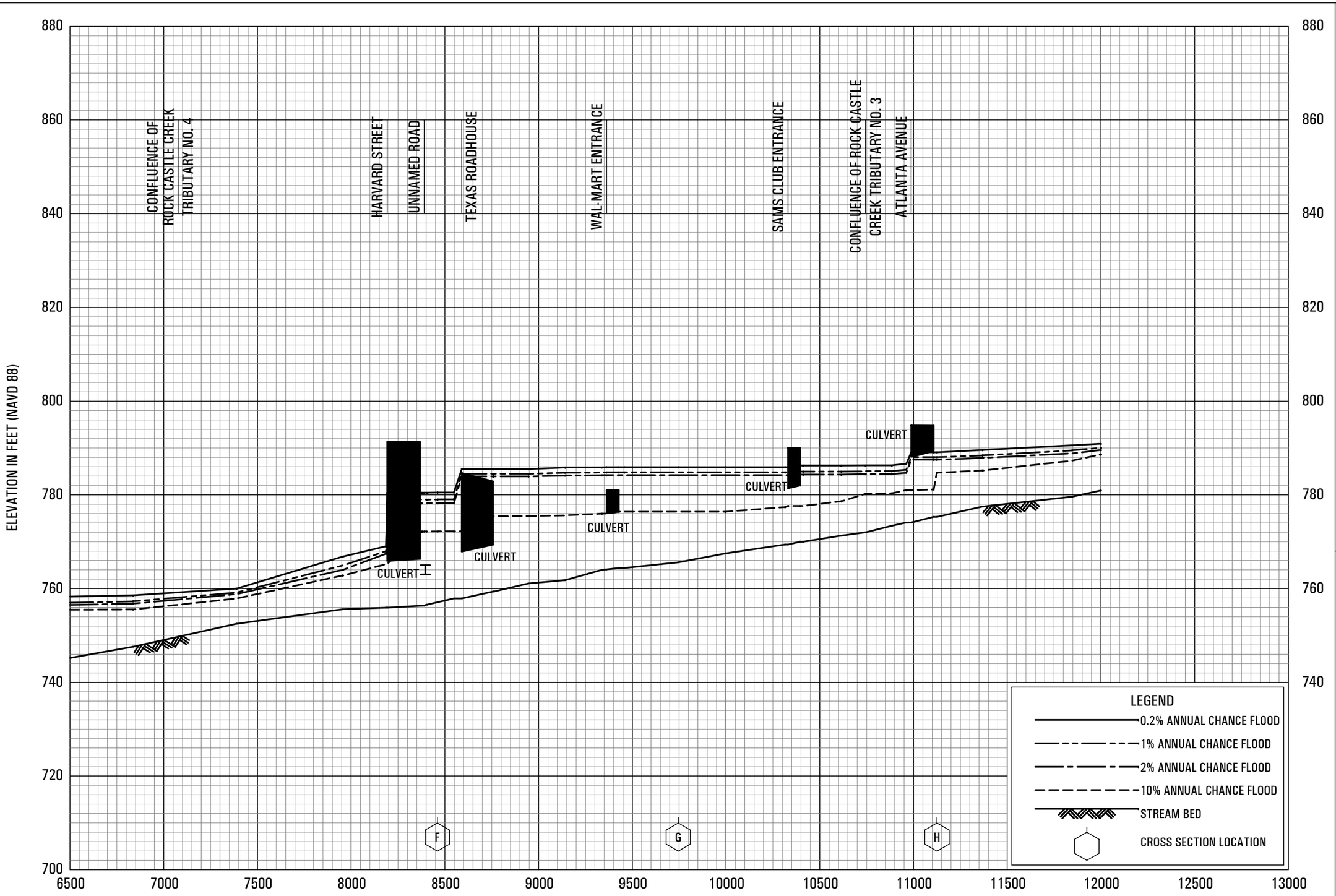
ROCK CASTLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

22P



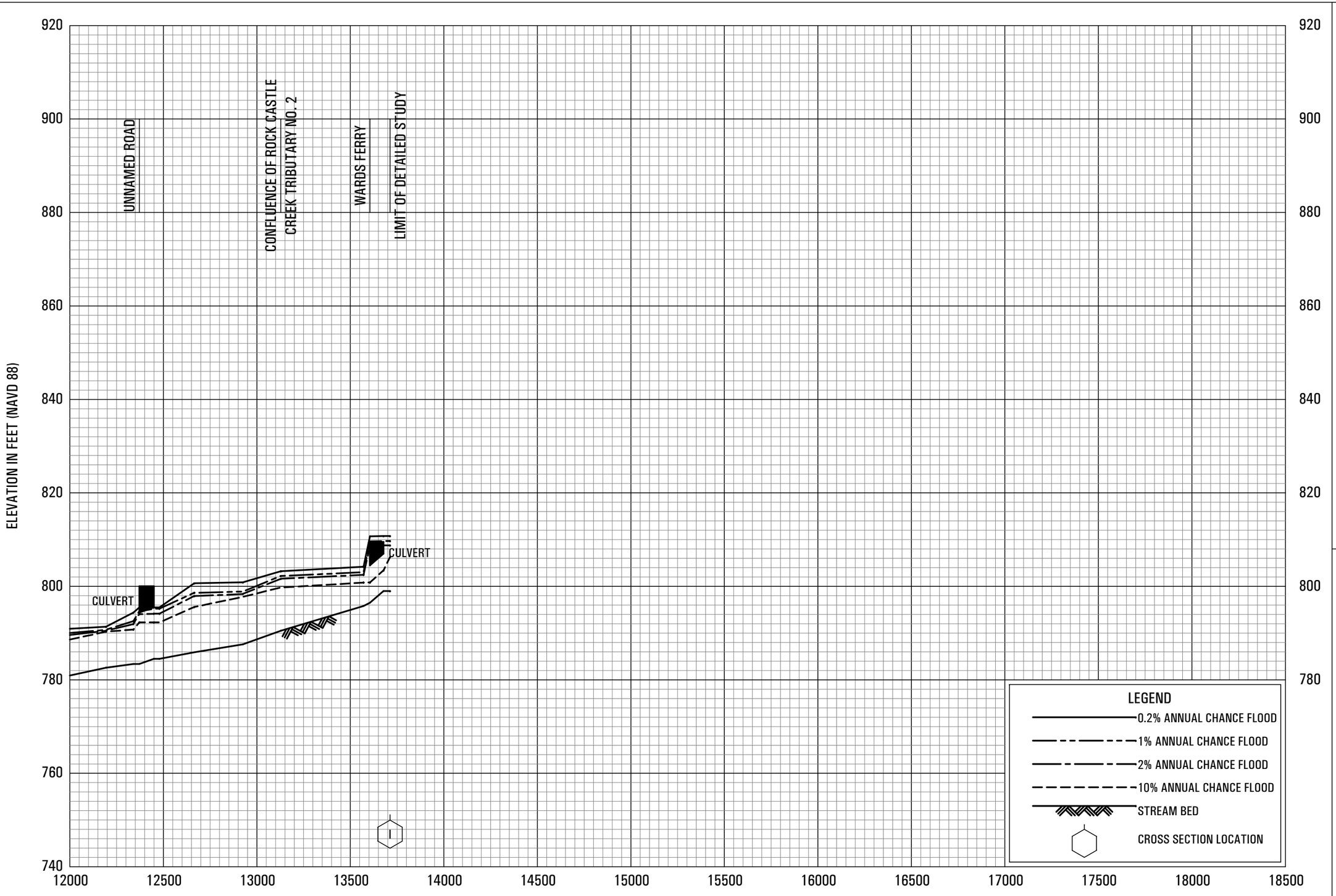
FLOOD PROFILES

ROCK CASTLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



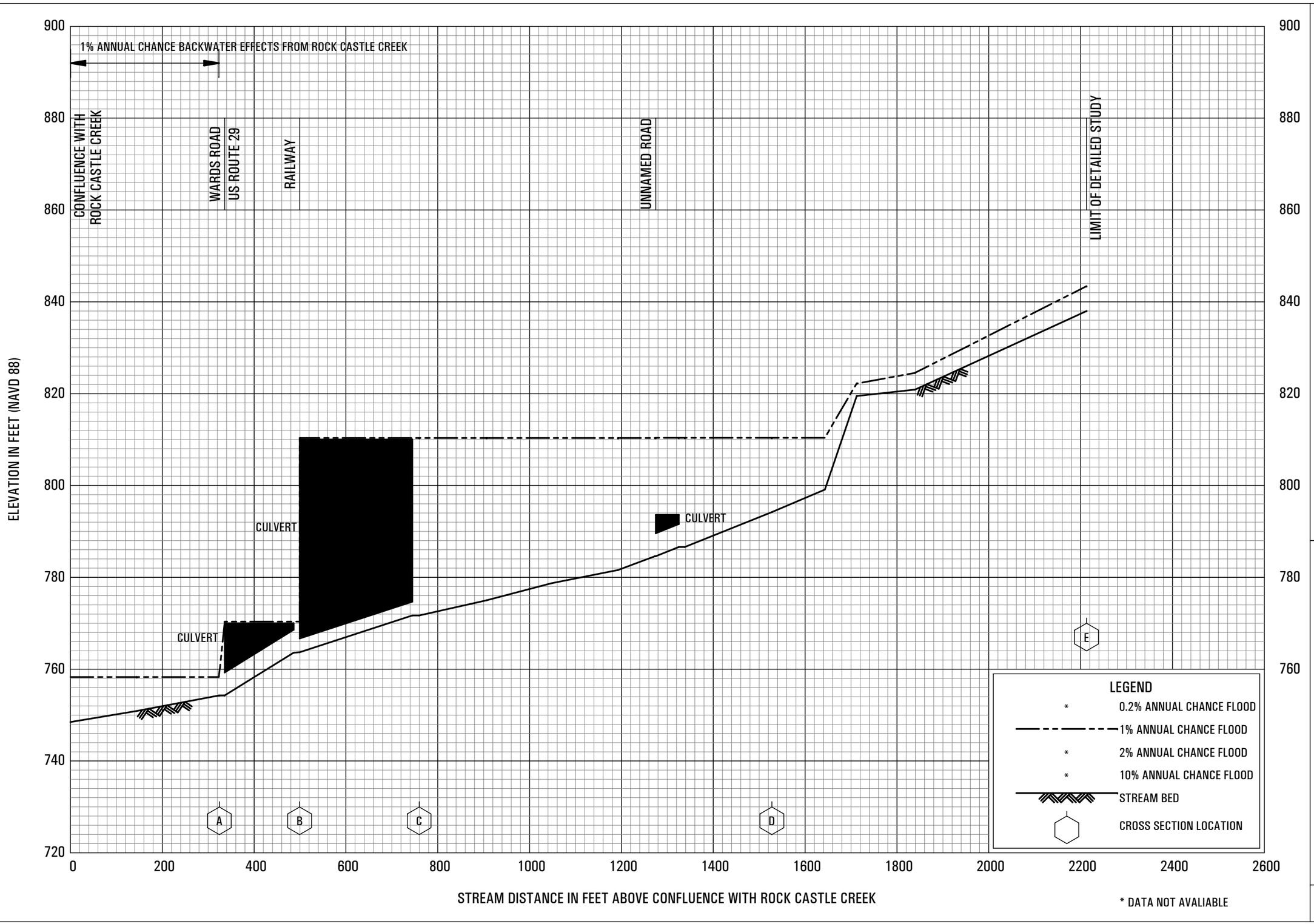
FLOOD PROFILES

ROCK CASTLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



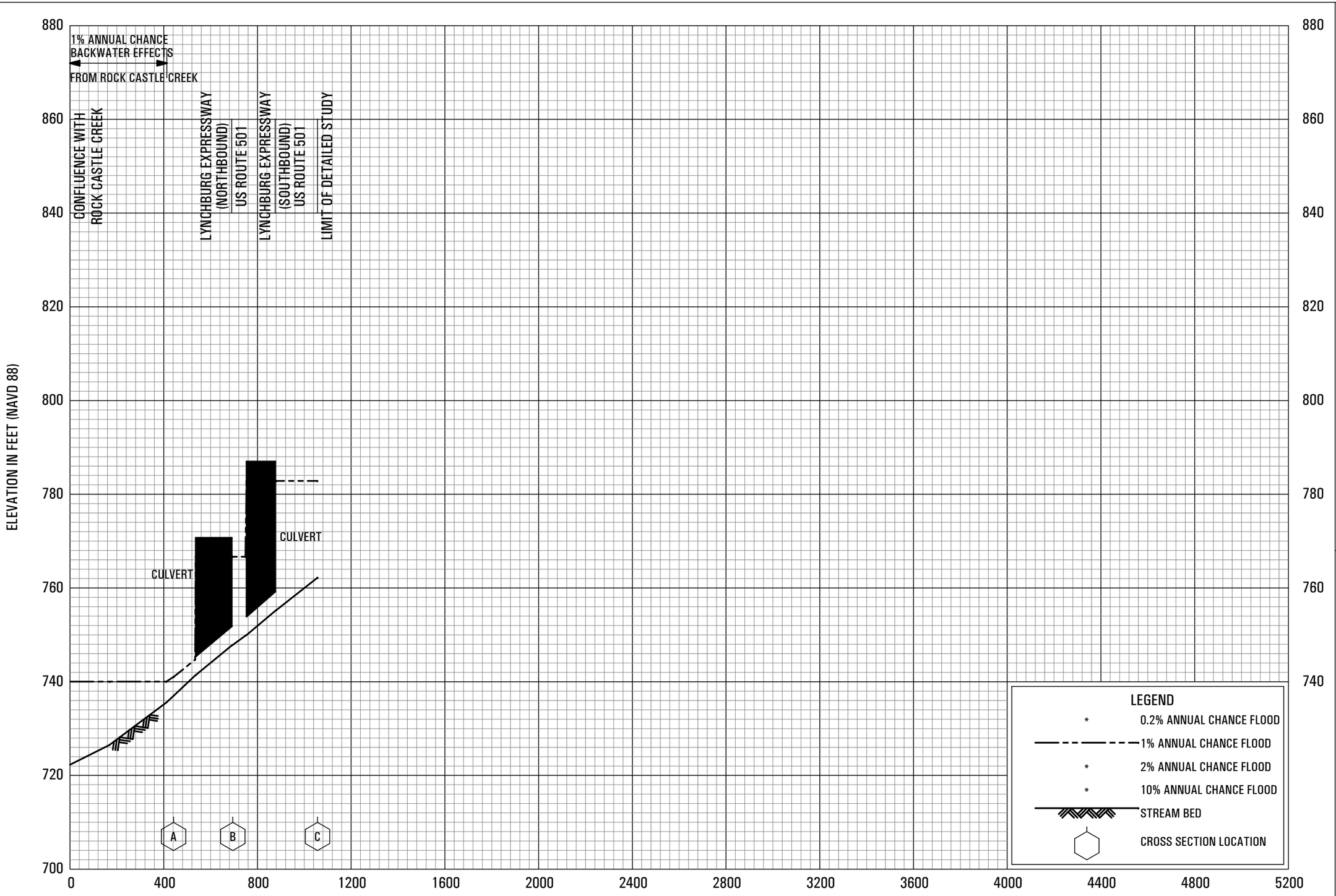
FLOOD PROFILES

ROCK CASTLE CREEK TRIBUTARY NO.4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



* DATA NOT AVAALIABLE

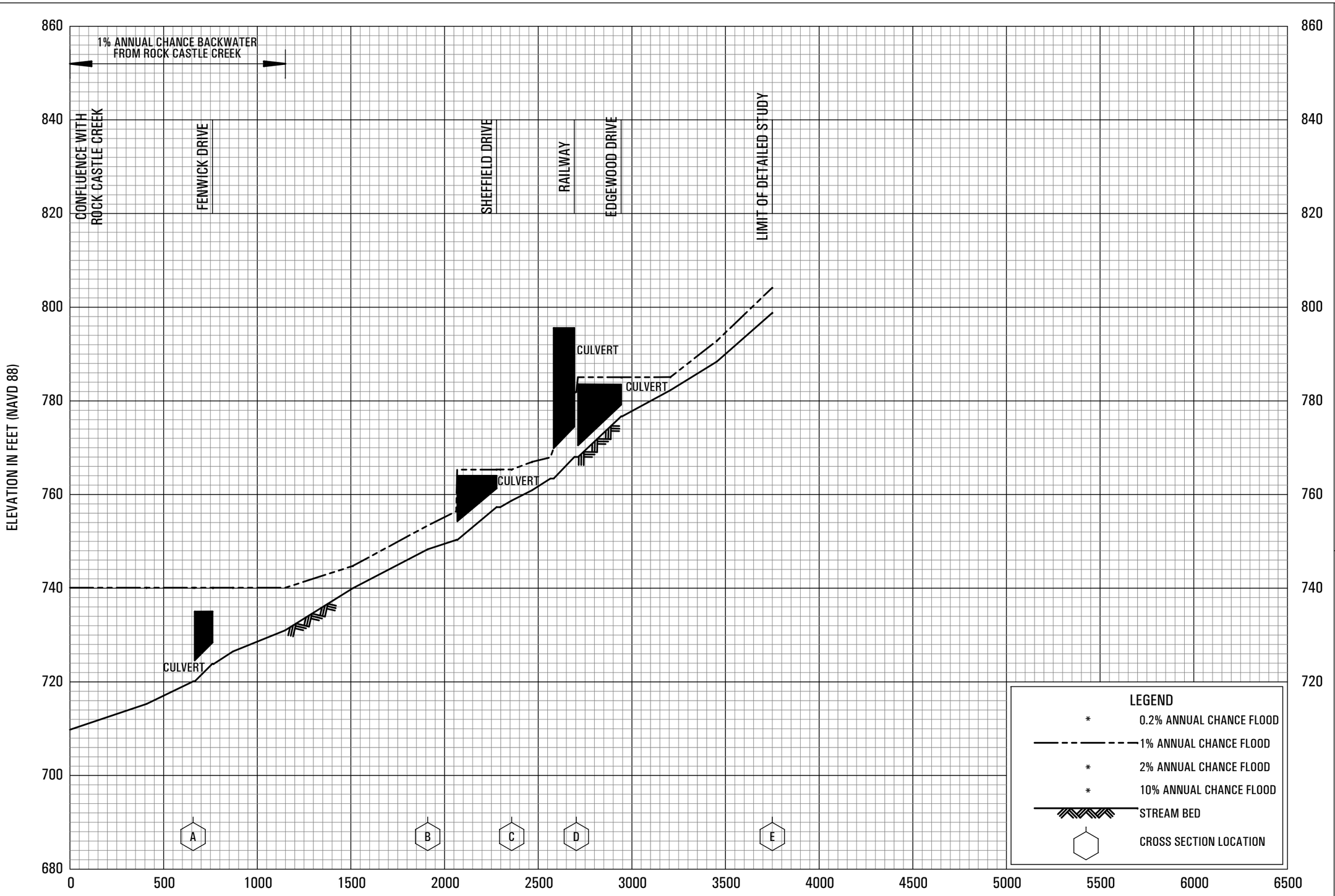
FLOOD PROFILES

ROCK CASTLE CREEK TRIBUTARY NO.5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



* DATA NOT AVAILABLE

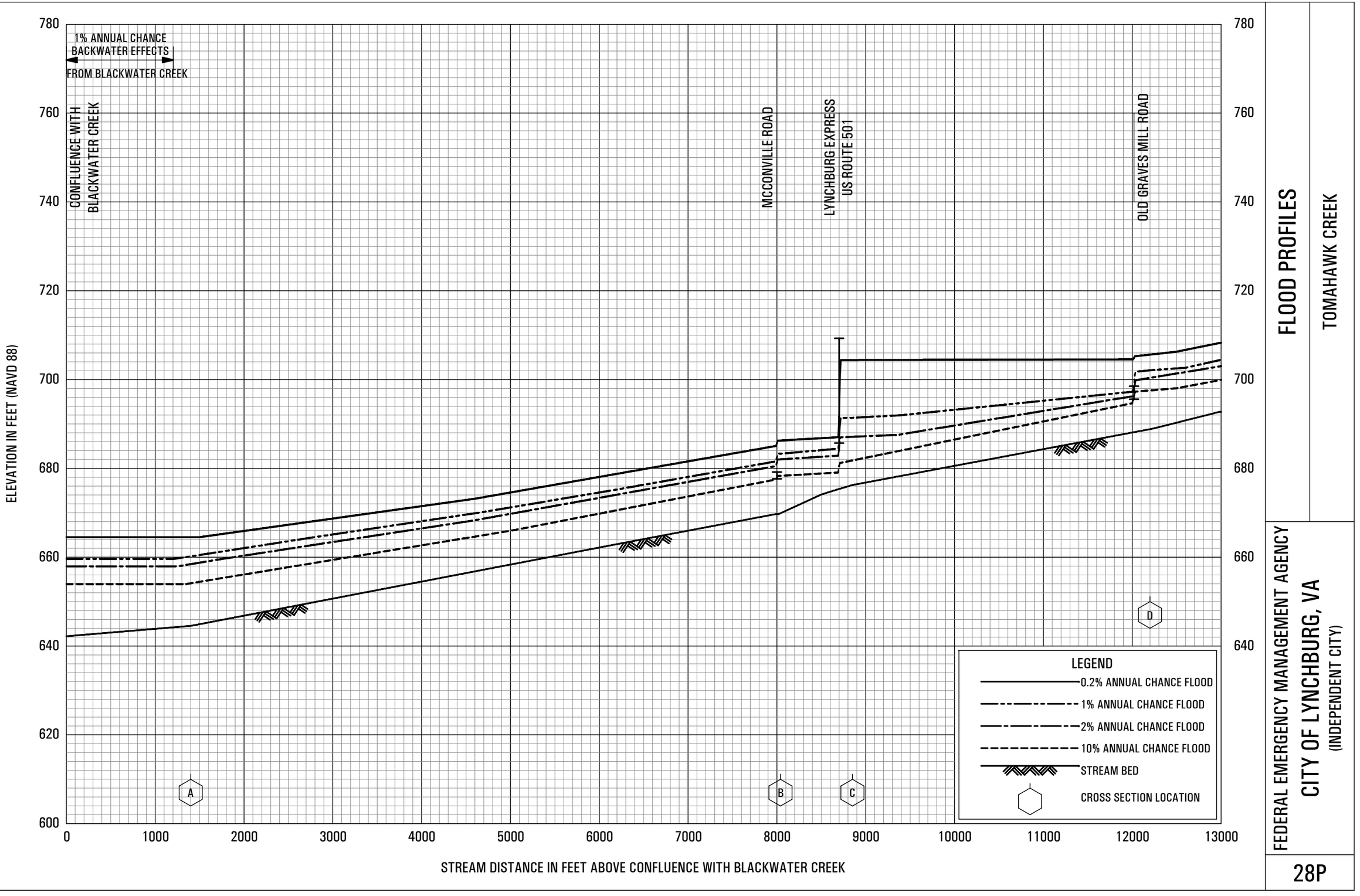
FLOOD PROFILES

ROCK CASTLE CREEK TRIBUTARY NO.6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)



FLOOD PROFILES

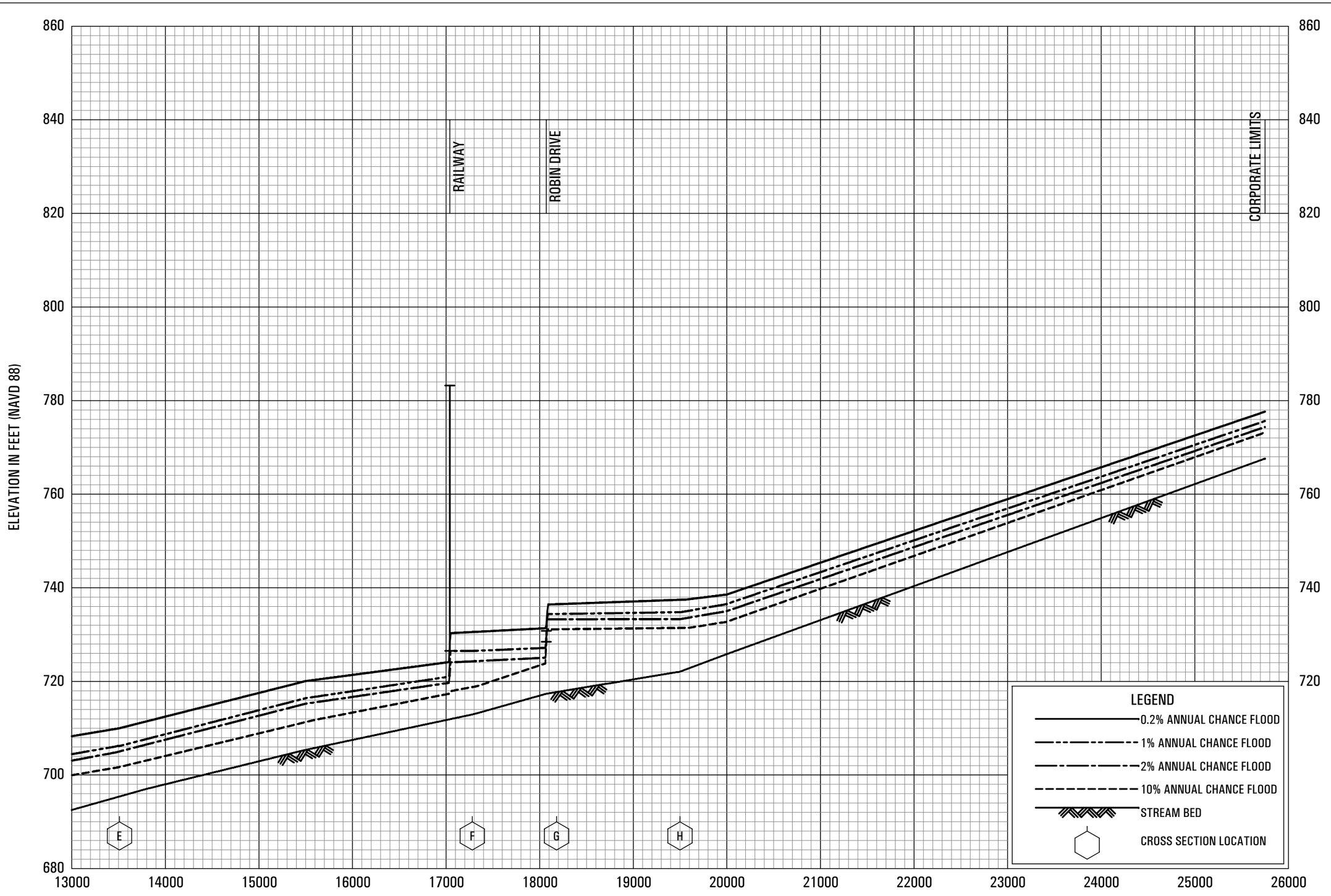
TOMAHAWK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

28P



FLOOD PROFILES

TOMAHAWK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LYNCHBURG, VA

(INDEPENDENT CITY)

29P