Kristin Holmes, P.E., LEED AP
Robert Cunningham, P.E., LEED AP

July 20, 2022

Via Email and Hand Delivery

Loretta Alston
Bensalem Township
2400 Byberry Road
Bensalem, PA 19020

RE: 1515 Gibson Road Subdivision Resubmission
TMP#: 02-054-005
Bensalem Township, Bucks County, PA
HCE Project No.: 1608

Dear Loretta:

Enclosed please find the following revised materials for the above referenced subdivision and land development application:

- Land Development Plans revised July 15, 2022;
- Highway Occupancy Plans revised July 15, 2022;
- Post Construction Stormwater Management Report revised July 15, 2022;
- Keystone Tree Experts Letter dated March 24, 2022;
- Township Waiver Letter dated July 15, 2022;
- NPDES permit dated January 25, 2022;
- Aqua water service letter;
- BCWSA sanitary service letter;
- Sewage Planning Mailer for 6 EDU.

The plans have been revised to address comments from Township consultants, PennDOT, and council members during the 2-2-1 meeting discussion. The layout has been revised to shift the proposed street intersection with Gibson Road to achieve the required sight distance per PennDOT, and to widen the cartway to 32-feet to allow parking on one side of the road. The plan also reduced the number of proposed lots to 6 lots in order to achieve a zoning by-right plan.

We are in receipt of review letters for the above-referenced project. Below please find responses to each of the comments contained in those letters.

Review Letter from Traffic Planning and Design, Inc. dated January 14, 2022

1. As previously noted, a PennDOT Highway Occupancy Permit (HOP) will need to be obtained for any work performed in the state's right-of-way. Please continue to submit plans and correspondence to the Township for review and approval.
   Response: Acknowledged.

2. Revise ADA details by:
   a) Ensure slopes and elevations match
   b) Do not show warping within the detectable warning surface
   c) The NE corner ramp landing area should slope out the back to avoid ponding within the ramp.
   d) It is recommended to not design to the maximum slope. Designing below the maximum slopes assists the contractor in building a compliant ramp.

Response: The ADA ramps have been updated per the revised layout. Appropriate ADA information has been revised on the plans.

Trip Generation Comments

3. Per the revised plan, an impact fee will be necessary for the site. Based on the location of the Development within the Township (service area 3), the impact fee per trip is $562.31. The development (7-Single Family Detached Housing, ITE code 210) will generate 6 new trips during the PM Peak hour, which results in an impact fee of $3,373.86. This amount has not been reviewed and approved by the Traffic Impact Fee Committee.
   Response: Acknowledged. The plan has been revised to generate 5 new trips.

Review Letter from T&M Associates dated February 9, 2022

Chapter 232 – Zoning Ordinance (ZO)

1. In accordance with ZO Section 232-57(a)(1)a, woodlands shall be preserved in at least an 80 percent natural open space state where such area also contains wetlands or significant natural features. As requested, the record plan has been revised to include a tabulation of natural resource preservation. The current plans have been revised to show a much smaller existing woodlands area than the previous plans. The Aerial Map shows 2.2 acres of woodlands. This also corresponds with the previously submitted plan set. The revised Existing Conditions & Demolition Plan shows only 1.2 acres of woodlands. Please clarify. Based on the existing woodlands boundary as shown on the Aerial Map (2.2 acres), 76.4% of the woodlands outside of the wetlands area are to be disturbed. Per Section 232-57(a)(1)b. and as discussed, woodlands outside of the wetlands area are to be preserved in a 50% natural state. Revise the plan to provide the required woodlands preservation. As requested, a woodlands preservation deed restricted area has been shown on the record plan. Provide notes on the restrictions associated with the deed restriction.
   Response: An arborist was retained to review the existing vegetation at the site and his report is included with this submission. The arborist determined the existing vegetation does not meet the definition of woodlands and presents a hazard to property and life and should be removed. This report was emailed to Mr. Farrall and Ms. Wall in March and was revised to address Ms. Wall's comments and resubmitted back in March. The woodlands have been removed from the natural resource table.

2. In accordance with ZO Section 232-57(a)(2)b., a buffer of 50 feet shall be measured from the wetlands vegetation or the limit of wet soils, whichever is shorter, and shall be preserved in an 80 percent natural cover, defined as native existing vegetation, maintained in an No structures or paved areas shall be permitted in the buffer. A minimum undisturbed natural cover buffer of 20 feet measured from the wetlands vegetation or limit of wet soil, whichever is shorter, shall be maintained at all times. Show both the 20-foot and 50-foot wetland buffers on the record subdivision plan (sheet 4). Provide a note on the record plan stating that no structures or paved areas are permitted in the 50-foot buffer.
   Response: Note 9 has been added to the record plan.

3. In accordance with ZO Section 232-59(a)(2)a, for those portions of sites having slopes greater than eight percent, based upon contour lines measured at vertical intervals of two feet, the following standards shall also apply for all proposed uses:
   1) eight percent to 15 percent: no more than 40 percent of the total area of such portions shall be regraded and/or stripped of vegetation.
   2) Fifteen percent to 25: no more than 30 percent of the total area of such portions shall be regraded and/or stripped of vegetation.
   3) Twenty-five percent or more: no more than 15 percent of the total area of such portions shall be regraded and/or stripped of vegetation

   Response: This was discussed with Ms. Wall earlier this year and determined to be compliant. The limit of disturbance has not changed with the current revisions.

4. In accordance with ZO Section 232-167(a), an R-2 lot of not less than 7,500 square feet shall be provided for every building hereafter erected or used in whole or in part as a dwelling. Lot areas listed on the plan will be confirmed once accurate boundary information is provided. Revise the Zoning, Lot Area and Coverage Tables accordingly.
   Response: Lot areas and layouts have been revised. Lot boundary information has been provided on the plans with this submission.

5. This comment has been addressed.
   Response: Acknowledged

6. In accordance with ZO Section 232-583(c), the maximum permitted exposed height of a retaining wall abutting a residential district shall be no higher than the distance to the nearest building on an adjacent parcel or eight feet, whichever is less. The plan has been revised to relocate the retaining wall and to reduce the wall height to less than 4 feet. We offer the following comments regarding the wall.
   a. The wall crosses a lot line. An easement on either side of the lot line, extending at least 10 feet in both directions must be provided to all for maintenance of the wall.
      Response: The layout has been revised so that the wall is only located on one property and in the proposed road ROW.

   b. The plan must clarify who is responsible for maintenance of the wall.
      Response: Note 10 has been added to the record plan.

   c. The wall is located in the snow storage easement. Our concern is drainage from the stored snow will impact/damage the wall.
      Response: The layout has been revised and the snow easement is now proposed in a different location away from the wall.

7-8. These comments have been addressed.
   Response: Acknowledged

<u>Chapter 201 – Subdivision and Land Development Ordinance (SLDO)</u>

1. This comment has been addressed.
   Response: Acknowledged

2. This comment has been addressed.
   Response: Acknowledged

3. In accordance with SLDO Section 201-41(d)(2), the preliminary plan shall provide the …names and owners of all adjacent tax parcels, with the tax map parcel numbers, land use and zoning classifications and present use. As requested, an adjacent property label for TMP # 02-055-002 has been added to the record plans. However, the label is covered by certifications and should be revised to be visible.
   Response: The label has been revised to be visible on the record plan.

4. In accordance with SLDO Section 201-41(d)(3), the preliminary plan shall provide… the total tract boundary lines of the area being subdivided and/or developed, with accurate distances to hundredths of a foot and bearing to 15 second. These boundaries shall be determined by accurate survey in the field to an error of closure not to exceed one foot in 10,000 feet…. As requested, bearing and distance for proposed lot lines and the right-of-way of the proposed street have been added to the Record Subdivision Plan. The following lots do not provide adequate closure and/or are missing information:
   - The right-of-way of the proposed road

- Proposed lots 2-5

Response: The layout has been revised, the tract boundary lines and labels have been updated accordingly.

5. This comment has been addressed.
   Response: Acknowledged

6. In accordance with SLDO Section 201-41(d)(7), the preliminary plan shall provide… all existing streets of record in or adjoining the tract including names, right-of-way widths and cartway widths. Revise the record plan to include the following:
   a. Dimension the full width and half width of the existing cartway of Gibson Road.
      Response: The full width and half width of the existing cartway of Gibson Road have been added to the existing features plan.

   b. Dimension the half width of the legal r/w along Gibson Road.
      Response: The half width of the legal r/w along Gibson Road has been added to the record plan and existing features plan.

   c. Dimension the proposed full and half cartway widths of Gibson Road on the record plan.
      Response: The proposed full and half cartway widths of Gibson Road have been added to the record plan.

7. In accordance with SLDO Section 201-41(d)(9), the preliminary plan shall provide… all existing sewer lines, water lines, fire hydrants, utility transmission lines, culverts, bridges, railroads, or other manmade features within the proposed subdivision and/or land development and within 400 feet of the boundaries…Since an aerial has been provided a waiver is not required. In addition to the aerial, revised the plan view of each sheet to include the following include:
   a. Show the location of the existing water lateral to the existing dwelling.
      Response: The waiver request has been removed from the letter. The approximate location of the existing water service line has been added to the plan.

   b. The PCSM Report states that there is an existing septic system on-site. Show the location of the existing on-site system. Clarify if it is going to be removed.
      Response: The approximate location of the existing septic system has been added to the plan.

8. In accordance with SLDO Section 201-41(d)(9), the preliminary plan shall provide… location, width and purpose of existing easements and utility rights-of-way within 50 feet of the proposed subdivision and/or land development. Note #4 on plan sheet 4 states that "this survey does not purport to reflect any of the following which may be applicable… easement… restrictive covenants…" It must be determined, as a part of this application, if there are existing easements or covenants. The response letter indicates the deed does not indicate any existing easements on the property. Note this on the record plan.
   Response: Note 11 has been added to the record plan.

9. This comment has been addressed.
   Response: Acknowledged

10. In accordance with SLDO Section 201-41(d)(11)a., the preliminary plan shall provide… location and width of all proposed and existing streets and easements, with a statement of any conditions governing their use…Site Plan Notes #6 on the Record Site Plan states that "the on-site road shall be offered for dedication to Bensalem Township." Site Plan Notes #8 states

that "the length of proposed private drive is 300 LF." The Township should advise the applicant as to whether the proposed cul-de-sac shall be public or private. If the cul-de-sac is private, revise the record plan to indicate who will be responsible for ownership and maintenance of the cul-de-sac. As requested, the proposed stormwater easement has been shown on the record plans. Per Section 201-41(d)(11)a.5., provide bearing, dimensions and areas of any delineated easements.
Response: Acknowledged.

11. In accordance with SLDO Section 201-41(d)(11)a.4., the preliminary plan shall provide… bearings, dimensions and areas of the rights-of-ways of streets. As requested, complete boundary information has been added to the plan for the proposed street. However, the provided information does not provide adequate closure. Per Section 201- 41(d)(3), revise the boundary information to not exceed an error of closure of one foot in 10,000 feet.
Response: The layout has been revised, the tract boundary lines and labels have been updated accordingly.

12. In accordance with SLDO Section 201-41(d)(13), a certification of ownership, acknowledgement of plan, and offer of dedication shall be lettered on the plan, duly acknowledged and signed by the owner of the property, and notarized; a certificate for approval of the plan by the Bensalem Township Council and review by the Township Engineer shall be provide…. We have the following comments regarding the signature blocks on the record plans:
    - Remove the Bensalem Township Planning Commission approval signature block
    - The drawing list (on the cover sheet) must be on a plan sheet that is to be recorded.

    Response: The approval signature block for the Bensalem Township Planning Commission has been removed.

13. In accordance with SLDO Section 201-41(e)(3), the preliminary plan shall be accompanied by… a plan for providing utility services as approved by appropriate public utility or by utilities chartered under the law of PA who will provide the utility services, including but not limited to all electric, telephone, gas and cable television. Show existing gas (if applicable) and telecommunications lines to the existing dwelling. Show proposed electric, gas (if applicable) and telecommunications lines to the proposed dwellings. Provide will-serve letters for all utilities to the dwellings. The applicant shall obtain approval from the appropriate water company for the proposed water facilities. The applicant shall obtain BCWSA approval for the proposed sanitary facilities and sewer extension. This is also referenced in Section 201-109(g).
Response: Acknowledged. Service letters are included with this submission.

14. This comment has been addressed.
Response: Acknowledged.

15. In accordance with SLDO Section 201-102(d), wherever possible, developers shall preserve trees, groves, waterways, scenic points, historic spots and other community assets and landmarks. An Unnamed Tributary to the Neshaminy Creek is at the rear of the site. Show and label this stream on the plans.
Response: The stream is labeled and shown on the existing features plan.

16. In accordance with SLDO Section 201-103(e)(2)a., the developer of every residential subdivision and/or land development requiring approval pursuant to the land development and subdivision ordinance shall contribute 1,500 square feet of land for each residential lot or dwelling unit in the proposed subdivision or land development, for the purpose of providing park or recreational facilities accessible to the development. Per Section 201- 103(e)(2)b, Should the Council of Bensalem Township, in the exercise of its sole discretion, determine that

the purposes of the Bensalem Township recreation plan will be better served by the Township's acceptance of fees in lieu of dedication of land, the Township may require a contribution for recreational purposes in the amount of $2,000.00 for each residential lot or dwelling unit in the proposed subdivision of land development. The required land for the purpose of providing park or recreational facilities accessible to the development is 10,500 sf (7 x 1,500). The applicant is requesting a waiver from providing the land. Council should review the application and determine if a fee is required as referenced in this ordinance section. While we acknowledge the plan shows 50,508 SF of proposed open space, it should be noted that this "open space" does not fulfill the park or recreational facilities requirements as referenced in Section 201-103(e)(3)a which states recreation facility in Bensalem Township shall consist of parks and play ground for the purpose of providing open air recreation…
Response: Acknowledged. The revised layout has reduced the project to 5 new building lots.

17. This comment has been addressed.
Response: Acknowledged

18. This comment has been addressed.
Response: Acknowledged

19. In accordance with SLDO Section 201-104(g)(7), in a cul-de-sac, whenever possible, a snow storage area shall be provided by easement, right-of-way or other means at the end of the turnaround. This area shall be accessible by means of a depressed curb and driveway apron. As requested, a snow storage easement has been provided at the cul-de-sac bulb. Provide depressed curb and a driveway apron for access to the snow storage area.
Response: Depressed curbing has been added in the area of the snow storage area to provide access.

20. In accordance with SLDO Section 201-106(a)(1)a., no changes shall be made in the contour of the land; no grading, excavating, removal or destruction of topsoil, trees or other vegetative cover of the land shall be commenced within a proposed subdivision or land development until such time as a plan for minimizing erosion and sedimentation has been reviewed by the County district, reviewed and approved by the Township Planning Commission and Bensalem Township Council and until a land alteration permit has been issued in accordance with Ordinance No. 212, as amended. Provide a note on the record plan stating that a land alteration permit will be needed prior to any the start of any grading, excavation, removal of topsoil, removal of trees or removal of any other vegetative cover. Bucks County Conservation District approval is required. We defer review of the erosion controls to the BCCD.
Response: Acknowledged. Note 12 has been added to the record plan.

21. This comment has been addressed.
Response: Acknowledged.

22. In accordance with SLDO Section 201-106(a)(2)a.6, no proposed gradings shall be permitted within three feet of any site property line...Revise the proposed grading on Lot 4 and the homeowners' association lot along the eastern property line to be a minimum of three feet from the property line.
Response: Grading is shown to be 3 feet from the property line.

23. In accordance with SLDO Section 201-106(a)(2)a.15, run-off from upstream properties passing through or along downstream properties shall be limited to no more than three lots. Should it be determined by the Township Engineer that water runoff is likely to pass more than three lots, appropriate storm sewer inlets and piping systems as may be acceptable to the Township Engineer shall be provided. Cross-lot drainage crosses more than 3 lots along the

eastern site boundary (Lot 7 to Lot 4). The plan must be revised to address this comment with inlets and piping. We also note this swale occupies the entire rear yard of Lots 4 through 7. Our concern is that future homeowners will be unable to install backyard amenities such as patios, decks, sheds, pools, gardens, property line fences, play equipment, landscaping etc. since they would impact the swale/drainage. This issue should be addressed. Once the plan is revised to address these issues it will be determined if swale calculations/details are required per Section 201-106(a)(2)a.2 and 17.
Response: The site layout has been revised. The revised layout does not exceed the allowable 3 lots of cross drainage pattens.

24. In accordance with SLDO Section 201-106(b)(2)a., the developer shall provide an easement to the Township, for maintenance purposes, a minimum of 50 feet in width along each river or flowing stream bank, but in all cases of sufficient width to provide proper maintenance. An unnamed tributary to the Neshaminy Creek runs across the rear of the site. As requested, a stream easement has been shown on the plan. It shall be noted on the record plan that the easement shall be in favor of the Township to allow the Township the right, but not the obligation, to inspect the watercourse. The property owner (not the Township) is responsible for maintaining any portion of the easement and the watercourse located on this site and is responsible for addressing any issues including, but not limited to, erosion as directed by the Township or any regulating agency.
Response: A stream easement has been added to the plans.

25. This comment has been addressed.
Response: Acknowledged.

26. This comment has been addressed.
Response: Acknowledged.

27. This comment has been addressed.
Response: Acknowledged.

28. This comment has been addressed.
Response: Acknowledged.

29. In accordance with SLDO Section 201-108(c)(2), where access is intended to a state road or highway, application for a permit must be submitted to the Pennsylvania Department of Transportation upon receipt of preliminary plan approval. A copy of the permit must be produced prior to final plan approval. A PennDOT Highway Occupancy Permit (HOP) will be required for the proposed improvements within the legal right-of-way of Gibson Road. As requested, Highway Occupancy Permit Plans have been included with this submission to the Township. These plans shall be incorporated into the land development plan set. In addition, the Township Engineer shall be notified of all meetings with PennDOT and shall be copied on all correspondence.
Response: Acknowledged. A copy of the HOP plans are included with this submission.

30. This comment has been addressed.
Response: Acknowledged.

31. In accordance with SLDO Section 201-109(e), where stormwater or surface water will be gathered within the subdivision or land development and discharged or drained in volume over lands within or beyond the boundaries of the subdivision or land development, the applicant or owner shall reserve or obtain easements over all lands affected thereby, which easements shall be adequate for such discharge of drainage and for the carrying off of such water and for the maintenance, repair and reconstruction of the same, including the right of passage over

and upon the same by vehicles, machinery and other equipment for such purposes, and shall be of sufficient width but not less than 30 feet in width, for such passage and work…It is unclear how vehicles/equipment needed for maintenance or repair will access the bottom of the proposed basin. Please provide a stabilized access with a maximum 10% slope to the basin bottom. The current access does not extend to the basin bottom. Clarify how this access will be stabilized for equipment. Provide applicable details to the plan.
Response: A stabilized access easement has been provided to the stormwater management facility.

32. In accordance with SLDO Section 201-110(b), along the existing street on which a subdivision or land development abuts (hereinafter called boundary streets), curbs shall be constructed and the existing paved cartway shall be widened to the curb by the developer. The location of curbing along a boundary street shall be determined by the width of the required paved cartway of the road as established by the Township. The required cartway width for a Collector Street is 36-42 feet (18-21 half width). The existing cartway half width of Gibson Road is 12.1 feet and the applicant is requesting a waiver. Dimension the proposed cartway half width on the record plan. We also defer review of cartway widening to PennDOT and the Township Traffic Engineer.
Response: Full and half widths for the cartway of Gibson Road have been added to the plans.

33. In accordance with SLDO Section 201-111(a), sidewalks shall be provided along streets by the developer. All sidewalks shall meet all applicable standards for handicapped persons. As requested, detailed designs of the ADA ramps are included in this submission as a part of the Roadway improvement Plans. These plans shall be incorporated into the land development plan set. Both ramps are missing spot elevations on a corner of the landing area.
Response: The HOP plans have been added as a supplement of the Land Development drawings. The ADA ramps have been revised to show the spot elevations.

34. In accordance with SLDO Section 201-113(e)(2), access and circulation for firefighting and other emergency vehicles, moving vans, fuel trucks, garbage collection, deliveries and snow removal vehicles shall be shown on the preliminary plan. We defer the review of fire truck circulation plan to the Bensalem Township Fire Department. Submit written confirmation that all comments in the Fire Rescue Department review letter dated June 9, 2021 have been addressed.
Response: Acknowledged.

35. In accordance with SLDO Section 201-115(1), no owner or other person shall construct…the whole or any part of any water facility and/or sewage facility for the use… of any buildings or structures constructed or planned to be constructed within the Township until ... plans and specification thereof have been filed and approved by the Bensalem Township Council and the Department of Environmental Protection...The applicant shall submit a Sewage Facilities Planning Module Application to the PA DEP to determine if an Act 537 Planning Module must be submitted for this development.
Response: The applicant received the signed planning module mailer from the Township and will submit to PADEP.

36. In accordance with SLDO Section 201-115(3), when water service is furnished to, or proposed to be furnished to, any subdivision or land development, the developer shall, at his own expense and without any cost to the Township, install fire hydrants according to the technical regulations and specifications of the Township. Hydrants shall be located so that the distance from each and every wall, or each and every part thereof, of any building in the proposed subdivision and/or land development to an operable fire hydrant is not more than 300 feet and

so that there is at least one hydrant in each block. We defer the review of fire hydrants to the Township Fire Rescue Department.
Response: Acknowledged.

37. In accordance with SLDO Section 201-138(a), concrete monuments shall be placed at each change in direction of a boundary, at each intersection corner and on each side of each street at all angle points, expect where placement would be redundant and at the beginning and end of curves; Revise the record plan to provide concrete monuments at each end of the Township ultimate r/w along Gibson Road.
Response: The plan has been updated to show proposed concrete monuments.

Chapter 196 – Stormwater Management Ordinance (SWMO)
As referenced above, per SWMO Section 196-35(a) Table 304.1, for Neshaminy Creek Watershed District C, the post development peak rate runoff cannot exceed the pre-development peak rate runoff for each design storm. The storm report indicates the post development rates of runoff have been reduced from the predevelopment rates as depicted on the following chart for the 2, 5, 10, 25, 50 and 100-year storm. Please note that these rates may change once the comments referenced below are addressed. Based on the current storm report, the pre and post development peak runoff rates are as follows.

Design Storm Frequency (Year)	Pre-Development Flows (cfs)	Post Development Flow (cfs)
100	8.544	7.703
50	7.778	7.052
25	7.008	6.403
10	4.866	4.502
5	4.308	3.833
2	3.545	2.769

1. This comment has been addressed:
Response: Acknowledged.

2. This comment has been addressed:
Response: Acknowledged.

3. In accordance with SWMO Section 196-33(g)(1), areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase to maintain maximum infiltration capacity. Barriers such as construction fencing should be used to protect and keep construction phases to maintain maximum infiltration where BMPs are proposed. Revise the construction sequence and all appropriate plan sheets and details to clearly state the infiltration BMP should be protected from compaction at all times. We note the sequence does not reference installation of the sediment trap and tree protection fence.
Response: The construction sequence has been updated accordingly.

4. In accordance with SWMO Section 196-33(g)(2), infiltration BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has achieved final stabilization, or as approved by the engineer. Clarify how this will be addressed in the event the lots are not developed simultaneously. The response letter states this will be addressed with a sediment trap. We note the construction sequence does not reference installation of the sediment trap and tree protection fence.
Response: The construction sequence has been updated to include all proposed E&S features.

5. In accordance with SWMO Section 196-47(2)b.1.B., the SWM site plan shall provide… the locations of all existing and proposed utilities, sanitary sewers, on-site septic systems, wells, stormwater BMPs and water lines on site and within 100 feet of property lines. Revise the Post

Construction Stormwater Management (PCSM) Plan to show and label the location of the existing on-site septic system. Clarify if it is to be removed. This is also referenced in Section 196-47(2)b.1.F.
Response: Acknowledged.

6. This comment has been addressed.
Response: Acknowledged.

7. This comment has been addressed.
Response: Acknowledged.

8. This comment has been addressed.
Response: Acknowledged.

9. In accordance with SWMO Section 196-4792)c.8., an access easement around all stormwater management facilities is required that would provide ingress to and egress from a public right-of-way. The size of the easement shall commensurate with the maintenance and access requirements determined in the design of the BMP. The plan has been revised to propose an access easement the cul-de-sac bulb. Clarify that this easement gives the Township the right, but not the obligation, to access, inspect and repair the stormwater management facilities if they are not properly maintained by the property owner. Since this is a defined easement (instead of a blanket easement), provide boundary information and a legal description.
Response: Acknowledged. The Legal Description will be provided under a separate cover.

10. This comment has been addressed.
Response: Acknowledged.

11. This comment has been addressed.
Response: Acknowledged.

12. In accordance with SWMO Section 196-47(2)f.6.A, the following information should be included in the stormwater report and calculations: the design computation for the stormwater drainage systems…Provide a Tc calculations of the offsite drainage area B3.
Response: Tc calculations of the offsite drainage area B3 have been provided as part of the hydraflow analysis.

13. This comment has been addressed.
Response: Acknowledged.

14. In accordance with SWMO Section 196-48(1)a., proof of application or documentation of required permit(s) or approvals for the programs listed below shall be part of the plan: NPDES permit for stormwater discharges from construction activities. An NPDES permit is required since the limit of disturbance exceeds 1 acre.
Response: NPDES permit has been received and is included with this submission.

15. This comment has been addressed.
Response: Acknowledged.

16. In accordance with SWMO Section 196-61(b)(1), storm sewers (pipes and other structures) shall be reinforced concrete pipe, have a minimum grade of ½% and a minimum inside diameter of 18 inches. The proposed pipe is HDPEP instead of RCP and the applicant is requesting a waiver. We have no objection to this request since there is over 2 feet of cover over the pipe.

Response: Acknowledged.

17. In accordance with SWMO Section 196-61(b)(2), roof drains or yard drains shall not connect to any sanitary sewer and shall not discharge water directly over any sidewalk. Per SWMO Section 196-112, roof drains and sump pumps shall discharge to infiltration or vegetative BMPs… The plan has been revised to show discharge locations for roof drains and sump pumps. We offer the following comments.
    a. The sump pump and roof drain at the northern corner of the dwelling should be directed towards the cul-de-sac bulb instead of towards the rear to avoid impact on the abutting property.
    Response: The layout has been revised and the sump pump discharge location have been revised.

    b. For lots 5, 6 and 7, redirect the discharge direction towards the rear property line instead of towards the side lot lines.
    Response: The layout has been revised and the sump pump discharge location have been revised.

    c. Provide a visible note in the plan view of plan sheet 7 stating if, during construction or the maintenance period, it is determined that roof drain or sump pump discharge locations are impacting abutting lots/properties or sidewalks, they must be relocated to address such issues.
    Response: The note has been added to plan sheet 7.

18. This comment has been addressed.
    Response: Acknowledged.

19. In accordance with SLDO Section 196-61(c)(10)c., maintenance of all drainage facilities and watercourses, both existing and proposed, within the proposed site shall be the responsibility of the developer until such a time as one of the following is accomplished: a homeowner's association, approved by the Township, assumes responsibility for the maintenance of the development, including the maintenance of the watercourses and/or drainage facilities. Site Plan Note #10 on the Record Site Plan states that "ownership of land, ownership and maintenance of drainage facilities, and ownership and maintenance of open space within the property is to be retained by the homeowner's association." Provide a copy of the homeowners' association agreement to the Township for review.
    Response: Acknowledged. HOA document will be provided under separate cover.

20. In accordance with SWMO Section 196-61(e)(5), anti-seep collars shall be poured in place concrete and installed around the principal pipe barrel within the normal saturation zone of the detention basin terms…The spacing between collars shall be 16 feet. The plan view appears to show one anti-seep collar, however the detail shows 12.62 spacing. Please clarify. Per Section 196-61(e)(14) revised the Basin Berm Detail on plan sheet 8 to show the following:
    a. Location and spacing of the anti-seep collars,
    b. top of berm width
    c. top of berm and spillway elevations

    Response: The basin berm detail has been updated to include the additional information.

21. This comment has been addressed.
    Response: Acknowledged.

22. In accordance with SWMO Section 196-61(e)(8), the minimum top width of detention basin berms shall be ten feet. Revise the Basin Berm detail on plan sheet 8 to reference a 10-foot wide top of berm instead of 8 feet.
    Response: The Basin Berm detail has been updated to show 10-foot wide top of berm.

23. In accordance with SWMO Section 196-62(l)(1)a.1., grade changes and excavation on any location within the site shall not… encroach upon a tree protection zone. The proposed level spreader and one of the proposed anti-seep collars are located within the tree protection zone. Revise the plan so that proposed improvements and grading do not encroach into the tree protection zone. This comment has been addressed, however, the level spreader shall be redesigned to be 13LF long per 1cfs in 10yr post construction condition.
    Response: The level spreader is not designed to be utilized for Peak Flow or volume reduction.

24. This comment has been addressed.
    Response: Acknowledged.

25. In accordance with SWMO Section 196-97(a), the owners of any land upon which stormwater facilities and BMPs will be placed, constructed or implemented…shall record the following documents in the Office of the Recorder of Deeds for Bucks County, within 10 days of approval of the stormwater facility and BMP O & M plan by the municipality:
    a. O & M agreements
    b. Easements under Section 196-100

    The applicant will be required to execute a stormwater management O & M agreement with easement.
    Response: Acknowledged.

26. In accordance with SWMO Section 196-97(e), (f) and (h), (e) facilities, areas, or structures used as BMPs shall be enumerated as permanent real estate appurtenances and recorded as deed restrictions or conservation easements that run with the land. (f) the O&M plan shall be recorded as a restrictive deed covenant that runs with the land. (h) The O&M agreement shall be transferred with transfer of ownership. The agreement shall be substantially the same as the agreement in Appendix A. The raingarden must be enumerated as a permanent real estate appurtenance and recorded as a deed restriction that run with the land. The PCSM plan and O & M agreement shall be recorded as a restrictive deed covenant that runs with the land. Since the developer will have ownership and O&M responsibilities during construction, and will execute the O & M agreement, revise the record plan and the PCSM plan to clearly indicate the O&M agreement must be transferred to the Homeowner's Association once established.
    Response: Note 13 on the record plan and Note 9 on the PCSM plan have been added.

27. This comment has been addressed.
    Response: Acknowledged.

28. In accordance with SWMO Section 196-61(e)(12), the distance from the highest free water surface of any detention basin or drainage facility to a dwelling unit shall be a minimum of 100 feet. The basin has been relocated and is only 20 feet from the dwelling on Lot 4. The dwelling must be relocated to provide the required setback. Since the basin is in a residential neighborhood, in addition to the setback requirement, provide a fence around the basin for safety. Show the fence in the plan view and provide a fence detail.
    Response: The waiver for the 100 feet setback has been added to the waiver letter. A fence has been proposed around the basin.

29. In accordance with SWMO Section 196-61(e)(2), all detention basins shall be designed as per the procedures developed by the USDA SCD as outlined in TR-55…The applicant is

requesting a waiver to allow the use of the Dekalb Rational method to design the basin. We have no objection to this request since PennDOT allows the Dekalb rational method and since the site is only 7 lots.
Response: Acknowledged.

General Comments

1. Submit a construction cost estimate per Section 201-64(a)(1).
   Response: A construction cost estimate will be provided under a separate cover.

2. This comment has been addressed.
   Response: Acknowledged.

3. As requested, the Township Roadway Restoration Detail has been added to the plans. However, the detail is not legible and this should be addressed.
   Response: The Township Roadway Restoration Detail has been updated to print legibly.

4. The proposed cartway width (28 feet) of the private cul-de-sac complies with SLDO Section 201-104(b)(1). However, we note it is not wide enough to accommodate 2 lanes of traffic and on-street parking. No parking signs should be provided.
   Response: The cartway width has been revised to be 32' wide to accommodate parking on one side of the street.

5. The plan set is titled "Preliminary and Final Subdivision Plans…". The submitted Township application references preliminary only. Please clarify.
   Response: Plans have been revised to say preliminary.

If you have any questions or require additional information, please do not hesitate to contact us at 215-586-3330 or kristin@hcengineering.net.

Very truly yours,
Holmes Cunningham Engineering

Kristin Holmes, P.E.
Partner

ecc: Bill Laphen
Mike Meginniss

O:\1608 - 1515 Gibson Road\Outbound\Twp 2022-07-14 Response Letter .docx

PRELIMINARY SUBDIVISION PLANS FOR

1515 GIBSON ROAD SUBDIVISION

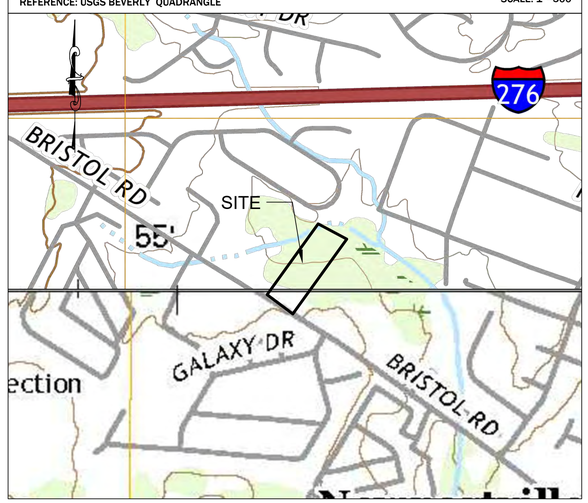
TMP # 02-054-005

Bensalem Township, Bucks County, PA

SITE LOCATION MAP

REFERENCE: USGS BEVERLY QUADRANGLE

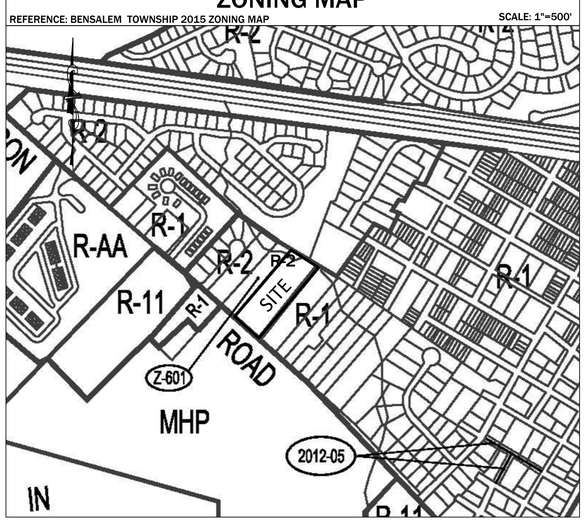
SCALE: 1"=500'



ZONING MAP

REFERENCE: BENSALEM TOWNSHIP 2015 ZONING MAP

SCALE: 1"=500'



AREA MAP

REFERENCE: DVRPC AERIAL PHOTOGRAPHS 2010

SCALE: 1"=200'

DRAWING LIST

SHEET NUMBER	DRAWING NUMBER	DRAWING TITLE	LAST REVISED DATE
1	C0.0	COVER SHEET	07/15/2022
2	C0.1	EXISTING CONDITIONS & DEMOLITION PLAN	07/15/2022
3	C0.2	AREA MAP	07/15/2022
4	C1.0	RECORD SUBDIVISION PLAN	07/15/2022
5	C1.1	RECORD SITE PLAN	07/15/2022
6	C1.2	SITE DETAILS	07/15/2022
7	C2.0	GRADING AND DRAINAGE PLAN	07/15/2022
8	C2.1	DRAINAGE DETAILS	07/15/2022
9	C3.0	UTILITIES PLAN	07/15/2022
10	C3.1	WATER DETAILS	07/15/2022
11	C3.2	SANITARY SEWER DETAILS	07/15/2022
12	C4.0	ROAD PROFILES	07/15/2022
13	C4.1	UTILITY PROFILES	07/15/2022
14	C5.0	EROSION AND SEDIMENT CONTROL PLAN	07/15/2022
15	C5.1	EROSION AND SEDIMENT CONTROL DETAILS	07/15/2022
16	C5.2	EROSION AND SEDIMENT CONTROL DETAILS	07/15/2022
17	C5.3	POST CONSTRUCTION STORMWATER MANAGEMENT PLAN	07/15/2022
18	C5.4	POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS	07/15/2022
19	C6.0	LANDSCAPE AND LIGHTING PLAN	07/15/2022
20	C6.1	LANDSCAPE AND LIGHTING DETAILS	07/15/2022
21	C7.0	TRUCK TURN PLAN	07/15/2022

SUPPLEMENTAL HOP DRAWING LIST

SHEET NUMBER	DRAWING TITLE	LAST REVISED DATE
1	COVER SHEET	07/15/2022
2	INDEX SHEET	07/15/2022
3	SIGNING AND PAVEMENT MARKING PLAN	07/15/2022
4	ROADWAY IMPROVEMENT PLAN	07/15/2022
5	GRADING AND DRAINAGE PLAN	07/15/2022
6	DRIVEWAY PROFILE AND TRUCK TURNING MOVEMENTS	07/15/2022
7	PROFILES AND DETAILS	07/15/2022
8	MAINTENANCE AND PROTECTION OF TRAFFIC PLAN	07/15/2022

APPLICANT & OWNER:

GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA, 18901

PREPARED BY:

HOLMES CUNNINGHAM LLC
409 EAST BUTLER AVENUE
UNIT 5
DOYLESTOWN, PA 18901
(215) 586-3330

CONTACTS

BENSALEM TOWNSHIP
2400 BYBERRY ROAD
BENSALEM, PA 19020
PHONE: (215) 633-3730

BUCKS COUNTY PLANNING COMMISSION
THE ALMSHOUSE NESHAMINY MANOR CENTER
1260 ALMSHOUSE ROAD
DOYLESTOWN, PA 18901
215-345-3400

BUCKS COUNTY CONSERVATION DISTRICT
1456 FERRY ROAD, SUITE 704
DOYLESTOWN, PA 18901
215-345-7577

TOWNSHIP ENGINEER
T&M ASSOCIATES
RUSSELL G. BENNER, P.E.
74 W BROAD ST
BETHLEHEM, PA 18018
PHONE (610) 625-2999
FAX (610) 625-2969

BUCKS COUNTY WATER AND SEWER AUTHORITY
1275 ALMSHOUSE ROAD
WARRINGTON, PA 18976
PHONE: (215) 343-2538

BUCKS/MONT REGION CONTRACTOR AND BUILDER SERVICES
400 PARK AVENUE
WARMINSTER, PA 18974
PHONE: (215) 956-3270
FAX: (215) 956-3240

AQUA PENNSYLVANIA
762 W. LANCASTER AVENUE
BRYN MAWR, PA 19010
(877) 987-2782

PECO
2301 MARKET STREET
PHILADELPHIA, PA 19103
(800) 494-4000

ACT 187 AS AMENDED

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.

TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
(3) WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
(10) WORKING DAYS IN DESIGN STAGE
-- STOP & CALL --
Pennsylvania One Call System, Inc.
1-800-242-1776

REVISED:	07/15/2022
REVISED:	12/02/2021
DATE:	5/28/2021
PROJECT #	1608
DRAWING #	C0.0
SHEET	1 OF 21

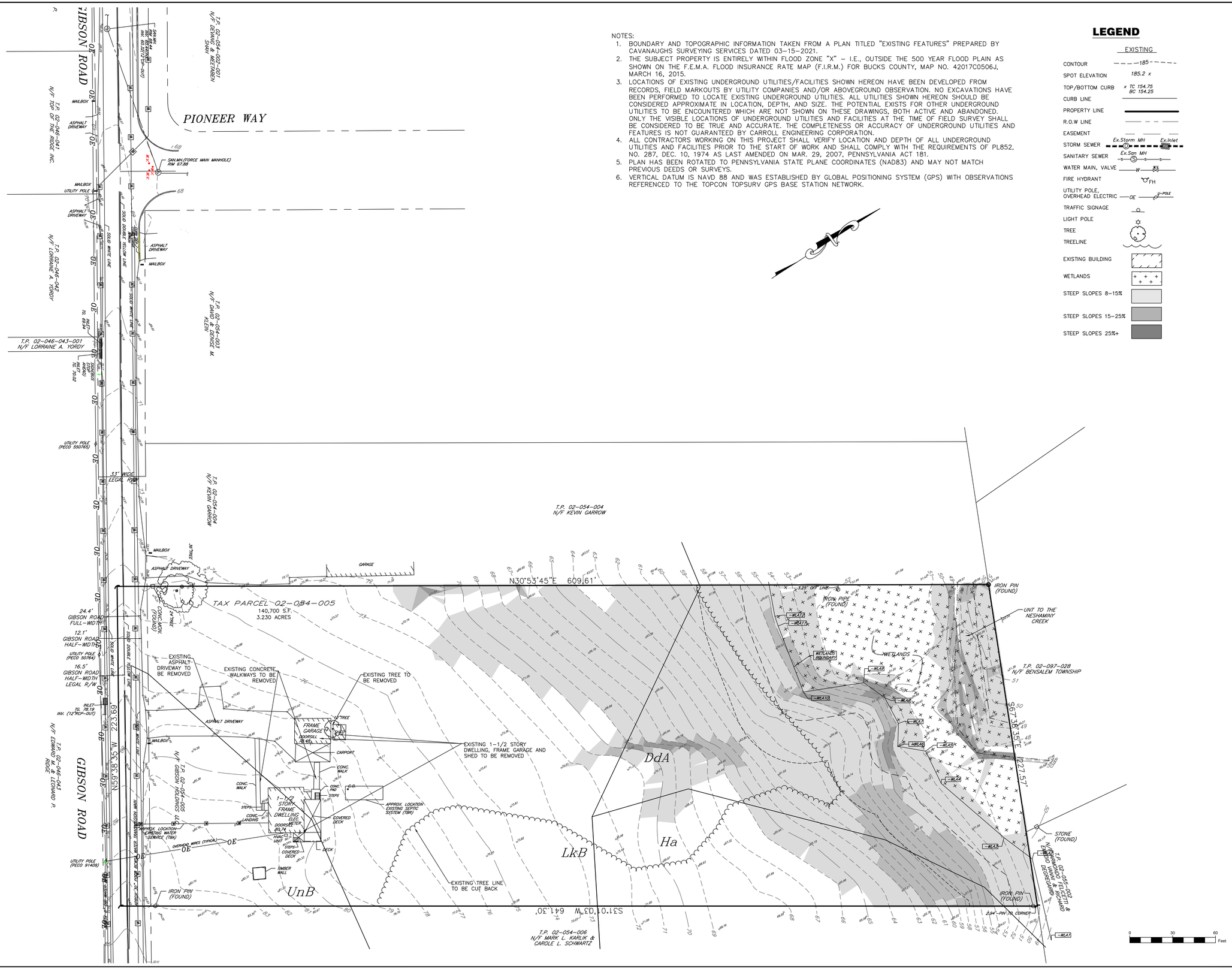
NOTES:

1. BOUNDARY AND TOPOGRAPHIC INFORMATION TAKEN FROM A PLAN TITLED "EXISTING FEATURES" PREPARED BY CAVANAUGHS SURVEYING SERVICES DATED 03–15–2021.
2. THE SUBJECT PROPERTY IS ENTIRELY WITHIN FLOOD ZONE "X" – I.E., OUTSIDE THE 500 YEAR FLOOD PLAIN AS SHOWN ON THE F.E.M.A. FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR BUCKS COUNTY, MAP NO. 42017C0506J, MARCH 16, 2015.
3. LOCATIONS OF EXISTING UNDERGROUND UTILITIES/FACILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM RECORDS, FIELD MARKOUTS BY UTILITY COMPANIES AND/OR ABOVEGROUND OBSERVATION. NO EXCAVATIONS HAVE BEEN PERFORMED TO LOCATE EXISTING UNDERGROUND UTILITIES. ALL UTILITIES SHOWN HEREON SHOULD BE CONSIDERED APPROXIMATE IN LOCATION, DEPTH, AND SIZE. THE POTENTIAL EXISTS FOR OTHER UNDERGROUND UTILITIES TO BE ENCOUNTERED WHICH ARE NOT SHOWN ON THESE DRAWINGS, BOTH ACTIVE AND ABANDONED. ONLY THE VISIBLE LOCATIONS OF UNDERGROUND UTILITIES AND FACILITIES AT THE TIME OF FIELD SURVEY SHALL BE CONSIDERED TO BE TRUE AND ACCURATE. THE COMPLETENESS OR ACCURACY OF UNDERGROUND UTILITIES AND FEATURES IS NOT GUARANTEED BY CARROLL ENGINEERING CORPORATION.
4. ALL CONTRACTORS WORKING ON THIS PROJECT SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO THE START OF WORK AND SHALL COMPLY WITH THE REQUIREMENTS OF PL852, NO. 287, DEC. 10, 1974 AS LAST AMENDED ON MAR. 29, 2007, PENNSYLVANIA ACT 181.
5. PLAN HAS BEEN ROTATED TO PENNSYLVANIA STATE PLANE COORDINATES (NAD83) AND MAY NOT MATCH PREVIOUS DEEDS OR SURVEYS.
6. VERTICAL DATUM IS NAVD 88 AND WAS ESTABLISHED BY GLOBAL POSITIONING SYSTEM (GPS) WITH OBSERVATIONS REFERENCED TO THE TOPCON TOPSURV GPS BASE STATION NETWORK.

LEGEND

EXISTING

CONTOUR — 185 —
SPOT ELEVATION 185.2 ×
TOP/BOTTOM CURB × TC 154.75 BC 154.25
CURB LINE
PROPERTY LINE
R.O.W LINE
EASEMENT
STORM SEWER Ex.Storm MH Ex.Inlet
SANITARY SEWER Ex.San MH
WATER MAIN, VALVE W
FIRE HYDRANT FH
UTILITY POLE, OVERHEAD ELECTRIC OE U-POLE
TRAFFIC SIGNAGE
LIGHT POLE
TREE
TREELINE
EXISTING BUILDING
WETLANDS
STEEP SLOPES 8–15%
STEEP SLOPES 15–25%
STEEP SLOPES 25%+



Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
Holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENDOT COMMENTS

CALL BEFORE YOU DIG!!!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION WORK AND
10 WORKING DAYS IN DESIGN STAGE
— STOP & CALL —
Pennsylvania One Call
Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

EXISTING CONDITIONS & DEMOLITION PLAN

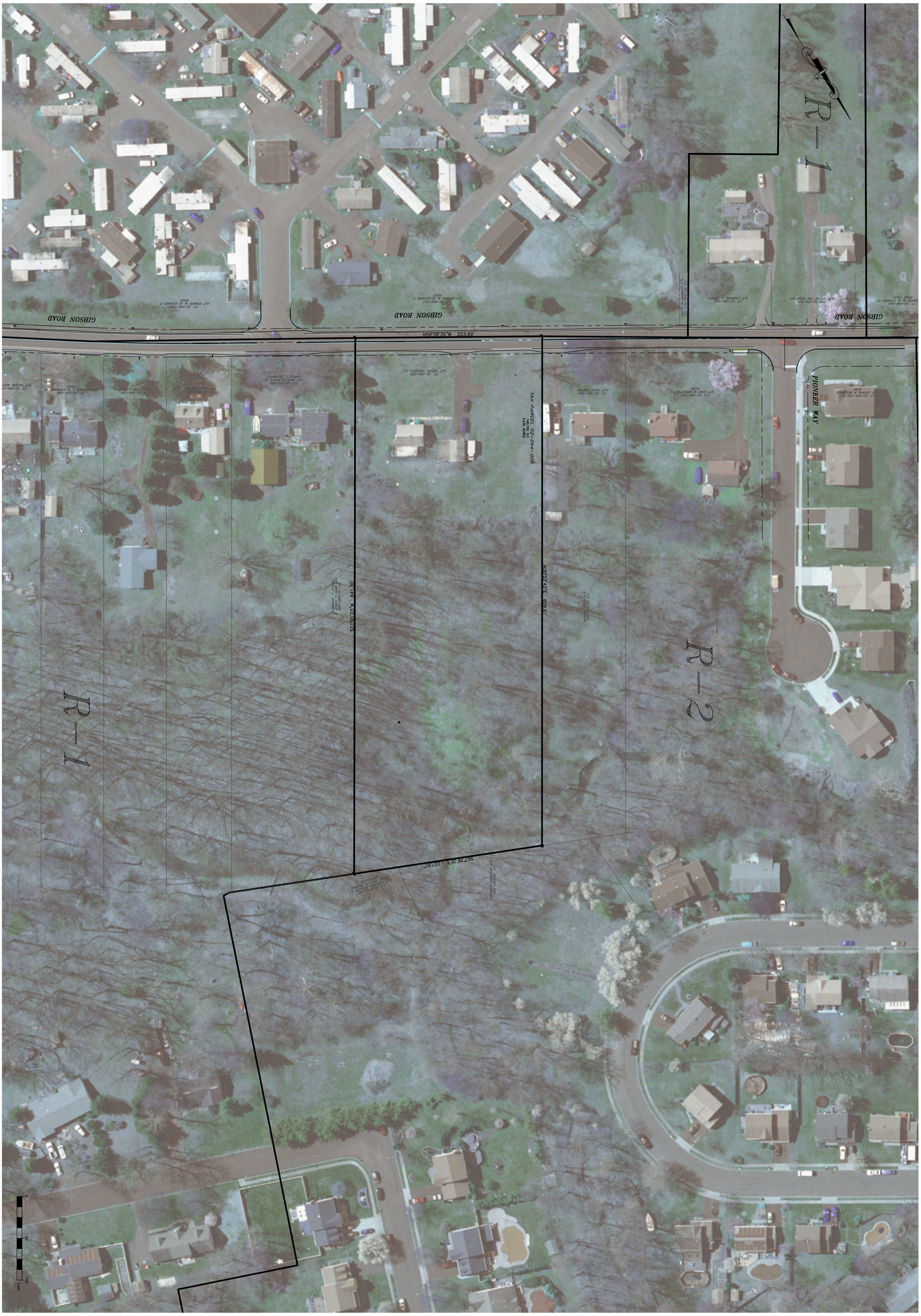
REGISTERED PROFESSIONAL ENGINEER ROGER THOMAS CUNNINGHAM PE076424 COMMONWEALTH OF PENNSYLVANIA

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C0.1_Existing.DWG

HCE Job	1608		
Date	5/27/2021	Scale	1"=30'
Designed	RC		
Sheet	2 of 21		

Drawing No.
C0.1



HCE Job	1608	File No.	1608_C0.2_AreaMap.DWG
Date	5/27/2021		
Scale	1"=50'		
Designed	RC		
Sheet	3 of 21		

Drawing No. C0.2

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ROBERT THOMAS CUNNINGHAM PE-076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

AREA MAP

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR CONSTRUCTION PHASE AND
10 WORKING DAYS IN DESIGN STAGE
– STOP & CALL –
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1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
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Holmes Cunningham LLC
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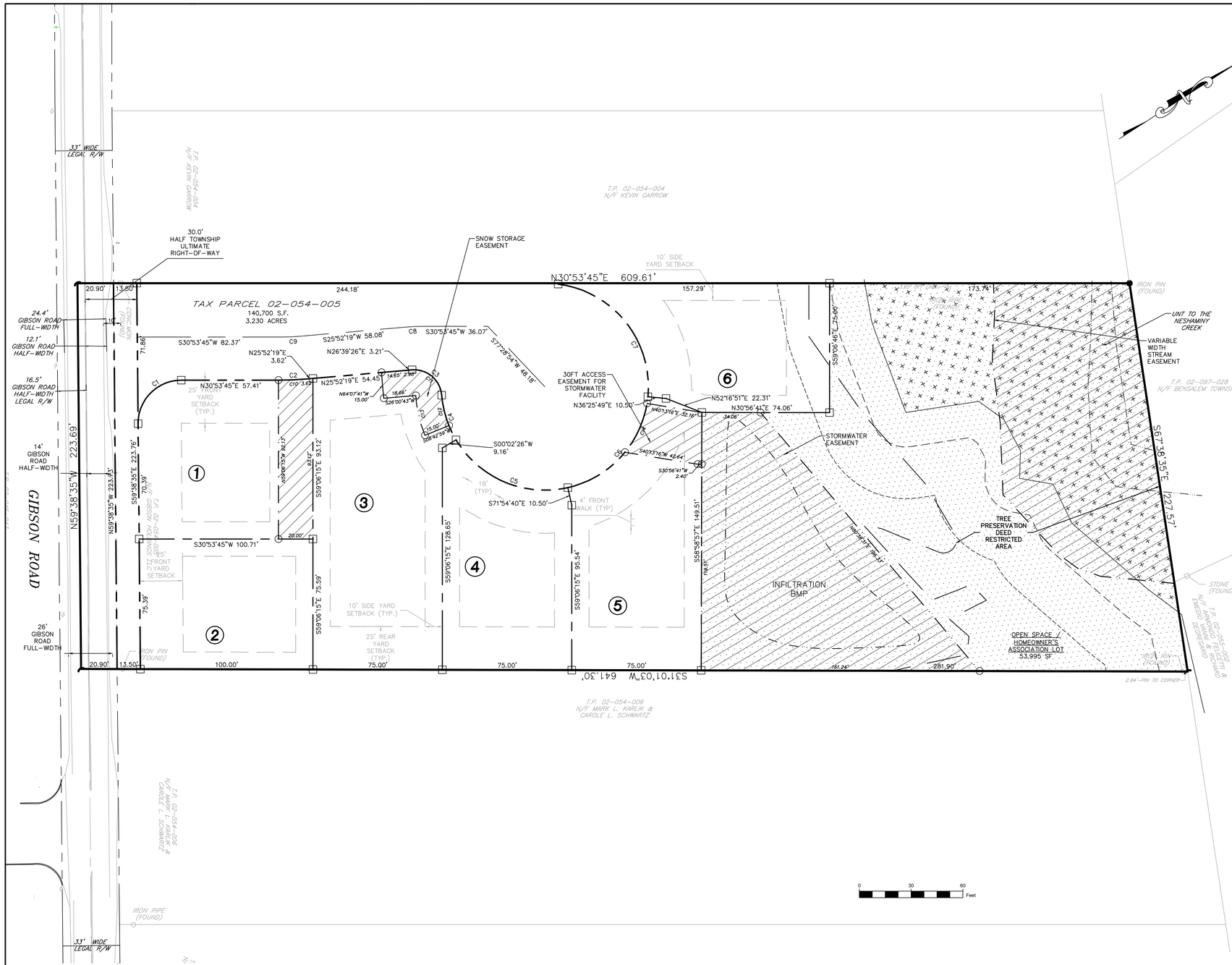

SURVEYOR'S CERTIFICATION

I, PATRICK A. CAVANAUGH, A REGISTERED SURVEYOR OF THE COMMONWEALTH OF PENNSYLVANIA, DO HEREBY CERTIFY THAT THIS PLAN CORRECTLY REPRESENTS THE PROPOSED METES AND BOUNDS, AS SHOWN, AND THE LOTS, LAND, STREETS, HIGHWAYS, AND EASEMENTS AS PLOTTED BY ME FOR THE OWNERS OR AGENTS, ARE CORRECT.

PATRICK A. CAVANAUGH, P.L.S.
PENNSYLVANIA LICENSE NO. SU51056E

OWNER'S CERTIFICATION

I, _____, HEREBY CERTIFY THAT GIBSON HOLDINGS, LLC, HAVE LAID OUT UPON OUR LAND SITUATED IN THE TOWNSHIP OF BENSALEM, COUNTY OF BUCKS, COMMONWEALTH OF PENNSYLVANIA, LOTS AND STREETS ACCORDING TO THE ACCOMPANYING PLAN WHICH IS INTENDED TO BE FORTHWITH RECORDED.

WITNESS OUR HAND AND SEAL THIS _____ DAY OF _____, 2018.

(SIGNATURE)

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF _____;
ON THE _____ DAY OF _____, 20____, BEFORE ME THE SUBSCRIBER, A NOTARY PUBLIC OF THE COMMONWEALTH OF PENNSYLVANIA, PERSONALLY APPEARED _____, WHO ACKNOWLEDGED THIS PLAN TO BE THE OFFICIAL PLAN OF LOTS AND PROPERTY SHOWN THERETO SITUATED IN THE TOWNSHIP OF BENSALEM, COUNTY OF BUCKS, COMMONWEALTH OF PENNSYLVANIA, AND DESIRED THAT THIS PLAN BE RECORDED ACCORDING TO LAW.

WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____, 20____.

NOTARY PUBLIC
(SEAL)

MY COMMISSION EXPIRES: _____

APPROVAL OF THE BENSALEM TOWNSHIP COUNCIL

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS APPROVED BY RESOLUTION OF THE TOWNSHIP COUNCIL OF BENSALEM TOWNSHIP THIS _____ DAY OF _____, 20____.

REVIEWED BY THE TOWNSHIP ENGINEER

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS REVIEWED BY THE APPOINTED TOWNSHIP ENGINEER FOR BENSALEM TOWNSHIP ON THIS _____ DAY OF _____, 20____.

TOWNSHIP ENGINEER

REVIEWED BY THE BUCKS COUNTY PLANNING COMMISSION

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS REVIEWED BY THE BUCKS COUNTY PLANNING COMMISSION ON THE _____ DAY OF _____, 20____, BCPC #

CHAIRMAN

DIRECTOR

CERTIFICATION FOR RECORDING

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS RECORDED IN THE OFFICE OF RECORDER OF DEEDS FOR BUCKS COUNTY, AT DOYLESTOWN, PENNSYLVANIA, THIS _____ DAY OF _____, 20____.

BY:
RECORDER OF DEEDS

WETLANDS CERTIFICATION

I HEREBY CERTIFY THAT A WETLAND IS LOCATED WITHIN 250 FEET OF A PROPOSED REGULATED ACTIVITY ASSOCIATED WITH THIS SUBDIVISION DEVELOPMENT, AS INDICATED ON THE PLAN. THE WETLAND IS A CATEGORY ____ WETLAND AS DETERMINED USING THE DEPARTMENT OF ECOLOGY RATING FORM (PUB. 04-06-025). I ALSO CERTIFY THAT ALL PROPOSED REGULATED ACTIVITIES WILL BE OUTSIDE OF THE WETLAND AND THE REQUIRED 20 FOOT BUFFER.

WETLAND SPECIALIST

NOTES:
1. EXTERIOR BOUNDARY INFORMATION IS BASED ON A PLAN OF SURVEY AND TOPOGRAPHIC SURVEY OF TMP 02-033-007 PREPARED BY CARROLL ENGINEERING CORPORATION DATED 02-16-2017. THIS SUBDIVSION PLAN RELIES ON THE ABOVE REFERENCED PLAN.
2. THE SUBJECT PROPERTY IS ENTIRELY WITHIN FLOOD ZONE "X" – I.E., OUTSIDE THE 500 YEAR FLOOD PLAIN AS SHOWN ON THE F.E.M.A. FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR BUCKS COUNTY, MAP NO. 42017C0502J, , MARCH 16, 2015.
3. NO ATTEMPT WAS MADE TO LOCATE THE UNDERGROUND UTILITIES WHICH MAY EXIST ON THIS PROPERTY. THIS PLAN DOES NOT CERTIFY TO THE LOCATION, BOTH HORIZONTAL AND VERTICAL OR ANY UNDERGROUND FEATURE OR STRUCTURE WHICH HAS NOT BEEN EXPOSED FOR DIRECT MEASUREMENT. LOCATIONS OF SUBSURFACE CONDITIONS SUCH AS UTILITIES, TANKS, DISPOSAL SYSTEMS, ETC ARE NOT REPRESENTED HEREON.
4. EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAN, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE: EASEMENT, OTHER THAN POSSIBLE EASEMENTS THAT WERE VISIBLE AT THE TIME OF MAKING OF THIS SURVEY; BUILDING SETBACK LINES; RESTRICTIVE COVENANTS; SUBDIVISION RESTRICTIONS; ZONING OR OTHER LAND USE REGULATIONS; AND ANY OTHER FACTS THAT AN ACCURATE TITLE SEARCH MAY DISCLOSE.
5. SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OR RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE TITLE SEARCH MAY DISCLOSE.
6. THE WORD "CERTIFY" AS USED IN ITS VARIOUS FORMS HEREON, IS UNDERSTOOD TO BE AN EXPRESSION OF PROFESSIONAL OPINION BY THE SURVEYOR, WHICH IS BASED ON HIS BEST KNOWLEDGE, INFORMATION AND BELIEF. AS SUCH, IT CONSTITUTES NEITHER A GUARANTEE OR WARRANTY, EITHER EXPRESSED OR IMPLIED.
7. CONCRETE MONUMENTS SHALL BE PLACED AT THE LOCATIONS SHOWN ON THIS PLAN IN ACCORDANCE WITH BENSALEM TOWNSHIP REGULATIONS.
8. HIGHWAY OCCUPANCY PERMIT IS REQUIRED PURSUANT TO SECTION 420 OF THE ACT OF JUNE 1, 1945 (P.L. 1242, 4280 KNOWN AS THE "STATE HIGHWAY LAW").
9. NO STRUCTURES OR PAVED AREAS ARE PERMITTED IN THE 50-FOOT WETLANDS BUFFER.
10. THE HOA WILL BE RESPONSIBLE FOR THE MAINTENANCE OF THE PROPOSED WALL.
11. THE DEED DOES NOT INDICATE ANY EXISTING EASEMENTS LOCATED ON THE PROPERTY.
12. A LAND ALTERATION PERMIT WILL BE NEEDED PRIOR TO THE START OF ANY GRADING, EXCAVATION, REMOVAL OF TOPSOIL, REMOVAL OF TREES OR REMOVAL OF ANY OTHER VEGETATIVE COVER.
13. THE STORMWATER O&M AGREEMENT MUST BE TRANSFERRED TO THE HOMEOWNER'S ASSOCIATION ONCE ESTABLISHED.

SITE AREA CALCULATIONS		
	Area (SF)	Area (Ac.)
Gross Tract	140,315	3.221
Gibson Road Legal ROW	4,675	0.107
Gibson Road Township Ultimate ROW	3,021	0.069
Net Tract	132,619	3.045
Total Proposed Lots	6	
Proposed Density (DU per AC)	1.97	

LOT AREA TABLE		
Lot	Gross Lot Area	Net Lot Area
#	(SF)	(SF)
1	9,188	9,188
2	7,576	7,576
3	12,919	12,919
4	8,465	8,465
5	10,177	10,177
6	8,470	8,470
HOA Lot	53,995	53,995

OWNER/ APPLICANT
GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA, 18901
DEED BOOK: 6883 PAGE: 972

Curve Table

Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	39.50'	25.00'	090°32'19"	N14°22'25"W	35.52'
C2	15.34'	175.00'	005°01'26"	N28°23'02"E	15.34'
C3	25.01'	16.00'	089°33'35"	N71°26'14"E	22.54'
C4	27.41'	60.00'	026°10'35"	N76°52'16"W	27.17'
C5	75.35'	60.00'	071°57'06"	N54°03'53"E	70.49'
C6	75.04'	60.00'	071°39'31"	N17°44'25"W	70.24'
C7	92.32'	60.00'	088°09'47"	S82°20'55"W	83.48'
C8	13.15'	150.00'	005°01'26"	S28°23'02"W	13.15'
C9	13.15'	150.00'	005°01'26"	S28°23'02"W	13.15'
C10	15.34'	175.00'	005°01'26"	N28°23'02"E	15.34'
C11	25.01'	16.00'	089°33'35"	N71°26'14"E	22.54'
C12	18.24'	60.00'	017°24'48"	S72°29'22"E	18.16'
C13	23.80'	75.00'	018°10'46"	N72°06'23"W	23.70'
C14	31.42'	60.00'	030°00'00"	N34°46'44"W	31.06'

LEGEND

PROPERTY/R.O.W. LINE
BUILDING SETBACK
PROPOSED MONUMENT
PROPOSED IRON PIN
WETLANDS
PROPOSED OPEN SPACE
EASEMENT
DEED RESTRICTED WOODLANDS PRESERVATION AREA

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
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holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR MARKING UNDERGROUND UTILITIES IN DESIGN STAGE 10 WORKING DAYS IN CONSTRUCTION STAGE
Pennsylvania One-Call Serviceline, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

RECORD SUBDIVISION PLAN

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT THOMAS CUNNINGHAM
NUMBER 076424
ENGINEER

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C1.0_Subdivision.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	1"=30'		
Designed	RC		
Sheet	4	of	21

Drawing No.
C1.0

Soils Legend						
Type	Name	Depth to Bedrock	Depth to Seasonal High Water Table	Floodplain Soil	HSG	Hydric Soil
Ha	Hatboro silt loam	60"-99"	0"-6"	No	B/D	Yes
DdA	Doylestown Silt Loam (0% to 3% slopes)	60"-72"	0"-6"	No	C/D	Yes
LxB	Lawrenceville silt loam (3% to 8% slopes)	48"-99"	18"-36"	No	C	No
UnB	Urban Land-duffield complex (0% to 8% slopes)	10"-100"	>80"	No	B	No

Limitations and Resolutions: The soils found within the project limits have varying limitations including possible shallow depth to groundwater and possible shallow depth to bedrock. In order to resolve the groundwater limitation, any standing water should be pumped through a sediment filter bag. To resolve the bedrock limitation, the contractor shall determine whether rock is rippable. If rock is not rippable, blasting will be required. All blasting shall meet all local, county, state and federal regulations.

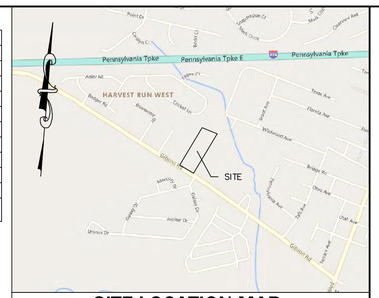
LOT AREA AND COVERAGE TABLE											
Lot	Gross Lot Area	Right-of-Way Area	Net Lot Area	Easement Areas	Building Area	Building Ratio	On-lot Impervious Excluding Building Area	Future Impervious for Owner	Impervious Ratio	Lot Street Frontage	Lot Width
#	(SF)	(SF)	(SF)	(SF)	(SF)	%		(SF)	%	(FT)	(FT)
1	9,188	0	9,188	1,849	1,750	19%	1,632	752	45%	92.1	92.1
2	7,576	0	7,576	0	1,750	23%	1,029	631	45%	75.4	75.4
3	12,919	0	12,919	773	1,750	14%	655	3,409	45%	110.1	75.0
4	8,465	0	8,465	516	1,750	21%	742	1,317	45%	75.3	75.0
5	10,177	0	10,177	1,107	1,750	17%	683	2,147	45%	75.0	75.0
6	8,470	0	8,470	0	1,750	21%	584	1,477	45%	92.8	75.0
HOA Lot	53,995	0	53,995	49,315	N/A						

NATURAL RESOURCES TABLE				
Cover Type	Permitted Disturbance	Actual Disturbance	Area On Site (SF)	Proposed Disturbance (SF)
Floodplains	0%	0.0%	0	0
Steep Slopes 8-15%	40%	40.0%	43,241	17,292
Steep Slopes 15-25%	30%	6.6%	8,304	552
Steep Slopes 25%+	15%	14.9%	1,243	185
Woodlands (within wetlands)	20%	0.0%	0	0
Woodlands (excluding wetlands)	50%	0.0%	0	0
Wetlands	0%	0.0%	17,071	0
Wetlands Buffer (50ft)	20%	2.1%	16,490	350

PARKING TABLE	
Dwellings	6
Total Required Spaces	12
Required Parking Ratio	2.0
Driveway Parking Spaces *	12
On-Street Parking Perpendicular	0
On-Street Parking Parallel	12
Total Proposed Spaces	24
Proposed Parking Ratio	4.0

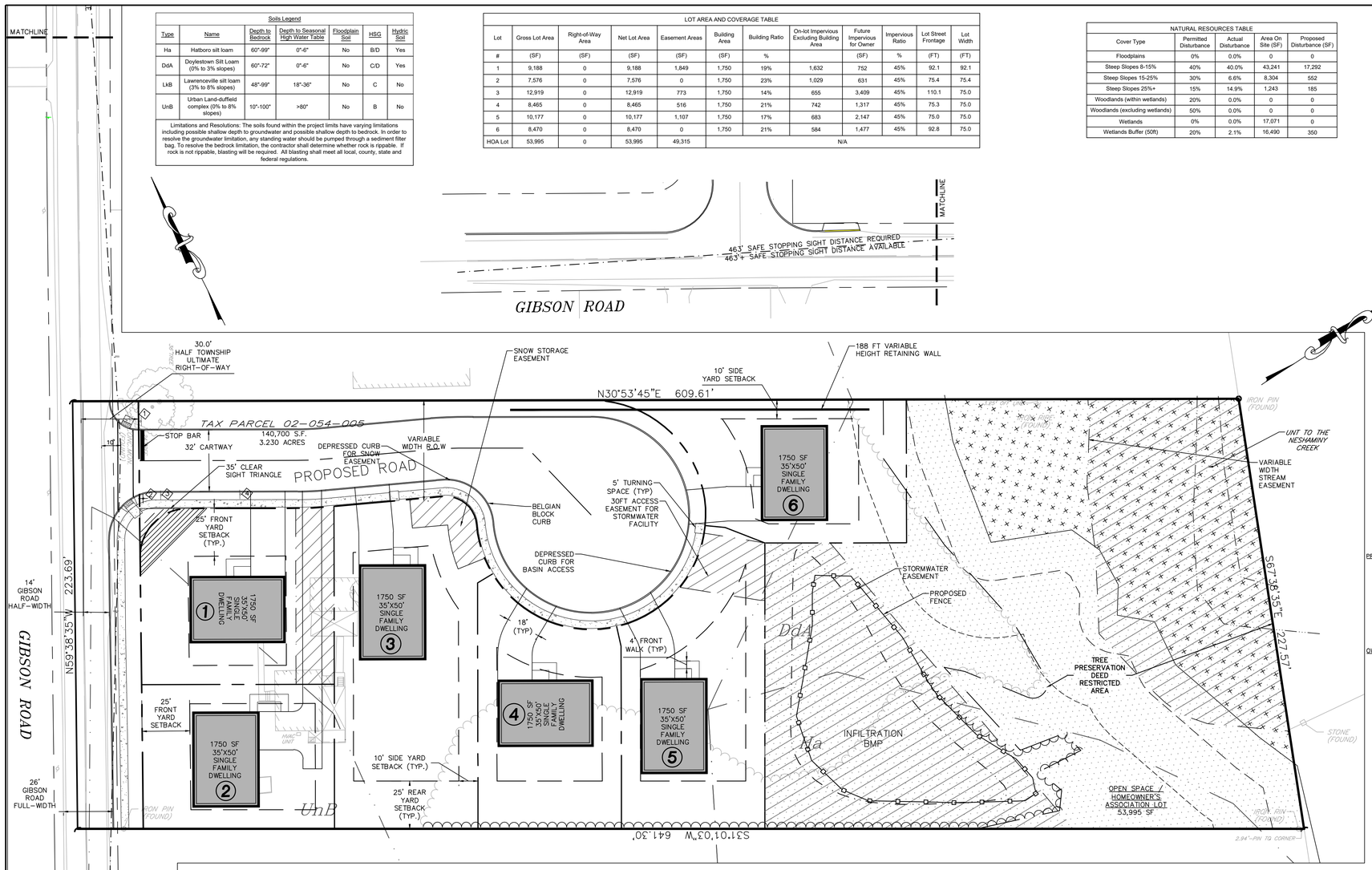
* Single Family Dwelling has two driveway spaces

OWNER / APPLICANT
GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA, 18901



SITE LOCATION MAP

REFERENCE: BING MAPS SCALE: 1"=1,000'



ZONING TABLE			
Zone: R-2; Use: Single Family Detached Dwelling			
ITEM	REQUIRED / PERMITTED	PROPOSED	ORDINANCE SECTION
Land Use:	1 - Single Family Detached Dwelling	1 - Single Family Detached Dwelling	232-166(1)
Min. Lot Area	7,500 SF	7,576 SF	232-167(a)
Min. Lot Street Frontage	75 FT	75 FT	232-167(b)
Avg. Lot Width	75 FT	77.9 FT	232-167(b)
Min. Front Yard	25 FT	25 FT	232-167(e)(1)
Min. Side Yard Aggregate Width	20 FT	20 FT	232-167(e)(2)
Min. Side Yard (Each)	9 FT	9 FT	232-167(e)(2)
Min. Rear Yard	25 FT	25 FT	232-167(e)(3)
Max. Building Coverage of Net Lot Area	40%	23.1%	232-167(c)
Max. Impervious Coverage Net Lot Area	45%	45.0%	232-167(d)
Max. Building Height / Stories	35 FT	35 FT	232-167(f)
Max. Density per Net Tract Area	2.8 DU/AC	2.0 DU/AC	232-167(g)
Min. Parking Spaces per Residential Dwelling Unit	2	2	
Min. ROW width	50 FT	50 FT	232-167(b)
Min/Max. Cartway Width	28/32 FT	32 FT	232-167(e)(1)

PROFESSIONAL ENGINEER'S CERTIFICATION

I, ROBERT T. CUNNINGHAM , A REGISTERED PROFESSIONAL ENGINEER OF THE COMMONWEALTH OF PENNSYLVANIA, DO HEREBY CERTIFY THAT THIS PLAN MEETS THE REQUIREMENTS OF ALL ORDINANCES AFFECTING THIS SUBDIVISION AND LAND DEVELOPMENT, INCLUDING THE AMENDED ZONING ORDINANCE OF THE TOWNSHIP OF BENSALEM IN WHICH THIS SUBDIVISION OR LAND DEVELOPMENT IS LOCATED NOT WITHSTANDING THE ZONING VARIANCES AND OTHER WAIVERS GRANTED BY BENSALEM TOWNSHIP.

_____
ROBERT T. CUNNINGHAM, P.E.
PENNSYLVANIA LICENSE NO. PE076424

OWNER'S CERTIFICATION

I, _____, HEREBY CERTIFY THAT GIBSON HOLDINGS, LLC, HAVE LAID OUT UPON OUR LAND SITUATED IN THE TOWNSHIP OF BENSALEM, COUNTY OF BUCKS, COMMONWEALTH OF PENNSYLVANIA, LOTS AND STREETS ACCORDING TO THE ACCOMPANYING PLAN WHICH IS INTENDED TO BE FORTHWITH RECORDED.

WITNESS OUR HAND AND SEAL THIS _____ DAY OF _____ , 20__.

_____
(SIGNATURE)

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF _____:
ON THE _____ DAY OF _____ , 20____, BEFORE ME THE SUBSCRIBER, A NOTARY PUBLIC OF THE COMMONWEALTH OF PENNSYLVANIA, PERSONALLY APPEARED _____, WHO ACKNOWLEDGED THIS PLAN TO BE THE OFFICIAL PLAN OF LOTS AND PROPERTY SHOWN THERETO SITUATED IN THE TOWNSHIP OF BENSALEM, COUNTY OF BUCKS, COMMONWEALTH OF PENNSYLVANIA, AND DESIRED THAT THIS PLAN BE RECORDED ACCORDING TO LAW.

WITNESS MY HAND AND NOTARIAL SEAL THIS _____ DAY OF _____ , 20____.

_____
NOTARY PUBLIC
(SEAL)

MY COMMISSION EXPIRES: _____

APPROVAL OF THE BENSALEM TOWNSHIP COUNCIL

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS APPROVED BY RESOLUTION OF THE BENSALEM TOWNSHIP COUNCIL ON THIS __ _ DAY OF _____, 20____.

_____
_____
_____

REVIEWED BY THE TOWNSHIP ENGINEER

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS REVIEWED BY THE APPOINTED TOWNSHIP ENGINEER FOR BENSALEM TOWNSHIP ON THIS _____ DAY OF _____, 20____.

_____
TOWNSHIP ENGINEER

REVIEWED BY THE BUCKS COUNTY PLANNING COMMISSION

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS REVIEWED BY THE BUCKS COUNTY PLANNING COMMISSION ON THIS _____ DAY OF_____, 20____, BCPC #_____

CERTIFICATION FOR RECORDING

THIS SUBDIVISION AND LAND DEVELOPMENT PLAN WAS RECORDED IN THE OFFICE OF RECORDER OF DEEDS FOR BUCKS COUNTY, AT DOYLESTOWN, PENNSYLVANIA, THIS _____ DAY OF _____, 20____.

BY: _____
RECORDER OF DEEDS

WETLANDS CERTIFICATION

I HEREBY CERTIFY THAT A WETLAND IS LOCATED WITHIN 250 FEET OF A PROPOSED REGULATED ACTIVITY ASSOCIATED WITH THIS SUBDIVISION DEVELOPMENT, AS INDICATED ON THE PLAN. THE WETLAND IS A CATEGORY _____ WETLAND AS DETERMINED USING THE DEPARTMENT OF ECOLOGY RATING FORM (PUB. 04-06-025). I ALSO CERTIFY THAT ALL PROPOSED REGULATED ACTIVITIES WILL BE OUTSIDE OF THE WETLAND AND THE REQUIRED 20 FOOT BUFFER.

_____
WETLAND SPECIALIST

SITE PLAN NOTES

1. BOUNDARY AND TOPOGRAPHIC INFORMATION TAKEN FROM A PLAN TITLED "EXISTING FEATURES" PREPARED BY CAVANAUGH'S SURVEYING SERVICES DATED 03-15-2021.
2. SUBJECT PROPERTY CONSISTS OF TAX PARCEL NO. 02-054-005.
3. ALL UTILITIES SERVICING THE PROPOSED SITE ARE TO BE PLACED UNDERGROUND.
4. ALL TRAFFIC SIGNS SHALL MEET THE REQUIREMENTS OF TITLE 67 OF THE PA CODE, CHAPTER 201, "TRAFFIC AND ENGINEERING STUDIES."
5. PROPOSED FACILITIES TO BE SERVICED BY PUBLIC WATER PROVIDED BY AQUA AMERICA AND PUBLIC SEWER PROVIDED BY THE BUCKS COUNTY WATER AND SEWER AUTHORITY.
6. THE PROPOSED ON-SITE ROADS HAVE BEEN DESIGNED AND WILL BE CONSTRUCTED IN ACCORDANCE WITH BENSALEM TOWNSHIP CONSTRUCTION STANDARDS. THE ON-SITE ROAD SHALL BE OFFERED FOR DEDICATION TO BENSALEM TOWNSHIP.
7. BUILDINGS, DRIVEWAYS, GRADING, AND OTHER PROPOSED FEATURES ON PROPOSED LOTS SUBJECT TO CHANGE UPON BUILDING DEPARTMENT PERMIT APPLICATION THAT WILL ILLUSTRATE DETAILED LOT LAYOUTS, ARCHITECTURAL PLANS, AND GRADING.
8. THE LENGTH OF PROPOSED PRIVATE DRIVE IS APPROXIMATELY 250 L.F.
9. TRASH COLLECTION WILL OCCUR VIA CURBSIDE PICKUP ONSITE.
10. OWNERSHIP OF LAND, OWNERSHIP AND MAINTENANCE OF DRAINAGE FACILITIES, AND OWNERSHIP AND MAINTENANCE OF OPEN SPACE WITHIN THE PROPERTY IS TO BE RETAINED BY THE HOMEOWNERS ASSOCIATION. OWNERSHIP, MAINTENANCE, AND INSPECTION RIGHTS OF THE SEWER MAINS WITHIN THE PROPERTY LIMITS SHALL BE RETAINED BY THE BUCKS COUNTY WATER AND SEWER AUTHORITY. OWNERSHIP, MAINTENANCE, AND INSPECTION RIGHTS OF THE WATER MAINS WITHIN THE PROPERTY LIMITS SHALL BE RETAINED BY AQUA AMERICA. OWNERSHIP, MAINTENANCE, AND INSPECTION RIGHTS OF ALL OTHER UTILITIES WITHIN THE PROPERTY LIMITS SHALL BE RETAINED BY THE APPROPRIATE UTILITY AUTHORITY.
11. THE CONTRACTOR MUST CONTACT THE BUCKS COUNTY WATER AND SEWER AUTHORITY ONE-WEEK PRIOR TO WATER MAIN CONSTRUCTION, AND 72 HOURS PRIOR TO EXCAVATION NEAR AND CONNECTING INTO THE EXISTING MAIN.
12. ALL DRIVEWAYS SHALL BE BLACK-TOPPED OR CEMENTED.
13. BENSALEM TOWNSHIP SHALL HAVE THE RIGHT TO ENTER PRIVATE PROPERTY THROUGH THE STORMWATER EASEMENT TO INSPECT AND REPAIR, IF NECESSARY, ANY STORMWATER MANAGEMENT FACILITY.
14. DETECTABLE WARNINGS MUST BE INSTALLED ON ALL CURB RAMPS FOR FULL LENGTH AND WIDTH OF RAMP, EXCEPT WITHIN PENNDOT RIGHT-OF-WAY.
15. SIGHT DISTANCE REQUIREMENTS FOR THE PROPOSED INTERSECTIONS WAS CALCULATED USING A 40 MPH SPEED ON GIBSON ROAD IN ACCORDANCE WITH PENNDOT FORM M-950S.
16. HIGHWAY OCCUPANCY PERMIT IS REQUIRED PURSUANT TO SECTION 420 OF THE ACT OF JUNE 1, 1945 (P.L. 1242, 4280 KNOWN AS THE "STATE HIGHWAY LAW"). ALL WORK WITHIN GIBSON ROAD RIGHT-OF-WAY SHALL BE COORDINATED WITH THE APPROVED HIGHWAY OCCUPANCY PERMIT PLANS FOR THIS PROJECT.
17. ALL PROPOSED PEDESTRIAN FACILITIES REFLECTED ON THESE PLANS SHALL BE CONSTRUCTED TO COMPLY WITH THE FOLLOWING STANDARDS:
    a. PENNDOT DESIGN MANUAL 2, CHAPTER 6.
    b. PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, PUBLICATION 72M, RC-67M.
    c. U.S. ACCESS BOARD, PUBLIC RIGHT OF WAR ACCESSIBILITY GUIDELINES (PROWAG) AND ADA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG).
18. ON ANY CORNER LOT WITH GIBSON ROAD, A 35-FOOT CLEAR SIGHT TRIANGLE SHALL BE PROVIDED. WITHIN SUCH TRIANGLES NO STRUCTURE, WALL, FENCE, PLANTING OR OTHER VISUAL OBSTRUCTION BETWEEN THE HEIGHT OF TWO FEET AND SEVEN FEET ABOVE THE LEVEL OF THE INTERSECTING STREETS SHALL BE PERMITTED.
19. ALL CONSTRUCTION SHALL COMPLY WITH THE BENSALEM TOWNSHIP STANDARDS AND WHERE FEDERAL OR STATE REGULATIONS IMPOSE MORE RESTRICTIVE STANDARDS AND REQUIREMENTS, THE MORE RESTRICTIVE REQUIREMENTS SHALL CONTROL.
20. THE AREA BETWEEN THE EXISTING THE EXISTING RIGHT-OF-WAY AND THE PROPOSED ULTIMATE RIGHT-OF-WAY IS OFFERED FOR DEDICATION TO THE TOWNSHIP.
21. THE SITE SHALL BE CONSTRUCTED AND ROUGH GRADED TO MATCH PROPOSED GRADING AND DRAINAGE PATTERNS TO ENSURE THE CROSS LOT GRADING AND DRAINAGE FUNCTIONS AS DESIGNED EVEN IF THE LOTS ARE NOT DEVELOPED SIMULTANEOUSLY. PA DEP STANDARD INDIVIDUAL ON-LOT E&S FEATURES SHALL BE INSTALLED AS THE LOTS ARE CONSTRUCTED TO ENSURE STABILIZED AREAS ARE NOT EFFECTED BY ADJACENT LOT DISTURBANCE.
22. AN AS-BUILT PLAN OF ALL STORMWATER BMPs IS REQUIRED UPON THE COMPLETION OF CONSTRUCTION OF THE PUBLIC IMPROVEMENTS.
23. ALL SIGHT DISTANCE OBSTRUCTIONS (INCLUDING BUT NOT LIMITED TO EMBANKMENTS AND VEGETATION) SHALL BE REMOVED BY THE APPLICANT TO PROVIDE A MINIMUM OF 352' SAFE STOPPING SIGHT DISTANCE TO THE LEFT AND 304' SAFE STOPPING SIGHT DISTANCE TO THE RIGHT FOR A DRIVER EXITING THE PROPOSED DRIVEWAY ONTO GIBSON ROAD. THE DRIVER MUST BE CONSIDERED TO BE POSITIONED 10' FROM THE NEAR EDGE OF THE CLOSEST HIGHWAY THROUGH TRAVEL LANE AT AN EYE HEIGHT OF THREE FEET-SIX INCHES (3'-6") ABOVE THE PAVEMENT SURFACE. THE POINT SIGHTED BY THE EXITING DRIVER SHALL BE THREE FEET-SIX INCHES (3'-6") ABOVE THE PAVEMENT SURFACE LOCATED IN THE CENTER OF THE CLOSEST HIGHWAY TRAVEL LANE DESIGNATED FOR USE BY APPROACHING TRAFFIC. THIS SIGHT DISTANCE SHALL BE MAINTAINED BY THE APPLICANT AND/OR THE APPLICANT'S SUCCESSORS AND ASSIGNORS.
24. FOR ALL RETAINING WALLS WITH A HEIGHT EXCEEDING 4 FEET, DETAILED DESIGN CALCULATIONS AND PLANS PREPARED BY A PENNSYLVANIA PROFESSIONAL ENGINEER MUST BE SUBMITTED TO THE TOWNSHIP FOR REVIEW AND APPROVAL.

SITE AREA CALCULATIONS		
	Area (SF)	Area (Ac.)
Gross Tract	140,315	3.221
Gibson Road Legal ROW	4,675	0.107
Gibson Road Township Ultimate ROW	3,021	0.069
Net Tract	132,619	3.045
Total Proposed Lots	6	
Proposed Density (DU per AC)	1.97	
IMPERVIOUS COVERAGE TABLE - EXISTING		
Cover Type	Area (SF)	Area (Ac.)
Buildings/ Porches	2,110	0.048
Sidewalk	262	0.006
Driveways (on Lot)	2,331	0.054
TOTAL	4,703	0.108
IMPERVIOUS COVERAGE TABLE - PROPOSED		
Cover Type	Area (SF)	Area (Ac.)
Buildings	10,500	0.241
Sidewalk	2,171	0.050
Lot Walkways	432	0.010
Driveways (on Lot)	4,864	0.112
Driveways (in Right-of-way)	483	0.011
Roadways	14,801	0.340
Curbing	336	0.008
TOTAL	33,587	0.771
OPEN SPACE CALCULATIONS		
	Area (SF)	Area (Ac.)
Open Space	53,952	1.239
Total	53,952	1.239
Total Percentage	40.7%	
Stormwater Area within Open Space	14,603	0.335
SWM Percentage of Open Space	27.1%	

SIGN LEGEND

STOP SIGN
STREET SIGN
NO OUTLET SIGN
NO PARKING – THIS SIDE

SITE PLAN LEGEND

CURB LINE
PROPERTY/R.O.W. LINE
BASIN/ RAIN GARDEN
BUILDING SETBACK
BUILDING
FENCE
TRAFFIC SIGNAGE
OPEN SPACE
CLEAR SIGHT TRIANGLE
WETLANDS
EASEMENT
DEED RESTRICTED WOODLANDS PRESERVATION AREA
SOIL LINE
SOILS TYPE UnB

0 30 60 Feet

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION WITHIN
10 WORKING DAYS IN DESIGN STAGE
-- STOP & CALL
Pennsylvania One-Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

RECORD SITE PLAN

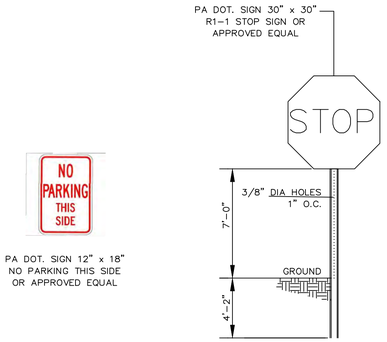
DRAFT 7/8/22

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C1.1_Site.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	1"=30'		
Designed	RC		
Sheet	5	of	21

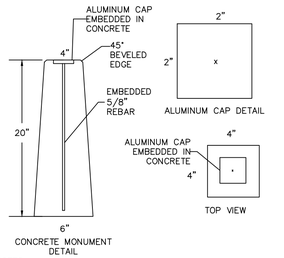
Drawing No.
C1.1



NOTES:

1. ALL POSTS SHALL BE OF ADEQUATE LENGTH TO MEET THE REQUIREMENTS FOR ERECTION AS STATED IN THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS".
2. ALL POSTS SHALL BE EMBEDDED 4'-2" MINIMUM BELOW GRADE.
3. ALL STEEL POSTS AND BRACKETS SHALL BE CUT, BENT, AND HOLES PUNCHED AND DRILLED BEFORE GALVANIZING. GALVANIZING SHALL BE IN CONFORMANCE WITH CURRENT A.S.T.M. SPECIFICATION A123-78 (OR LATEST REVISED).
4. POSTS MAY BE STEEL, ALUMINUM, OR TWO-PIECE U-POST.
5. SIGN PANEL SIZES SHALL DETERMINE POST TYPE AND NUMBERS AS SHOWN ON THIS DETAIL AND DIRECTIONAL SIGN SHEET.
6. BOLTS SHALL NOT PROTRUDE MORE THAN 3/4" BEYOND THE NUT WHEN TIGHT BUT SHALL ENGAGE ALL THREADS IN THE NUT.
7. ALL TRAFFIC AND PEDESTRIAN SIGNAGE AND LOCATION SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND ALL CURRENT AMENDMENTS.
8. SIGNS SHOULD BE INSTALLED ON PENNDOT APPROVED BREAKAWAY POSTS.

SIGN DETAIL

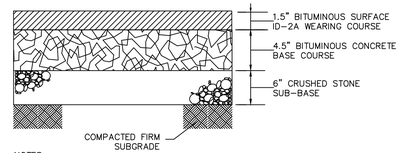


CONCRETE MONUMENT DETAIL

NOTES:

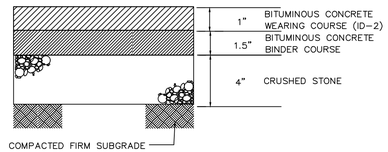
1. MONUMENTS TO BE SET FOR OUTBOUND PROPERTY LINE, ULTIMATE RIGHT-OF-WAYS, OPEN SPACE AND ONE SIDE OF EASEMENTS.
2. PK NAILS SHALL BE USED IN PLACE OF MONUMENTS IN PAVED AREAS.

CONCRETE MONUMENT



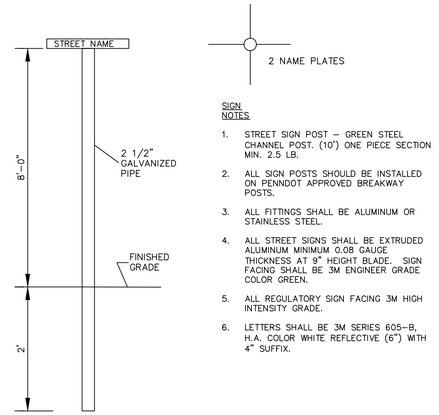
NOTES:
1) ALL COURSES SHALL CONFORM TO PADOT 408 REQUIREMENTS
2) PAVEMENT SECTION TO BE USED FOR ALL ON-SITE ROADS AND OLD STREET ROAD WIDENING

ROAD PAVEMENT SECTION



NOTES:
1) ALL DRIVEWAYS MUST HAVE A 1.5" CURB REVEAL.
2) CURB DEPRESSIONS SHALL BE 4' WIDER THAN THE DRIVEWAY.

DRIVEWAY PAVEMENT SECTION



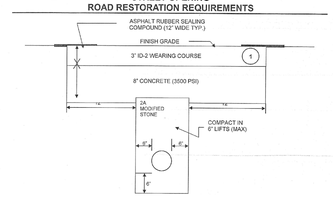
SIGN NOTES

1. STREET SIGN POST – GREEN STEEL CHANNEL POST. (10') ONE PIECE SECTION MIN. 2.5 LB.
2. ALL SIGN POSTS SHOULD BE INSTALLED ON PENNDOT APPROVED BREAKAWAY POSTS.
3. ALL FITTINGS SHALL BE ALUMINUM OR STAINLESS STEEL.
4. ALL STREET SIGNS SHALL BE EXTRUDED ALUMINUM MINIMUM 0.08 GAUGE THICKNESS AT 9" HEIGHT BLADE. SIGN FACING SHALL BE 3M ENGINEER GRADE COLOR GREEN.
5. ALL REGULATORY SIGN FACING 3M HIGH INTENSITY GRADE.
6. LETTERS SHALL BE 3M SERIES 605-B, H.A. COLOR WHITE REFLECTIVE (6") WITH 4" SUFFIX.

STREET SIGN

BENSALEM TOWNSHIP
Building and Planning Department
2400 Byberry Road Bensalem, PA 19020
215-633-3644 • Fax 215-633-3753

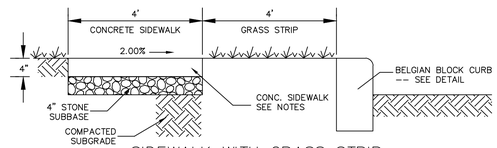
STREET OPENING
ROAD RESTORATION REQUIREMENTS



TYPICAL TRENCH RESTORATION IN PAVED CARTWAY N.T.S.

1. Certain conditions may require overlay of travel line or entire street width. See Bensalem Township Road Restoration requirements.
2. Trench work must be completed at 3:30 p.m. Trench area must be secured and road reopened by 5:00 p.m. If roadway is not secure by 5:00 p.m. contractors will incur additional consulting fees based on an hourly basis.
3. Final restoration on openings for new construction shall be completed prior to occupancy. The restoration must be completed within 30 days. Failure to comply will result in a $1500 escrow in addition to any other escrow previously required.

ALL WORK TO BE DONE IN ACCORDANCE WITH PENNDOT SPECIFICATIONS
PUBLICATION 408 AS AMENDED

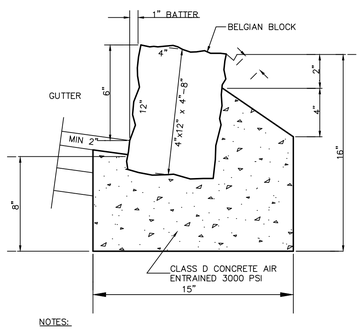


SIDEWALK WITH GRASS STRIP

NOTES:

1. SIDEWALK IS TO BE PROVIDED, PLACED, CURED AND FINISHED TO PENNDOT SPECIFICATIONS PUB. 408(CURRENT EDITION), SECTIONS 704 AND 1001. TYPE A CONCRETE (3,300 PSI, TWENTY-EIGHT-DAY STRENGTH) SHALL BE USED.
2. CONTRACTION JOINTS: SPACED AT EQUAL INTERVALS BETWEEN EXPANSION JOINTS, NOT TO EXCEED 5 FEET FOR SIDEWALKS TO BE FORMED BY DIVISION PLATES OR CUTTING GROOVE INTO CONCRETE SURFACE NOT LESS THAN 1/3 ENTIRE DEPTH OF SLAB.
3. SIDEWALK THICKNESS 6 INCHES AT RESIDENTIAL DRIVEWAYS. FINISHED WITH WOOD FLOAT, ROUGHEN FINISH FOR SLOPES IN EXCESS OF 4%. THE CONCRETE SIDEWALK SHALL BE PLACED UPON A SIX-INCH-THICK COMPACTED STONE BASE, CONSISTING OF TYPE 2A STONE.
4. DRAINAGE SLOPE TO BE MAINTAINED AT 2% TOWARDS CURB.
5. EXPANSION JOINTS TO BE ONE-HALF-INCH PRECLUDED, BITUMINOUS, EXPANSION JOINT MATERIAL AT THIRTY-FOOT INTERVALS; NEXT TO BUILDINGS, POLES, STRUCTURES AND CURBS; AROUND INTERSECTIONS OF TWO WALKS; DRIVEWAY APRON JOINT TO WALL, CURB OR SIDEWALK; AND AT ENDS OF ALL WALKS AND CURBS INCLUDING RADIUS CURBS.
6. MINIMUM NO. 9, SIX BY SIX MESH TO BE USED IN CONCRETE DRIVEWAY CONSTRUCTION.
7. CONTRACTION JOINTS ARE TO BE PLACED EVERY 5' AND EXPANSION JOINTS TO ARE TO BE PLACED EVERY 20'.
8. A 4" THICK 2B STONE BASE IS REQUIRED.
9. CLASS AA CONCRETE IS TO BE USED FOR SIDEWALK CONSTRUCTION

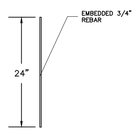
SIDEWALK



NOTES:

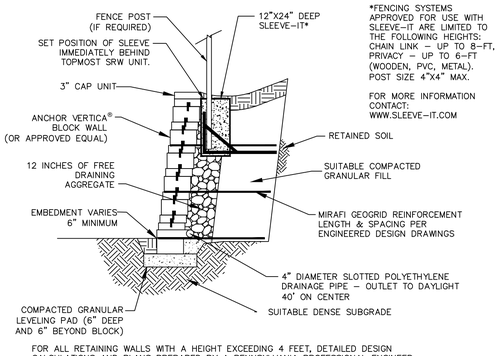
1. ON TRANSITIONS FROM AND TO PROPOSED CURB, USE ONE LARGE BLOCK SLOPED AND CUT TO FIT.
2. CURB IMMEDIATELY ADJACENT TO INLET CASTING MUST HAVE PREFORMED EXPANSION MATERIAL.
3. CONCRETE JOINTS USE MORTAR WITH COMPOSITION – 3 SAND:1 CEMENT, JOINTS TO BE 1/2" WIDE.
4. 6" BELGIAN BLOCK CURB TO BE USED FOR ALL ON-SITE RESIDENTIAL ROADS AND RETAIL ROADS.
5. CONCRETE CURB TO BE USED IN PENNDOT LEGAL RIGHT-OF-WAY

BELGIAN BLOCK CURB



NOTES:
1. PINS TO BE SET AS MARKERS FOR ALL INTERIOR LOTS.

IRON PIN MARKER

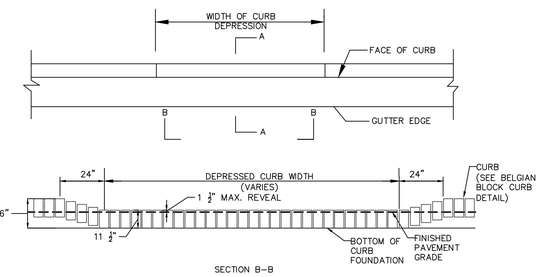


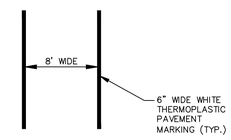
*FENCING SYSTEMS APPROVED FOR USE WITH SLEEVE-IT ARE LIMITED TO THE FOLLOWING HEIGHTS: CHAIN LINK – UP TO 8-FT, PRIVACY – UP TO 6-FT (WOODEN, PVC, METAL). POST SIZE 4"X4" MAX.

FOR MORE INFORMATION CONTACT: WWW.SLEEVE-IT.COM

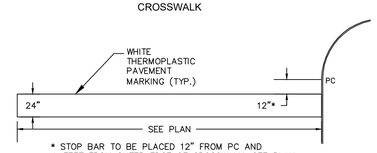
FOR ALL RETAINING WALLS WITH A HEIGHT EXCEEDING 4 FEET, DETAILED DESIGN CALCULATIONS AND PLANS PREPARED BY A PENNSYLVANIA PROFESSIONAL ENGINEER MUST BE SUBMITTED TO THE TOWNSHIP FOR REVIEW AND APPROVAL.

RETAINING WALL





CROSSWALK

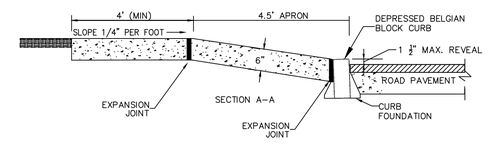


* STOP BAR TO BE PLACED 12" FROM PC AND 4-FEET FROM OUTER EDGE OF CROSSWALK. SEE PLAN

STOP BAR

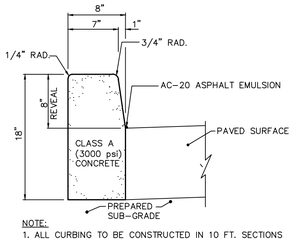
NOTES:
1. CONTRACTOR TO INSTALL CROSSWALKS PER THE MANUAL ON UNIFORM TRAFFIC CONTROL STANDARDS (MUTCD), CURRENT EDITION WITH LATEST REVISIONS.
2. ALL THERMOPLASTIC AND EPOXY RESIN PAVEMENT MARKINGS TO BE INSTALLED PER THE BENSALEM TOWNSHIP SPECIFICATIONS AND DESIGN STANDARDS.

PAVEMENT MARKINGS



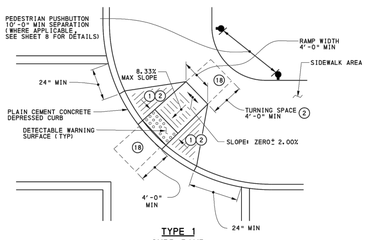
NOTES:
1. SIDEWALK 6" THICK ONLY AT DRIVEWAYS. 4" THICK AT ALL OTHER LOCATIONS.
2. DOUBLE DRIVEWAY- CONTRACTION JOINT CONSTRUCTED WITH A 1/8" STEEL PLATE SINGLE DRIVEWAY- BLIND JOINT 1/2" DEEP SURFACE GROVE.
3. DOUBLE DRIVEWAY- BLIND JOINTS. SINGLE DRIVEWAY NO TREATMENT REQUIRED.
4. SUBGRADE IS TO BE COMPACTED IN A MANNER SUITABLE TO THE TOWNSHIP ENGINEER.
5. EXPANSION JOINTS ARE TO BE 1/2" WIDE AND FILLED WITH PREFORMED BITUMINOUS TYPE JOINT FILLER. THE TOP OF ALL JOINT FILLER SHALL BE 1/4" BELOW THE TOP OF THE SURFACE.
6. BLIND JOINTS ARE TO BE SURFACE GROOVE CUT INTO SIDEWALK 1/2" DEEP.
7. CONTRACTION JOINTS ARE TO BE CONSTRUCTED WITH 1/8" THICK REMOVABLE PLATE.

DRIVEWAY APRON (BELGIAN BLOCK CURBING)



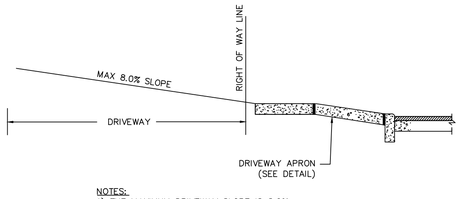
NOTE:
1. ALL CURBING TO BE CONSTRUCTED IN 10 FT. SECTIONS W/ STEEL PLATE SEPARATIONS, STEEL PLATES TO BE REMOVED AFTER CONCRETE SETS UP. EXPANSION JOINTS OF 1/2" BITUMINOUS IMPREGNATED FELT TO BE INSTALLED EVERY 30 FT.
2. CONTRACTION JOINTS TO BE 2" DEEP & 3/16" WIDE, TOOL-EDGED TO A 1/4" RADIUS.

CONCRETE CURB WITHIN PENNDOT RIGHT-OF-WAY



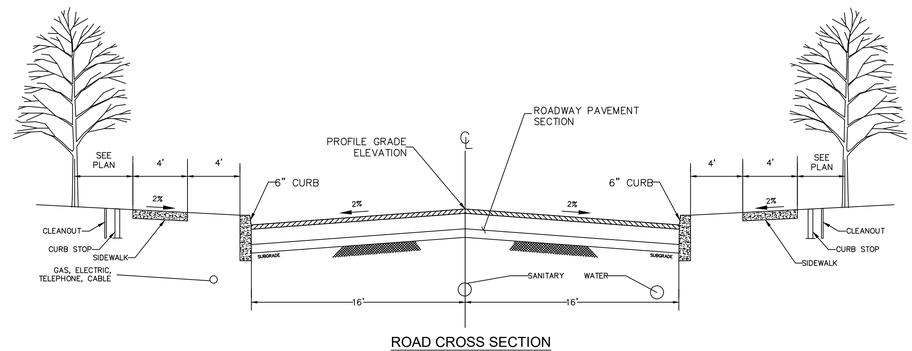
TYPE 1
CURB RAMP
(DIAGONAL - REQUIRES ASSISTANT DISTRICT EXECUTIVE APPROVAL)

CURB RAMP



NOTES:
1) THE MAXIMUM DRIVEWAY SLOPE IS 8.0%
2) THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH BOTH THE DRIVEWAY SLOPE REQUIREMENTS.

DRIVEWAY GRADING DETAIL



ROAD CROSS SECTION

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
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REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES
THREE WORKING DAYS
CONSTRUCTION PHASE AND
10 WORKING DAYS DESIGN STAGE
-- STOP & CALL --
Pennsylvania One
Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE CONTACT UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

SITE DETAILS

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C1.1_Site.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	N.T.S	Designed	RC
Sheet	6 of 21		

Drawing No.
C1.2

DRAINAGE NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE EXISTING LOCATION AND/OR ELEVATION OF FEATURES AS SHOWN ON THESE PLANS IS BASED ON A SURVEY PREPARED BY CARROLL ENGINEERING CORPORATION THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. ALL STORM SEWERS AND STRUCTURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH BENSALEM TOWNSHIP STANDARDS.
3. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE< MANHOLE SIZE, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
4. CATCH BASIN GRATE ELEVATIONS WITHIN THE CARTWAY OF THE PROPOSED ROADS SHALL BE SUMPED 2–INCHES FROM THE PROPOSED ROAD ELEVATION AT THE GUTTER LINE. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE OWNER'S ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
5. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR REVIEW AND APPROVAL BY THE OWNER FOR BASIN PIPES, CONNECTIONS, OUTLET STRUCTURES, CATCH BASINS, MANHOLES AND OTHER STORM STRUCTURES.
6. DOWNSPOUTS AND SUMP PUMPS SHALL NOT DISCHARGE STORMWATER DIRECTLY ONTO A SIDEWALK OR STREET.
7. ALL STORMWATER AND DRAINAGE FACILITIES ARE A PERMANENT PART OF THE DEVELOPMENT AND SHALL NOT BE REMOVED, ALTERED, OR MODIFIED WITHOUT PRIOR APPROVAL FROM BENSALEM TOWNSHIP.
8. BENSALEM TOWNSHIP SHALL HAVE THE RIGHT TO ENTER PRIVATE PROPERTY TO INSPECT AND REPAIR, IF NECESSARY, ANY STORMWATER MANAGEMENT OR DRAINAGE FACILITY.
9. THE STORMWATER MANAGEMENT BASINS WILL BE OWNED AND MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.
10. ALL STORM PIPES LOCATED OUTSIDE OF PAVED AREAS SHALL HAVE A MINIMUM OF TWO (2) FEET OF COVER.

1515 GIBSON ROAD

BUILDING ELEVATIONS

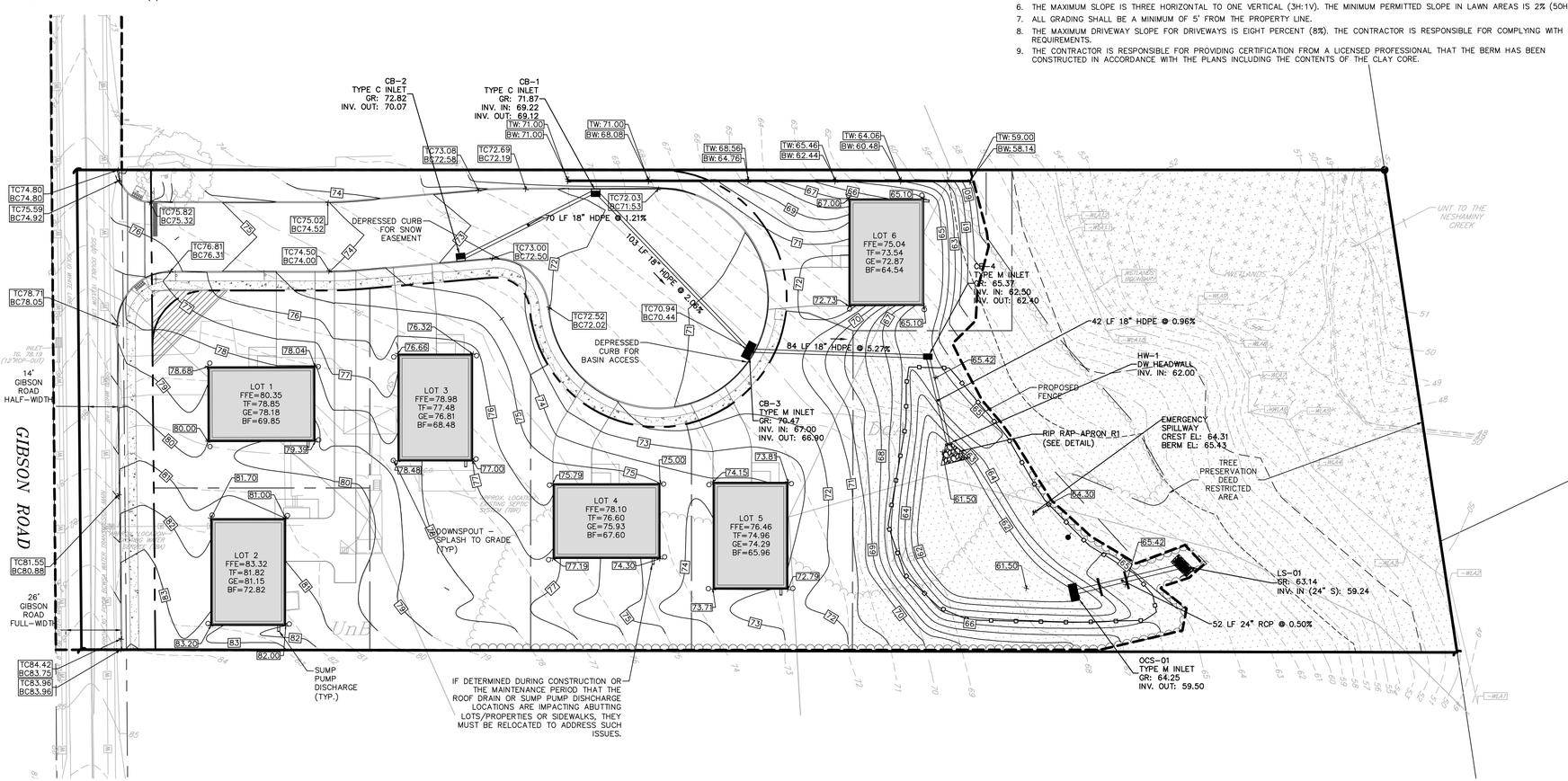
Lot Number	Driveway Elevation	Garage Floor Elevation	Basement Type	Top of Foundation Elevation	First Floor Elevation	Basement Floor Elevation
	DE	GE = DE +.15 ft	STANDARD / WALKOUT / DAYLIGHT	TF = GE+0.67 ft	FF = TF+ 1.50 ft	BF = TF- 9 ft
1	78.03	78.18	STANDARD	78.85	80.35	69.85
2	81.00	81.15	STANDARD	81.82	83.32	72.82
3	76.66	76.81	STANDARD	77.48	78.98	68.48
4	75.78	75.93	STANDARD	76.60	78.10	67.60
5	74.14	74.29	STANDARD	74.96	76.46	65.96
6	72.72	72.87	WALKOUT	73.54	75.04	64.54

GRADING NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS IN A MANNER WHICH WILL NOT NEGATIVELY AFFECT ANY EXISTING USERS OF THESE UTILITIES.
2. COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF THE MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D–1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA IS GIVEN ELSEWHERE:

FILL AREA	% OF MAX. DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	95%
SIDEWALKS	95%
LANDSCAPE AREAS	93%
TRENCH BACKFILL	SAME AS SURROUNDING AREA

3. PROTECTED SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION INCLUDING CONCRETE TRUCKS AN DUMP TRUCKS.
4. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH THE COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THAN BEST SUBGRADE MATERIAL ONSITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE AND TRUE TO GRADE AND CROSS SECTION.
5. ALL STRIPPED TOPSOIL SHOULD BE REUSED ON SITE TO THE GREATEST EXTENT POSSIBLE. HOWEVER, PRIOR TO REMOVAL OF TOPSOIL FROM THE SITE PERMISSION SHOULD BE OBTAINED FROM THE TOWNSHIP.
6. THE MAXIMUM SLOPE IS THREE HORIZONTAL TO ONE VERTICAL (3H:1V). THE MINIMUM PERMITTED SLOPE IN LAWN AREAS IS 2% (50H:1V).
7. ALL GRADING SHALL BE A MINIMUM OF 5' FROM THE PROPERTY LINE.
8. THE MAXIMUM DRIVEWAY SLOPE FOR DRIVEWAYS IS EIGHT PERCENT (8%). THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH THESE REQUIREMENTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING CERTIFICATION FROM A LICENSED PROFESSIONAL THAT THE BERM HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE PLANS INCLUDING THE CONTENTS OF THE CLAY CORE.

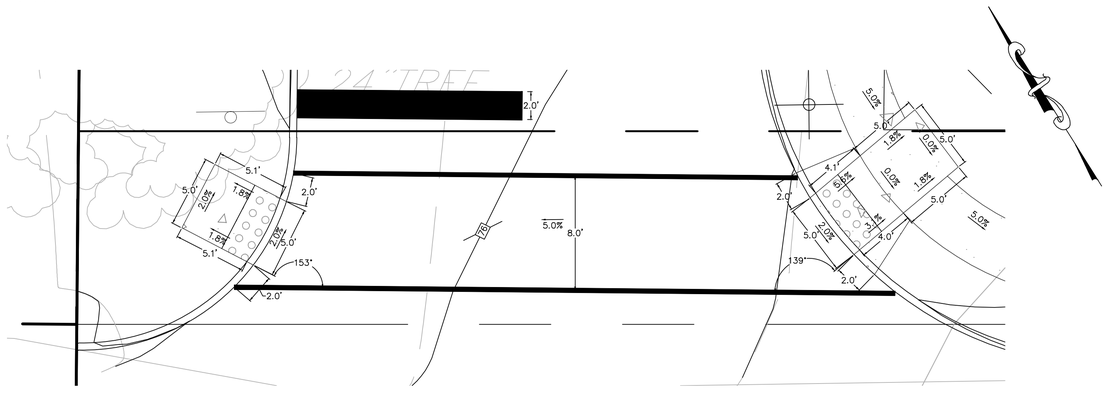


DRAINAGE LEGEND

EXISTING STORM PIPE
EXISTING INLET — Ex.Inlet
EXISTING MANHOLE
PROPOSED STORM PIPE
PROPOSED CURB INLET — CB–X GR: 185.56 INV 180.00
PROPOSED YARD INLET — CB–X GR: 185.56 INV 180.00
PROPOSED MANHOLE — MH–X RIM 185.56 INV 180.00

GRADING LEGEND

EXISTING CONTOUR — 185
EXISTING SPOT ELEVATION — 185.2 x
PROPOSED CONTOUR — 185
PROPOSED SPOT ELEVATION — 185.2 x
PROPOSED TOP/BOTTOM CURB — x TC 154.75 BC 154.25
PROPOSED TOP OF WALL — TW: 66.29
PROPOSED BOTTOM OF WALL — BW: 60.53



CURB RAMP DETAIL

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
HC holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR EXCAVATION, EXCLUDING DAYS IN 10 WORKING DAYS IN DESIGN STAGE STOP & CALL
Pennsylvania One-Call Systems, Inc.
1-800-242-1776

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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

GRADING AND DRAINAGE PLAN

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ROGER THOMAS CUNNINGHAM JR. PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C2.0_Grading.DWG

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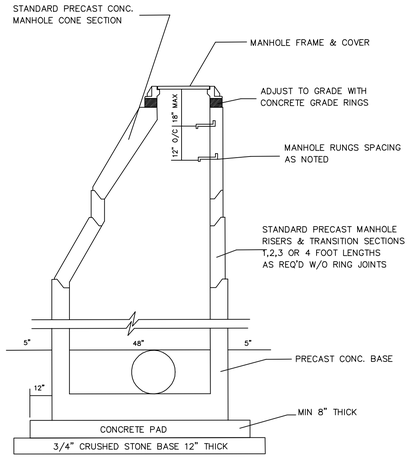
Date	5/27/2021
Scale	1"=30'
Designed	RC
Sheet	7 of 21

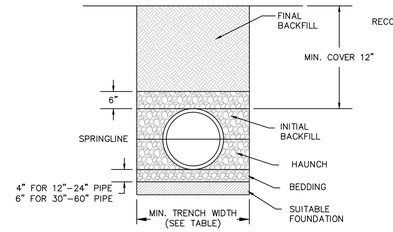
Drawing No.
C2.0



NOTES:

1. PRECAST CONCRETE MANHOLES SHALL BE AS DETAILED IN PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, CURRENT EDITION (PDT PUB #72M) RC-39M, 'STANDARD MANHOLES, PRECAST MANHOLES AND MANHOLE STEPS'.
2. STEPS SHALL BE PROVIDED WHENEVER STRUCTURE EXCEEDS 4 FEET IN DEPTH.
3. STEP DIMENSIONS AND CONFIGURATION SHALL BE IN ACCORDANCE WITH PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, CURRENT EDITION (PDT PUB 172M), RC-39M.
4. STEP AND STEP INSTALLATION SHALL MEET ALL REQUIREMENTS OF ASTM C 478 AND C 497 FOR DIMENSIONS, LOAD RATING AND PULLOUT RESISTANCE.
5. PROVIDE FRAME AND GRATE AS DETAILED IN PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION. CURRENT EDITION (PDT PUB 1172M) RC-39M. 'STANDRARD MANHOLES COVERS, FRAMES AND ADJUSTMENT RISERS'
6. THE CONTRACTOR SHALL PROVIDE CUT SHEETS TO ENGINEER TO REVIEW PRIOR TO CONSTRUCTION.
7. STORM MANHOLE COVERS SHALL HAVE THE WORD "STORM" ON THE COVER IN 2-INCH HIGH LETTERS.

PRECAST CONCRETE STORM MANHOLE



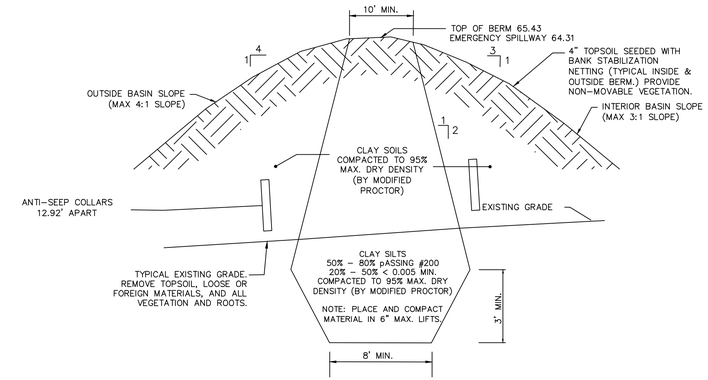
RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

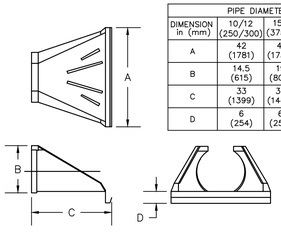
HDPE PIPE DETAIL



STANDARD BASIN BERM CONSTRUCTION NOTES

1. SITE PREPARATION - AREAS UNDER THE EMBANKMENT AND ANY STRUCTURES SHALL BE CLEARED, GRUBBED AND THE TOPSOIL STRIPPED TO REMOVE TREES. VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL. IN ORDER TO FACILITATE CLEAN-OUT AND RESTORATION, THE POOL AREA WILL BE CLEARED OF ALL BRUSH AND EXCESS TREES.
2. CUT OFF TRENCH - A CUT-OFF TRENCH WILL BE EXCAVATED ALONG THE BERM CENTERLINE BENEATH EARTH FILL EMBANKMENTS. THE MINIMUM DEPTH SHALL BE 3 FEET. THE CUT-OFF TRENCH SHALL EXTEND TO THE RISER CREST ELEVATION. THE MINIMUM BOTTOM WIDTH SHALL BE 8 FEET BUT WIDE ENOUGH TO PERMIT OPERATION OF COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THEN 1:1. COMPACTION REQUIREMENTS SHALL BE THE SOME AS THOSE FOR EMBANKMENTS. THE TRENCH SHALL BE KEPT FREE OF STANDING WATER DURING THE BACKFILLING OPERATIONS.
3. EMBANKMENT - THE FILL MATERIAL SHALL BE TAKEN FROM SELECTED BORROW AREAS. IT SHALL BE FREE OF ROOTS, WOODY VEGETATION, OVERSIZED STONES ROCKS OR OTHER OBJECTIONABLE MOTERIAL. AREAS ON WHICH FILL IS TO BE PLACED SHALL BE SCARIFIED PRIOR TO PLACEMENT OF FILL. THE FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED BY HAND INTO A BALL WITHOUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE- BALL, IT IS TOO WET FOR PROPER COMPACTION. FILL MATERIAL MUST BE PLACED IN 6 TO 8 INCH LAYERS AND SHALL BE CONTINUOUS OVER THE ENTIRE LENGTH OF THE FILL. COMPACTION MUST BE OBTAINED BY MECHANICAL SHEEP FOOT ROLLERS. THE EMBANKMENT SHALL BE CONSTRUCTED TO AN ELEVATION OF 5% HIGHER THAN THE DESIGN HEIGHT TO ALLOW FOR SETTLEMENT.

BASIN BERM DETAIL

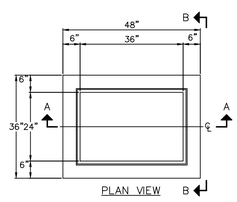


PIPE DIAMETER, in (mm)						
DIMENSION in (mm)	10/12 (250/300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
A	42 (1781)	41 (1738)	49 (2078)	59.5 (2523)	88 (3731)	88 (3731)
B	14.5 (615)	19 (806)	22 (933)	28 (1187)	36 (1526)	43 (1823)
C	33 (1399)	34 (1442)	43 (1823)	48 (2035)	63.5 (2692)	66.5 (2820)
D	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)

NOTES:

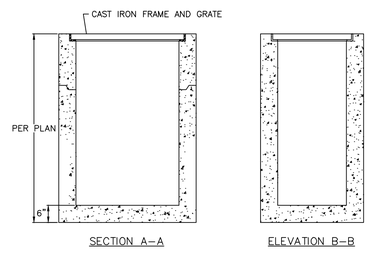
INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER INSTALLATION INSTRUCTIONS AND WITH THOSE ISSUED BY STATE OR LOCAL AUTHORITIES.

HDPE HEADWALL DETAIL

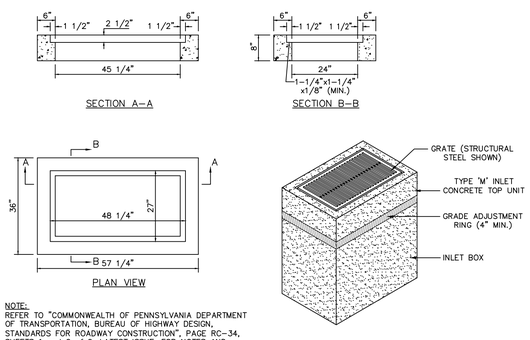


NOTES:

1. CONCRETE INLET AND TOP UNITS SHALL BE AS DETAILED IN PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, CURRENT EDITION (PDT PUB #72M) RC-34M, 'INLETS, CONCRETE TOP UNITS CAST-IN-PLACE AND PRECAST".
2. STEPS SHALL BE PROVIDED WHENEVER STRUCTURE EXCEEDS 4 FEET IN DEPTH.
3. STEP DIMENSIONS AND CONFIGURATION SHALL BE IN ACCORDANCE WITH PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, CURRENT EDITION (PDT PUB 172M), RC-39M.
4. STEP AND STEP INSTALLATION SHALL MEET ALL REQUIREMENTS OF ASTM C 478 AND C 497 FOR DIMENSIONS, LOAD RATING AND PULLOUT RESISTANCE.
5. PROVIDE STRUCTURAL STEEL GRATE - BICYCLE SAFE. AS DETAILED IN PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION. CURRENT EDITION (PDT PUB 1172M) RC-34M. 'INLET GRATES.
6. THE CONTRACTOR SHALL PROVIDE CUT SHEETS TO ENGINEER TO REVIEW PRIOR TO CONSTRUCTION.

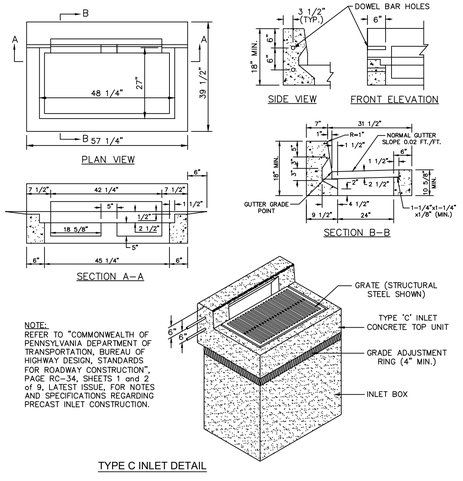


PRECAST CONCRETE STORM INLET



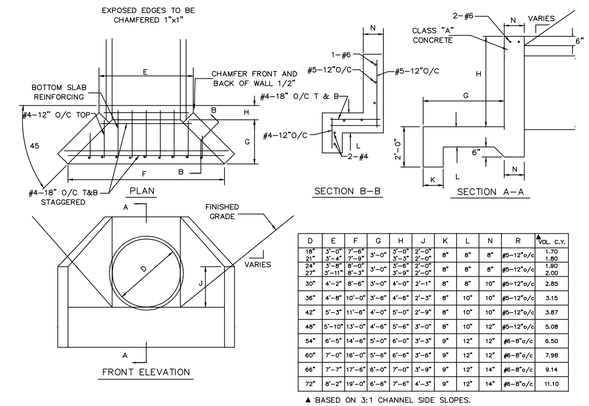
NOTE:
REFER TO "COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, BUREAU OF HIGHWAY DESIGN, STANDARDS FOR ROADWAY CONSTRUCTION", PAGE RC-34, SHEETS 1 AND 2 OF 9, LATEST ISSUE, FOR NOTES AND SPECIFICATIONS REGARDING PRECAST INLET CONSTRUCTION.

TYPE M INLET DETAIL



NOTE:
REFER TO "COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, BUREAU OF HIGHWAY DESIGN, STANDARDS FOR ROADWAY CONSTRUCTION", PAGE RC-34, SHEETS 1 and 2 of 9, LATEST ISSUE, FOR NOTES AND SPECIFICATIONS REGARDING PRECAST INLET CONSTRUCTION.

TYPE C INLET DETAIL



D	E	F	G	H	J	K	L	N	R	▲CU. C.Y.
18"	3'-0"	7'-6"	3'-0"	3'-0"	2'-0"	8"	8"	8"	#5-12"o/c	1.70
21"	3'-4"	7'-8"	3'-0"	3'-3"	2'-0"	8"	8"	8"		1.80
24"	3'-8"	8'-0"	3'-0"	3'-6"	2'-0"	8"	8"	8"	#5-12"o/c	1.90
27"	3'-11"	8'-2"	3'-0"	3'-9"	2'-0"	8"	8"	8"	#5-12"o/c	2.00
30"	4'-2"	8'-6"	3'-0"	4'-0"	2'-1"	8"	8"	10"	#5-12"o/c	2.85
36"	4'-8"	10'-0"	3'-6"	4'-6"	2'-3"	8"	10"	10"	#5-12"o/c	3.15
42"	5'-3"	11'-6"	4'-0"	5'-0"	2'-9"	8"	10"	10"	#5-12"o/c	3.87
48"	5'-10"	13'-0"	4'-6"	5'-6"	3'-0"	8"	10"	12"	#5-12"o/c	5.08
54"	6'-5"	14'-8"	5'-0"	6'-0"	3'-3"	9"	12"	12"	#6-8"o/c	6.50
60"	7'-0"	16'-0"	5'-6"	6'-6"	3'-6"	9"	12"	12"	#6-8"o/c	7.98
66"	7'-7"	17'-6"	6'-0"	7'-0"	3'-9"	9"	12"	14"	#6-8"o/c	9.14
72"	8'-2"	19'-0"	6'-6"	7'-6"	4'-3"	9"	12"	14"	#6-8"o/c	11.10

▲ BASED ON 3:1 CHANNEL SIDE SLOPES.

DW ENDWALL DETAIL

REFER TO C5.3-5.4 PCSM PLANS FOR BASIN DETAILS

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
Holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR EXCAVATION, EXCLUDING 10 WORKING DAYS IN DESIGN STAGE
- STOP & CALL
Pennsylvania One-Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT ALL UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

DRAINAGE DETAILS

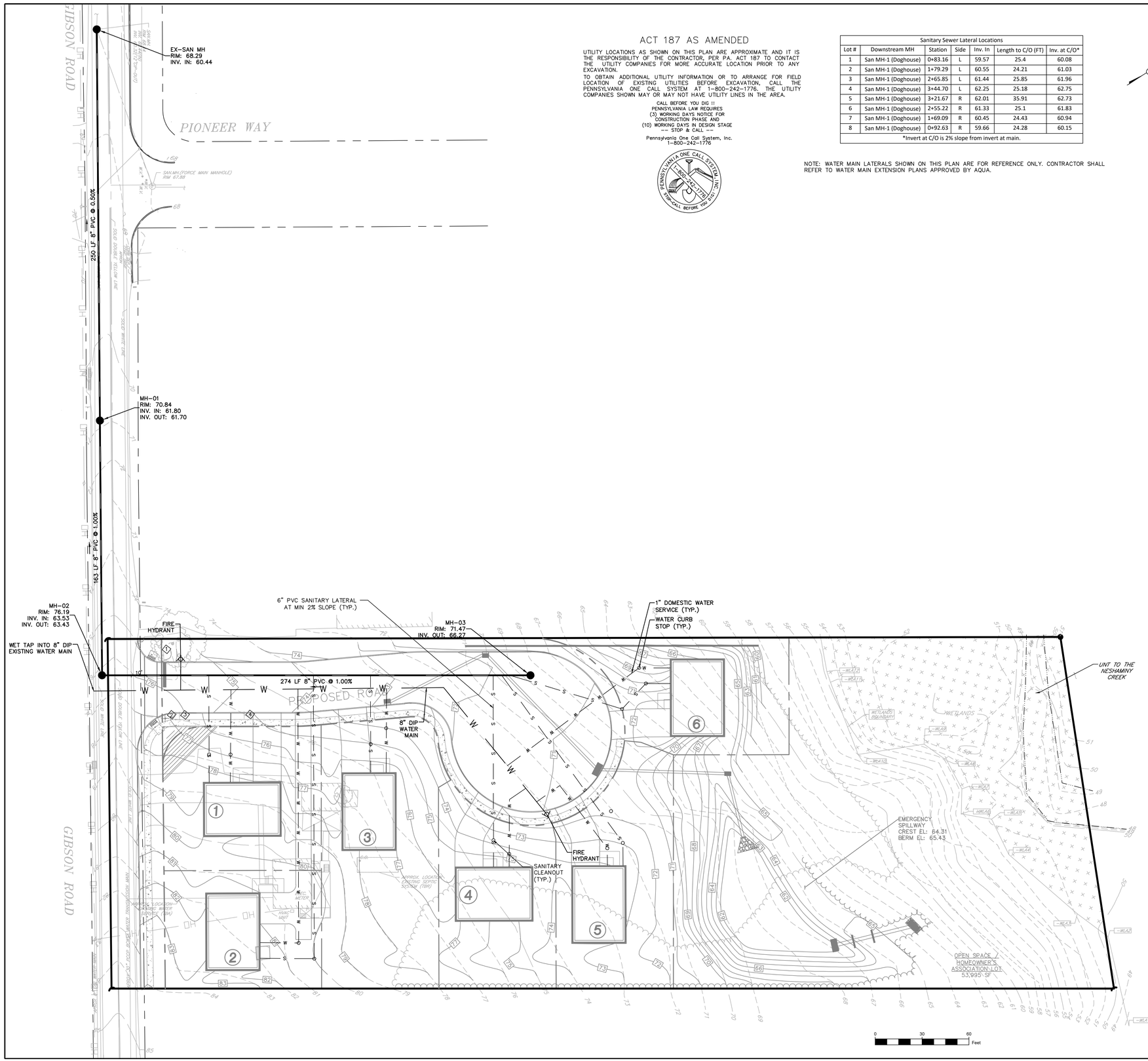
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ROBERT THOMAS CUNNINGHAM PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C2.1_Storm.DWG

HCE Job	1608		
Date	5/27/2021	Scale	N.T.S
Designed	RC	Sheet	8 of 21

Drawing No.
C2.1



ACT 187 AS AMENDED

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.

TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
(3) WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
(10) WORKING DAYS IN DESIGN STAGE
--- STOP & CALL ---

Pennsylvania One Call System, Inc.
1-800-242-1776

Sanitary Sewer Lateral Locations						
Lot #	Downstream MH	Station	Side	Inv. In	Length to C/O (FT)	Inv. at C/O*
1	San MH-1 (Doghouse)	0+83.16	L	59.57	25.4	60.08
2	San MH-1 (Doghouse)	1+79.29	L	60.55	24.21	61.03
3	San MH-1 (Doghouse)	2+65.85	L	61.44	25.85	61.96
4	San MH-1 (Doghouse)	3+44.70	L	62.25	25.18	62.75
5	San MH-1 (Doghouse)	3+21.67	R	62.01	35.91	62.73
6	San MH-1 (Doghouse)	2+55.22	R	61.33	25.1	61.83
7	San MH-1 (Doghouse)	1+69.09	R	60.45	24.43	60.94
8	San MH-1 (Doghouse)	0+92.63	R	59.66	24.28	60.15
*Invert at C/O is 2% slope from invert at main.						

NOTE: WATER MAIN LATERALS SHOWN ON THIS PLAN ARE FOR REFERENCE ONLY. CONTRACTOR SHALL REFER TO WATER MAIN EXTENSION PLANS APPROVED BY AQUA.

UTILITY NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS IN A MANNER WHICH WILL NOT NEGATIVELY AFFECT ANY EXISTING USERS OF THESE UTILITIES.
2. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC AND FIRE PROTECTION WATER SERVICE, ELECTRICAL, TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND ASSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE REGULATORY AGENCY AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
3. THE PROPOSED DEVELOPMENT WILL INCLUDE THE CONNECTION OF 8 SINGLE-FAMILY DETACHED DWELLINGS TO THE PROPOSED WATER AND SEWER MAINS LOCATED ON-SITE.
4. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING THE EXISTING UTILITY SERVICE (WATER, SEWER, GAS AND ELECTRIC) TO THE PROPERTY AND ENSURE THAT THEY ARE PROPERLY DISCONNECTED FROM THE EXISTING UTILITIES AND RECONNECTED TO THE NEW SERVICES PROVIDED.
5. ALL GAS WORK AND OTHER ASSOCIATED APPURTENANCES WILL BE IN CONFORMANCE WITH APPLICABLE LOCAL COUNTY, STATE AND FEDERAL GUIDELINES AND REQUIREMENTS.
6. ALL ELECTRICAL WORK, TRANSFORMER PADS, AND ASSOCIATED APPURTENANCES WILL BE IN CONFORMANCE WITH APPLICABLE LOCAL, COUNTY, STATE AND FEDERAL GUIDELINES AND REQUIREMENTS. MIN. DEPTH OF COVER OVER ELECTRIC, GAS, AND CABLE SHALL BE 2 FT.
7. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS, UTILITY LOCATIONS, CATHODIC PROTECTION AND INVERTS PRIOR TO CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DISRUPTIONS TO EXISTING UTILITIES SERVICES. ANY CONDITIONS FOUND TO DIFFER FROM THOSE SHOWN BY THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.
8. THE CONTRACTOR SHALL COORDINATE THE WATER WORK WITH AQUA.
9. THE CONTRACTOR SHALL COORDINATE THE SANITARY SEWER WORK WITH THE BUCKS COUNTY WATER AND SEWER AUTHORITY.
10. A MINIMUM TEN (10) FOOT HORIZONTAL AND EIGHTEEN (18) INCHES VERTICAL CLEARANCE MUST BE MAINTAINED BETWEEN WATER MAIN AND STORM SEWER.
11. EIGHTEEN (18) INCHES VERTICAL CLEARANCE SHOULD BE PROVIDED AT ALL UTILITY CROSSINGS. WHERE THIS CLEARANCE CANNOT BE MAINTAINED, THE WATER MAIN MUST BE ENCASED IN CONCRETE 10 FEET EACH SIDE OF THE CROSSING. IN CASES WHERE THE UTILITY IS A SANITARY OR STORM SEWER MAIN OR A LATERAL AND THE CLEARANCE CANNOT BE MAINTAINED, THEN THE SEWER AND/OR STORM SHALL ALSO BE ENCASED IN CONCRETE.
12. ALL WATER MAINS ARE TO HAVE A MINIMUM COVER OF 4 FEET FROM THE TOP OF THE PIPE TO THE PROPOSED SURFACE ELEVATION.
13. PROVIDE A MINIMUM HORIZONTAL CLEARANCE OF 10 FT BETWEEN SANITARY SEWER MAINS AND WATER MAINS. PROVIDE A 5 FT MINIMUM HORIZONTAL CLEARANCE BETWEEN SANITARY SEWER MAINS AND ALL OTHER UTILITIES. PROVIDE A 5 FT MINIMUM HORIZONTAL CLEARANCE BETWEEN SANITARY SEWER MAINS AND CONCRETE CURBS. A MINIMUM DISTANCE OF 10 FT SHALL BE PROVIDED BETWEEN NEW WATER AND SEWER SERVICE LINES AND LIGHT POLES, TREES ETC.
14. ALL PROPOSED WATER MAINS SHALL BE DUCTILE IRON PIPE, CLASS 52, BITUMINOUS COATED DOUBLE CEMENT MORTAR LINED. ALL PROPOSED WATER LATERALS SHALL BE TYPE K SOFT COPPER CONFORMING TO ASTM B-88 STANDARDS.
15. THE CONTRACTOR MUST CONTACT AQUA ONE WEEK PRIOR TO WATER MAIN CONSTRUCTION, AND 72 HOURS PRIOR TO EXCAVATION NEAR AND CONNECTION TO EXISTING WATER MAIN.
16. THE WATER PIPELINE IS TO BE OFFERED FOR DEDICATION TO AQUA.
17. ALL WATER MAIN FITTINGS AND VALVES SHALL BE MECHANICAL JOINT (RESTRAINED) AND THE FITTINGS SHALL BE PROVIDED WITH THRUST BLOCKING. REFER TO DRAWING C4.1 FOR THRUST BLOCK DETAILS AND FITTING SCHEDULES.
18. PROPOSED 8" WATER MAIN SHALL BE WET-TAP CONNECTED TO EXISTING WATER MAIN IN GALLOWAY ROAD RIGHT-OF-WAY. WATER MAIN SHALL BE INSTALLED VIA A 5-FT WIDE TRENCH CUT OF GALLOWAY ROAD. WET-TAP CONNECTIONS SHALL BE PERFORMED UNDER THE SUPERVISION OF AQUA PERSONNEL.
19. ALL FIRE HYDRANTS AND VALVES SHALL OPEN RIGHT (CLOCKWISE).
20. WITHIN THE WATER EASEMENTS SHOWN ON THESE PLANS, THERE SHALL NOT BE BUILT ANY TREES, SHRUBS, OR OTHER LANDSCAPING, EXCEPT TREES, SHRUBS AND OTHER LANDSCAPING WHICH WILL NOT GROW TO MORE THAN 6 FEET IN HEIGHT.
21. ALL WATER CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH AQUA SPECIFICATIONS.
22. EACH WATER CUSTOMER SHOULD HAVE A METER WITH BACKFLOW PREVENTER INSTALLED IN THE HOUSE WITH A REMOTE METER RADIO PAD ON THE OUTSIDE WALL.
23. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF AND PROTECTION OF ANY EXISTING CATHOIC PROTECTION LINES.
24. THE HOMEOWNERS ASSOCIATION IS RESPONSIBLE FOR REPLACEMENT OF LANDSCAPING SHOULD DISTURBANCE BE REQUIRED FOR SEWER REPAIRS.
25. BASEMENT SEWER SERVICE WILL NOT BE PROVIDED.
26. THE BUCKS COUNTY WATER & SEWER AUTHORITY IS TO BE CONTACTED ONE WEEK PRIOR TO SANITARY SEWER CONSTRUCTION, AND 72 HOURS PRIOR TO EXCAVATING NEAR OR CONNECTING INTO ANY EXISTING SEWER FACILITIES.
27. ALL SANITARY SEWER FACILITIES SHOULD BE CONSTRUCTED IN ACCORDANCE WITH THE BUCKS COUNTY WATER & SEWER AUTHORITY SPECIFICATIONS.
28. CLASS 50 DOUBLE CEMENT LINED DUCTILE IRON PIPE SHOULD BE PROVIDED FOR ALL SANITARY SEWERS OUTSIDE OF ROAD RIGHT-OF-WAYS (IN UNPAVED EASEMENTS), IN AREAS OF HIGH GROUNDWATER (FLOODPLAINS, WETLANDS, ETC.), OR WHERE DEPTH TO CROWN OF SEWER IS GREATER THAN 12 FEET.
29. CLEANOUTS SHALL BE PROVIDED AT THE RIGHT-OF-WAY FOR ALL SANITARY SEWER LATERALS. LATERAL SHALL BE 6" PVC SDR 35 AT 2% MINIMUM SLOPE. CLEANOUTS SHALL BE DCUT TO 6" ABOVE GRADE AND PROVIDED WITH A RECESSED TYPE PLUG.
30. PVC SEWER PIPE AND FITTINGS FOR PIPE 4 INCHES IN DIAMETER AND UP SHALL BE TYPE SDR-35 OR TYPE PS-46 PVC SEWER PIPE, CONFORMING TO THE REQUIREMENTS OF ASTM SPECIFICATION D3034, F789, AND F679.
31. 18 INCHES OF VERTICAL CLEARANCE OR 10 FEET OF HORIZONTAL CLEARANCE SHALL BE PROVIDED BETWEEN THE SANITARY SEWER AND ALL OTHER UTILITIES. OTHERWISE, CONCRETE ENCASEMENT OF THE SANITARY SEWER SHALL BE PROVIDED.
32. THERE SHALL NOT BE BUILT, INSTALLED, CONSTRUCTED, PLANTED OR LOCATED ANY TEMPORARY OR PERMANENT BUILDINGS OR STRUCTURES INCLUDING INFILTRATION BASINS, OR ANY TREES, SHRUBS, OR OTHER LANDSCAPING WITHIN 10 FEET OF SANITARY SEWER FACILITIES, EXCEPT TREES, SHRUBS AND OTHER LANDSCAPING WHICH WILL NOT GROW TO MORE THAN 6 FEET IN HEIGHT.

UTILITY LEGEND

EXISTING SANITARY SEWER MAIN	—S—
EXISTING SANITARY SEWER MANHOLE	Ex.San MH
EXISTING WATER MAIN AND VALVE	—W—
EXISTING FIRE HYDRANT	
PROPOSED SANITARY SEWER MAIN.	
PROPOSED SANITARY SEWER MANHOLE.	SAN. MH RIM 185.56 INV 180.00
PROPOSED WATER MAIN	—W—
PROPOSED WATER VALVE	
PROPOSED CLEANOUT/WATER CURB STOP	
PROPOSED FIRE HYDRANT	
PROPOSED SANITARY SERVICE LATERAL	—S—S—
PROPOSED WATER SERVICE LATERAL	—W—W—

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
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Holmes cunningham ENGINEERING

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1-800-242-1776

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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

UTILITIES PLAN

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT THOMAS CUNNINGHAM
ENGINEER
No. PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C3.0_Utilities.DWG

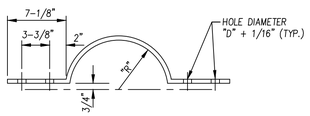
HCE Job	1608
Date	5/27/2021
Scale	1"=30'
Designed	RC
Sheet	9 of 21

Drawing No.
C3.0

MINIMUM CONCRETE VOLUMES AND STEEL STRAP SIZES REQUIRED FOR BLOCKING 6", 8", & 12" VERTICAL BENDS

KEY	PIPE DIAMETER	PRESSURE (P.S.I.)	BEND ANGLE	CONCRETE REQUIRED (CU. YD.)	STEEL STRAP SIZE	"R" STRAP RADIUS	ANCHOR BOLT DIAMETER "D" AND NUMBER REQUIRED PER STRAP	EMBEDMENT LENGTH
A	6"	0 – 100	ALL	1.0	1/4" x 2 1/2"	3 5/8"	(2) 3/4"	24"
A–1	6"	101 – 150	ALL	2.5	1/4" x 2 1/2"	3 5/8"	* (2) 1"	36"
B	8"	0 – 100	ALL	2.0	3/8" x 3"	4 3/4"	* (2) 1"	36"
B–1	8"	101 – 150	45°	3.0	3/8" x 3"	4 3/4"	* (2) 1"	36"
B–2	8"	101 – 150	90°	4.0	3/8" x 3"	4 3/4"	(4) 1"	36"
C	12"	0 – 100	ALL	4.5	1/2" x 3"	6 3/4"	(4) 1"	36"
C–1	12"	101 – 150	45°	6.0	(2) 1/2" x 3"	6 3/4"	(4) 1"	36"
C–2	12"	101 – 150	90°	8.5	(2) 1/2" x 3"	6 3/4"	(4) 1"	36"

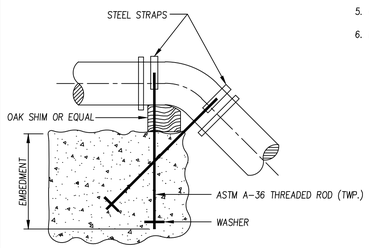
* – WHERE (2) 1" DIAMETER BOLTS ARE REQUIRED
(4) 3/4" DIAMETER BOLTS MAY BE USED



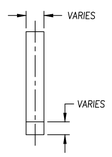
STRAP DETAIL

NOTES:

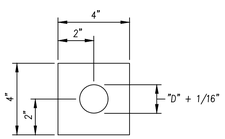
1. ALL STEEL SHALL CONFORM TO ASTM A–36
2. (2) STRAPS ARE REQUIRED, EACH WITH (4)–1" DIAMETER ANCHOR BOLTS FOR CASES C–1 AND C–2
3. REFER TO AQUA DRAWING E–4453 FOR USE AS PIPE AND VALVE CLAMP
4. CONTRACT ENGINEERING DEPARTMENT FOR DESIGN ON PRESSURE EXCEEDING 200 P.S.I. OR IF PIPE SIZE IS LARGER THAN 12"
5. COAT ALL EXPOSED METAL WITH 12 MILS OF ROSKOTE.
6. BOLT LENGTH WILL EQUAL "EMBEDMENT LENGTH" +SHIM +1/2" O.D. OF PIPE +3–1/2".



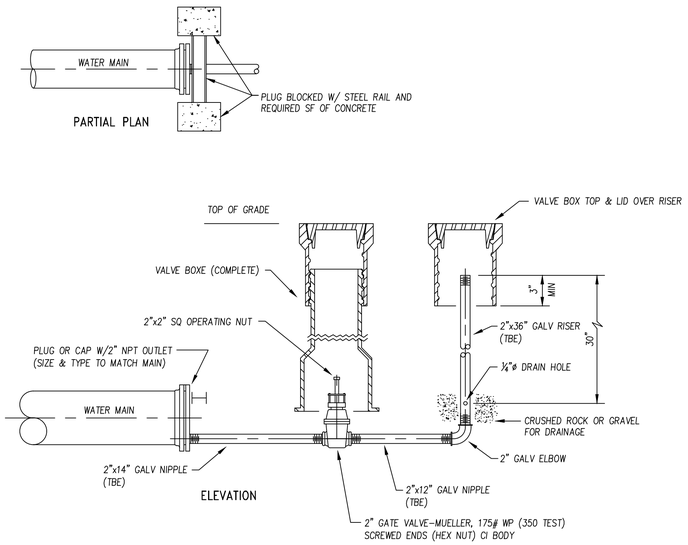
TYPICAL ANCHOR DETAIL



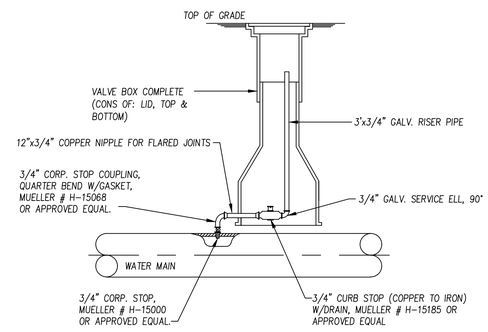
STRAP SECTION



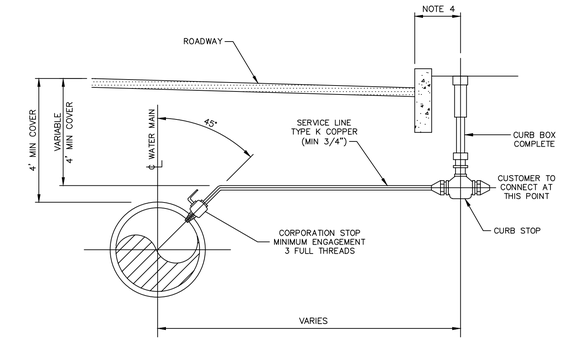
WASHER DETAIL



2" BLOW–OFF
N.T.S.



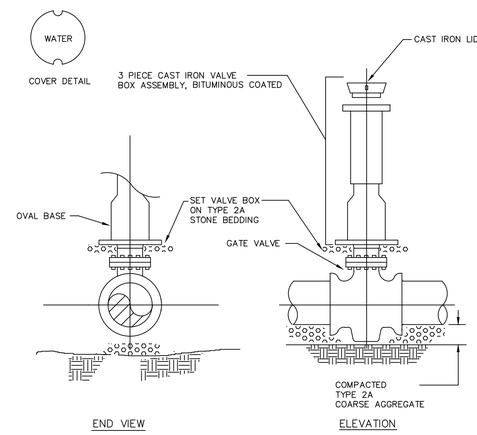
STANDARD 3/4" M.A.V. & CL2 ASSEMBLY
N.T.S.



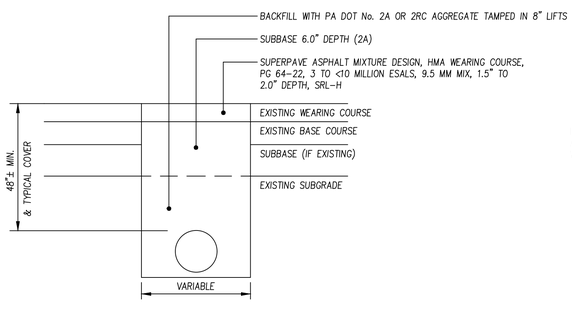
NOTES:

1. FOR STANDARD 3/4" CONNECTION, PROVIDE A TAPPED COUPLING WITH THREADED INSERT OR DOUBLE–STRAPPED SADDLE CLAMP.
2. DO NOT PLACE CURB STOP IN PAVED AREAS.
3. ALL SERVICE CONNECTIONS SHALL BE LOCATED AT THE MIDPOINT BETWEEN SIDE LOT LINES OR AS DIRECTED BY A AQUA PA FIELD REPRESENTATIVE.
4. WHERE SIDEWALK PARALLELS ROADWAY, THE CURB BOX SHALL BE PLACED BETWEEN THE CURB AND SIDEWALK. ALL OTHER LOCATIONS, CURB BOX TO BE PLACED AS DIRECTED BY A AQUA PA FIELD REPRESENTATIVE.

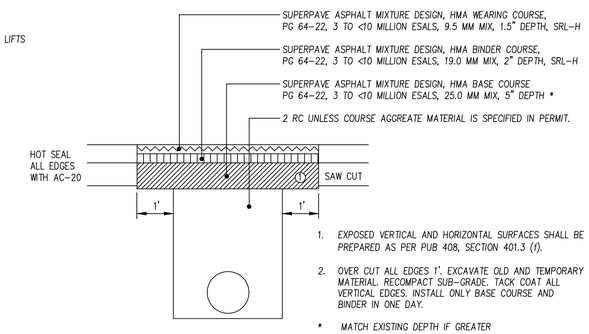
STANDARD SERVICE CONNECTION
(NTS)



STANDARD GATE VALVE AND VALVE BOX
N.T.S.



TEMPORARY RESTORATION
N.T.S.



1. EXPOSED VERTICAL AND HORIZONTAL SURFACES SHALL BE PREPARED AS PER PUB 408, SECTION 401.3 (f).
2. OVER CUT ALL EDGES 1'. EXCAVATE OLD AND TEMPORARY MATERIAL. RECOMPACT SUB–GRADE. TACK COAT ALL VERTICAL EDGES. INSTALL ONLY BASE COURSE AND BINDER IN ONE DAY.

* MATCH EXISTING DEPTH IF GREATER

FLEXIBLE PAVEMENT RESTORATION
N.T.S.

PENN DOT CONSTRUCTION NOTES:

1. TOWNSHIP TO BE NOTIFIED PRIOR TO WORKING NEAR SCHOOL SIGNALS AND SHALL MARK OUT AS REQUIRED.
2. SHOULDER AREAS PRONE TO WASHOUT SHALL BE PAVED.
3. ANY DAMAGE TO TREES OR CUT SLOPES CAUSING THEM TO FAIL SHALL BE THE RESPONSIBILITY OF THE PERMITTEE.
4. MAIN TO BE SLEEVED OR ENCASED WHERE PASSING THROUGH GUARDRAIL.
5. PERMITTEE AND HIS CONTRACTOR ARE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH THE REQUIRED EROSION AND SEDIMENTATION CONTROL MEASURES. APPROPRIATE CONTROLS ARE TO BE IN PLACE PRIOR TO SITE DISTURBANCE, CONTINUALLY MAINTAINED DURING CONSTRUCTION UNTIL REMOVED AND LEFT IN PLACE UNTIL SITE IS STABILIZED.
6. TOWNSHIP TO BE NOTIFIED PRIOR TO WORKING NEAR TRAFFIC SIGNAL LOOPS AND SHALL MARK OUT AS REQUIRED.

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Doylestown, PA 18901
(215) 586-3330
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REVISIONS

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CONSTRUCTION WITHIN
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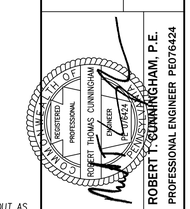
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

WATER DETAILS

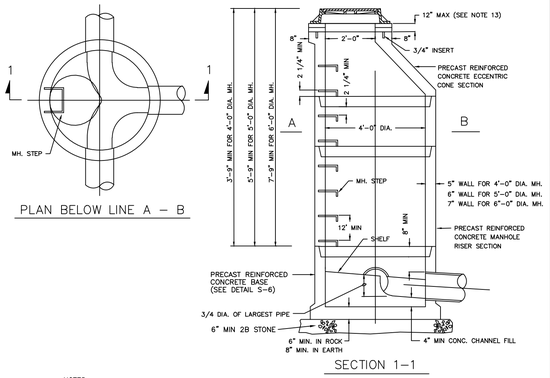


ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C3.0_Utilities.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	N.T.S		
Designed	RC		
Sheet	10	of	21

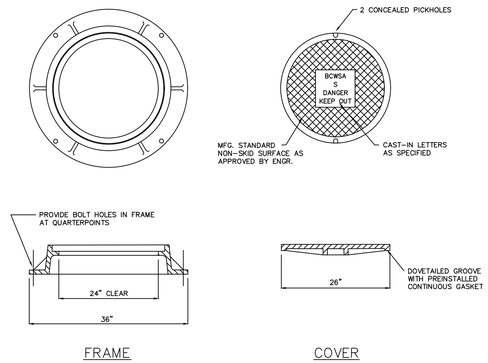
Drawing No.
C3.1



NOTES:

1. THE DEPTH OF THE INVERT CHANNEL SHALL BE EQUAL TO 3/4 OF THE DIAMETER OF THE SEWER.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT A RATE OF 1" PER FOOT.
3. TYPE "B" MANHOLES (SHALLOW TYPE) TO BE PROVIDED WHERE REQUIRED BY DEPTH CONDITIONS.
4. FOR MANHOLES HAVING 5' DIAMETER AND 6' DIAMETER BASE, REDUCTION IN DIAMETER TO 4' SHALL START AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL WHERE DEPTH IS SUFFICIENT.
5. ALL MANHOLE FRAMES SHALL BE BOLTED TO THE CONE SECTION WITH 2 – 3/4" DIAMETER BOLTS WITH WASHERS AND NUTS. BOLTS TO BE AT 180° ON BOLT CIRCLE.
6. SEE THE SPECIFICATIONS FOR LENGTH OF PIPE CONNECTIONS TO MANHOLE.
7. ALL CONCRETE SHALL BE 4000 PSI MINIMUM.
8. ENTIRE OUTSIDE SURFACE OF MANHOLE SHALL RECEIVE TWO COATS OF BITUMINOUS COATING. KOPPERS 300M PENNOXY TAR 32-B-4, OR APPROVED EQUAL.
9. INSTALL 2 LAYERS OF PLASTIC PREFORMED JOINT SEALANT BETWEEN ALL SECTIONS AND UNDER FRAME.
10. MANHOLE CONSTRUCTION SHALL BE IN ACCORDANCE WITH ASTM C478
11. STEPS TO BE ALUMINUM ALLOY WITH DEPRESSED TREAD. STEEL REINFORCED POLYPROPYLENE IS OPTIONAL. (SEE DETAIL S-10 AND S-11)
12. 4' DIAMETER MANHOLE – 8" TO 15" PIPES
    5' DIAMETER MANHOLE – 16" TO 27" PIPES
    6' DIAMETER MANHOLE – 30" TO 48" PIPES
13. WHEN TWO OR MORE GRADE ADJUSTMENT RINGS ARE USED, A WATERTIGHT PVC CONNECTOR SHALL BE INSTALLED BETWEEN THE FRAME AND THE CONE. CONNECTOR SHALL BE WATER-LOK CONNECTOR BFA ANTI-FLOATING BY A-LOK PRODUCTS INC. OR APPROVED EQUAL.
14. MANHOLES THAT RECEIVE FORCE MAIN DISCHARGE OR THAT ARE LOCATED ON INTERCEPTORS OR TRUNK SEWERS SHALL BE CONSTRUCTED WITH A PVC LINER IN ACCORDANCE WITH DETAIL S-2.

BUCKS COUNTY WATER AND SEWER AUTHORITY	TYPE "A" STANDARD MANHOLE	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-1	

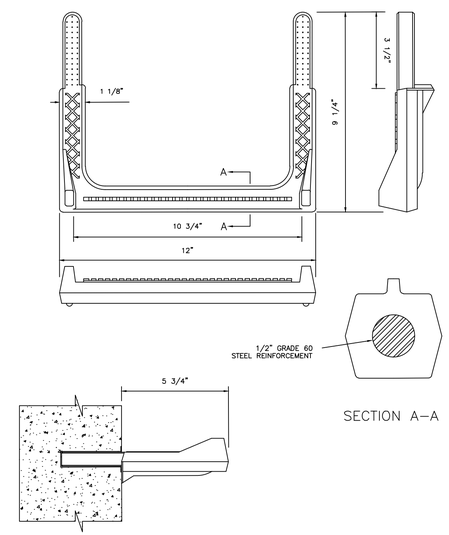


N.T.S.

NOTES:

1. MANHOLE FRAME AND COVER SHALL BE NEENAH FOUNDRY COMPANY MODEL R-1642 WITH SELF-SEALING GASKET TYPE COVER OR APPROVED EQUAL.
2. ALL MATERIAL SHALL BE GRAY CAST IRON, ASTM A48-83 CL35
3. CASTINGS SHALL BE DESIGNED FOR AASHTO HIGHWAY LOADING CLASS HS-20
4. PROVIDE FOUR (4) ANCHOR BOLT HOLES IN FRAME TO ACCOMODATE 3/4" ANCHOR BOLTS
5. COVER SHALL HAVE THE WORDS "BCWSA S DANGER KEEP OUT" OR "BCWSA SANITARY SEWER" CAST THEREON

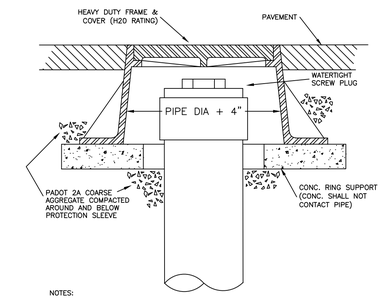
BUCKS COUNTY WATER AND SEWER AUTHORITY	STANDARD MANHOLE FRAME AND COVER	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-8	



NOTES:

STEPS TO BE FABRICATED FROM COPOLYMER POLYPROPYLENE PLASTIC

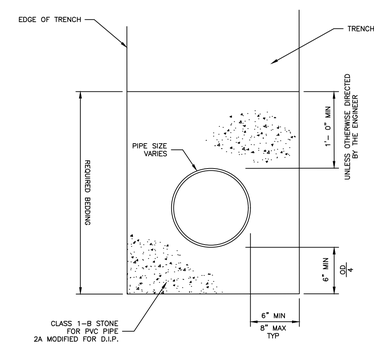
BUCKS COUNTY WATER AND SEWER AUTHORITY	POLYPROPYLENE MANHOLE STEP	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-11	



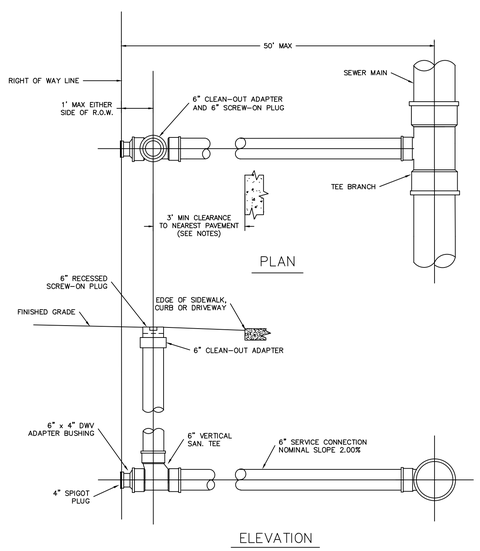
NOTES:

1. FRAME AND COVER SHALL BE NEENAH FOUNDRY COMPANY MODEL R-1976 OR APPROVED EQUAL
2. CLEAN-OUT PROTECTION SLEEVES ARE TO BE INSTALLED FOR CLEAN-OUTS LOCATED IN PAVED AREAS, OR LESS THAN 3 FEET FROM A PAVED AREA.

BUCKS COUNTY WATER AND SEWER AUTHORITY	CLEAN-OUT PROTECTION SLEEVE (FOR USE IN OR NEAR PAVED AREAS)	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-21	



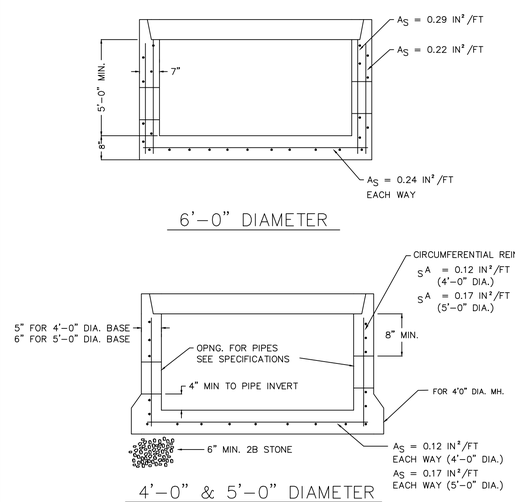
BUCKS COUNTY WATER AND SEWER AUTHORITY	STANDARD PIPE BEDDING	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-13	



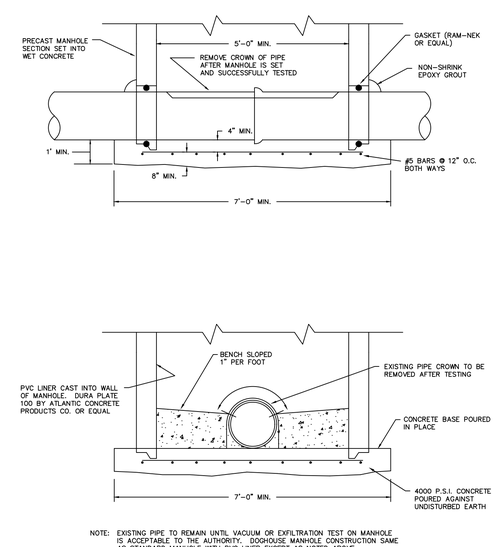
NOTES:

CLEAN-OUTS SHALL NOT NORMALLY BE LOCATED IN OR NEAR PAVED AREAS. UNDER SPECIAL CONDITIONS A CLEAN-OUT LOCATED IN, OR LESS THAN 3 FEET FROM, A PAVED AREA MAY BE ACCEPTABLE IF A PROTECTION SLEEVE AS SHOWN IN DETAIL S-21 IS PROVIDED.

BUCKS COUNTY WATER AND SEWER AUTHORITY	SERVICE CONNECTION SHALLOW SEWER	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-19	

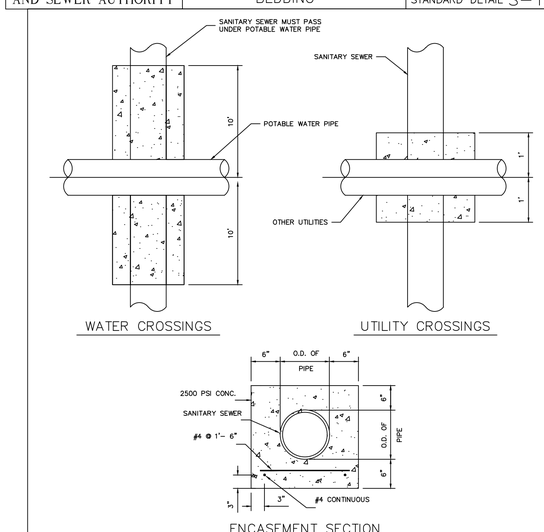


BUCKS COUNTY WATER AND SEWER AUTHORITY	PRECAST BASE	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-6	



NOTE: EXISTING PIPE TO REMAIN UNTIL VACUUM OR EXFILTRATION TEST ON MANHOLE IS ACCEPTABLE TO THE AUTHORITY. DOGHOUSE MANHOLE CONSTRUCTION SAME AS STANDARD MANHOLE WITH PVC LINER EXCEPT AS NOTED ABOVE. (SEE DETAIL S-2)

BUCKS COUNTY WATER AND SEWER AUTHORITY	DOGHOUSE MANHOLE	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-7	



NOTE:

PROVIDE REINFORCEMENT AT UTILITY CROSSINGS OR AS DIRECTED BY THE AUTHORITY'S ENGINEER

BUCKS COUNTY WATER AND SEWER AUTHORITY	CONCRETE ENCASEMENT	DATE 3/1/96	DWN BY GA
		STANDARD DETAIL S-12	

Holmes Cunningham LLC
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Doylestown, PA 18901
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REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR EXCAVATION BEYOND THIS 10 WORKING DAYS IN DESIGN STAGE – STOP & CALL
Pennsylvania One Call Systems, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND ARE BASED ON INFORMATION FURNISHED TO THE CONTRACTOR. PER PA. ACT 187 TO CONTACT UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

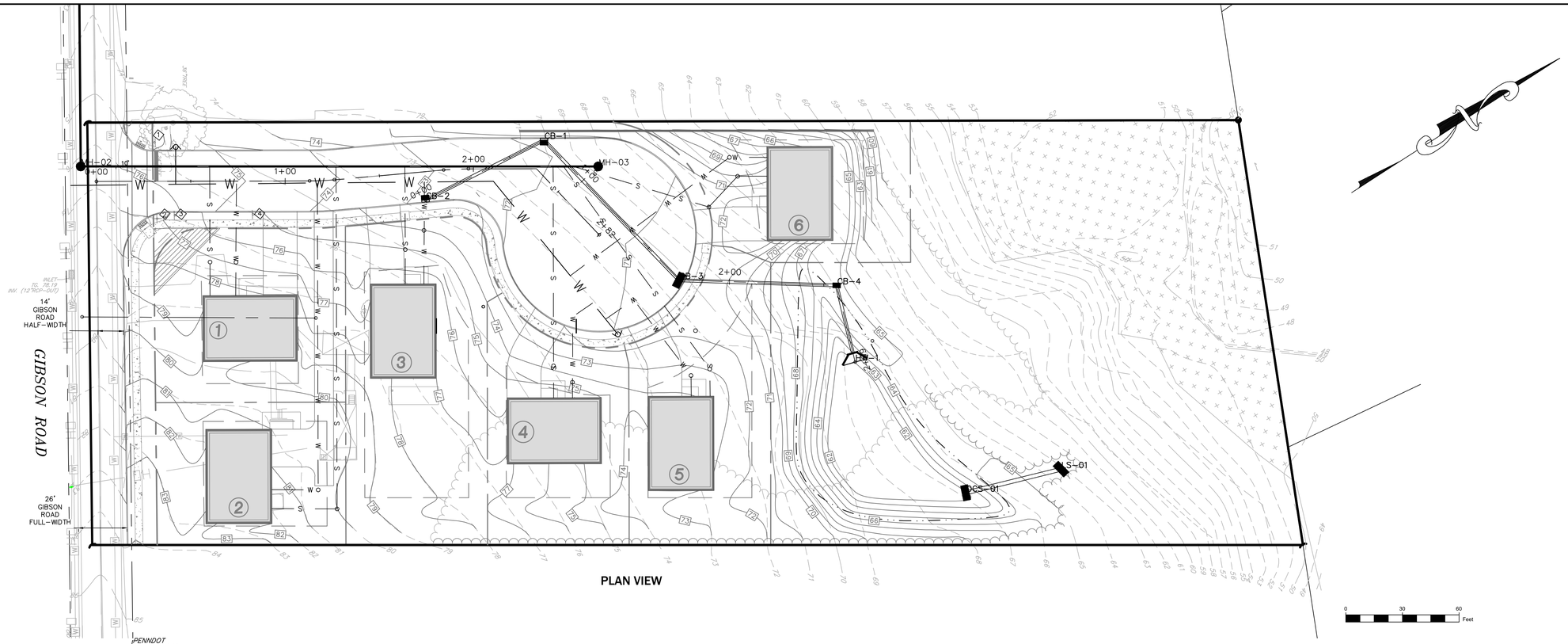
SANITARY SEWER DETAILS

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

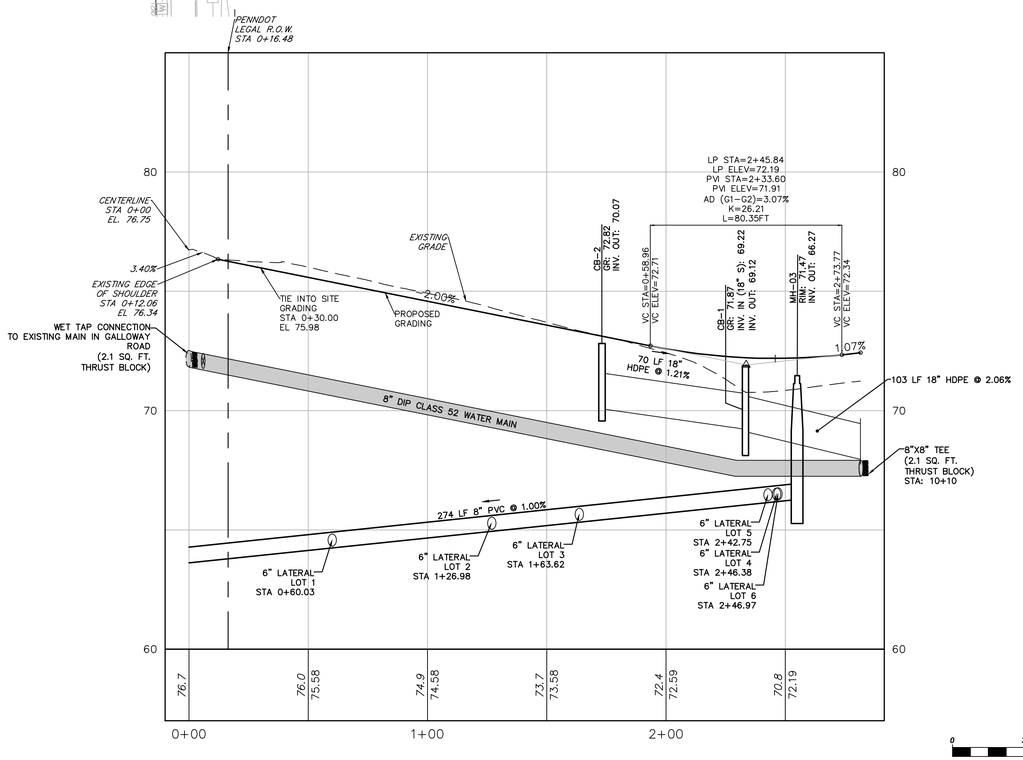
File No.
1608_C3.0_Utilities.DWG

HCE Job	1608
Date	5/27/2021
Scale	N.T.S
Designed	RC
Sheet	11 of 21

Drawing No.
C3.2



PLAN VIEW



PROPOSED ROAD PROFILE STANDARD = PROPOSED PROFILE ELEVATION
ITALICIZED = EXISTING PROFILE ELEVATION

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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

ROAD PROFILE

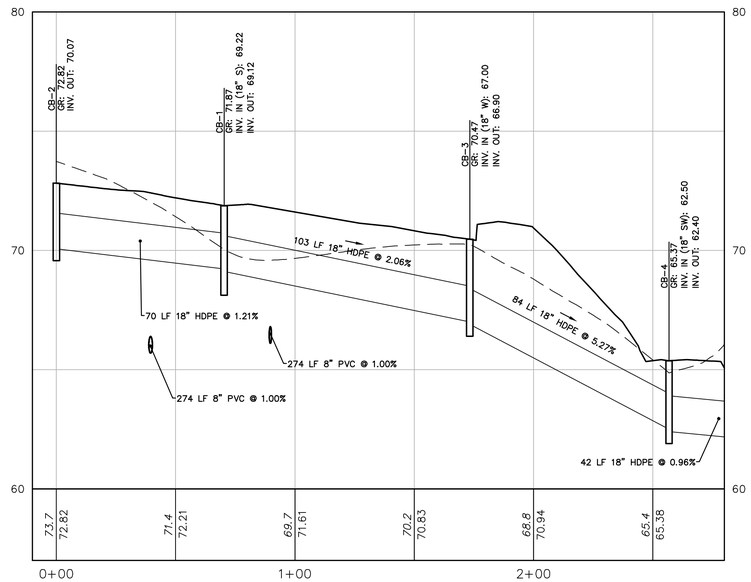
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ROGER THOMAS CUNNINGHAM ENGINEER PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

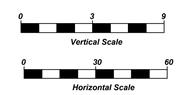
File No.
1608_C4.0_Profiles.DWG

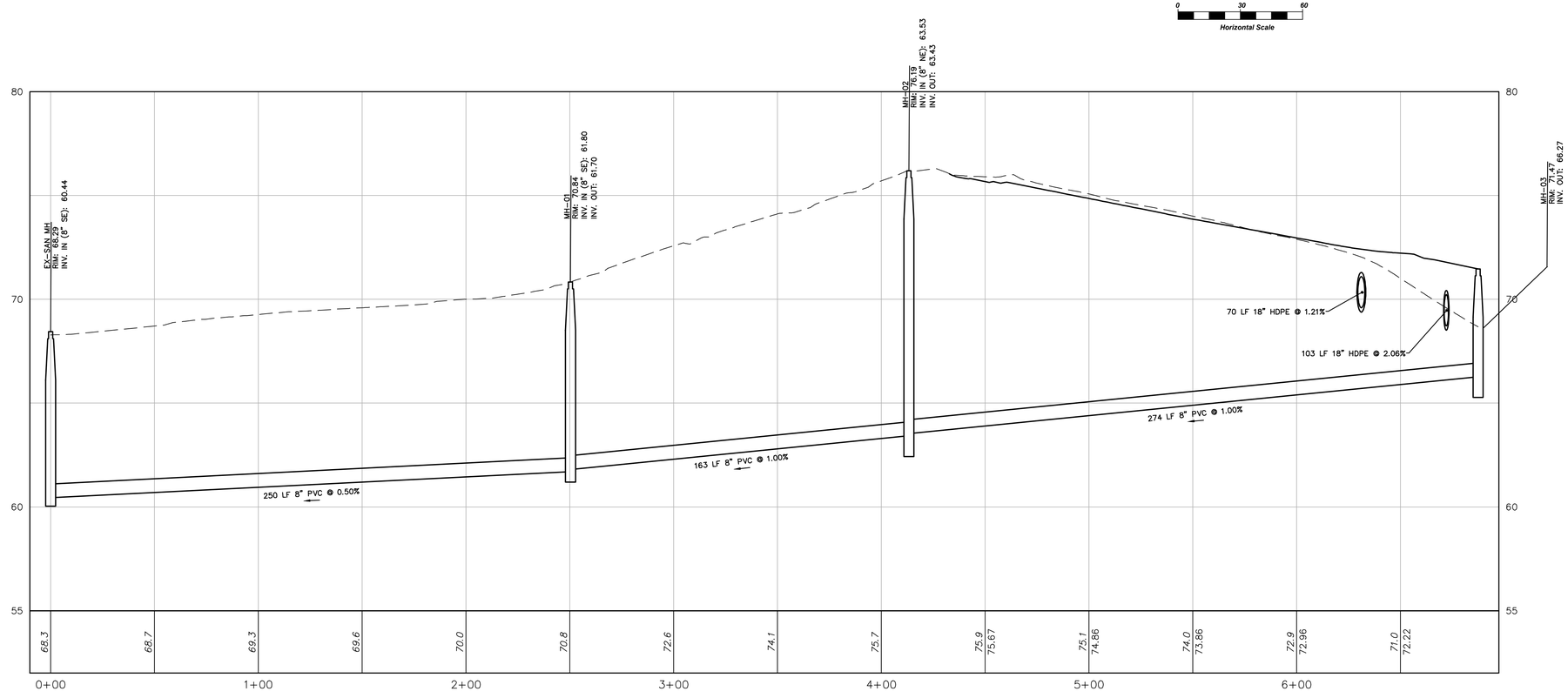
HCE Job	1608
Date	5/27/2021
Scale	AS SHOWN
Designed	RC
Sheet	12 of 21

Drawing No.
C4.0



CB-1 TO HW-1 PROFILE





SANITARY SEWER PROFILE

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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

UTILITY PROFILES

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROGER THOMAS CUNNINGHAM
ENGINEER
PE-076424-E

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C4.0_Profiles.DWG

HCE Job	1608
Date	5/27/2021
Scale	AS SHOWN
Designed	RC
Sheet	13 of 21

Drawing No.
C4.1

LIMIT OF DISTURBANCE = 2.70 ACRES

PROJECT SITE BOUNDARY = 3.66 ACRES

GENERAL NOTES

1. EXISTING BOUNDARY AND TOPOGRAPHIC INFORMATION TAKEN FROM A SURVEY PREPARED BY CAVANAUGH'S SURVEYING SERVICES DATED MARCH 15, 2021 .
2. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
3. UNDER PENNSYLVANIA LAW , THE CONTRACTOR IS REQUIRED TO NOTIFY THE PENNSYLVANIA ONE-CALL SYSTEM AT 1-800-242-1776 PRIOR TO THE START OF HIS WORK, SO THAT ALL THE VARIOUS UNDERGROUND UTILITY OPERATORS WILL BE ABLE TO LOCATE THEIR OWN UTILITIES.
4. THERE ARE NO HQ OR EV WATERSHEDS LOCATED WITHIN THE PROJECT AREA.
5. THERE ARE NO RIPARIAN AREAS OR BUFFERS IDENTIFIED WITHIN THE PROJECT AREA OR OUTSIDE THE LIMIT OF DISTURBANCE. THEREFORE, RIPARIAN BUFFER OBLIGATIONS DO NOT APPLY TO THIS PROJECT.
6. THERE ARE NO INFILTRATION BMPS LOCATED OUTSIDE PROPOSED GRADING AREAS.
7. THE EXISTING SITE IS NOT UNDERLAIN BY ANY NATURALLY OCCURRING GEOLOGIC FORMATIONS OR SOIL CONDITIONS WHICH COULD CAUSE POLLUTION DURING EARTH DISTURBANCE. THEREFORE, NO LOCATIONS ARE IDENTIFIED ON THIS PLAN AND NO DETAILS ARE PROVIDED FOR DISPOSAL OF SUCH MATERIAL.

CRITICAL STAGES OF PCSM PLAN IMPLEMENTATION

THE INSTALLATION OF THE PROPOSED INFILTRATION BMP SHALL BE OVERSEEN BY A LICENSED PROFESSIONAL ENGINEER OR THEIR DESIGNEE.

Soils Legend

Type	Name	Depth to Bedrock	Depth to Seasonal High Water Table	Floodplain Soil	HSG	Hydric Soil
Ha	Hatboro silt loam	60"-99"	0"-6"	No	B/D	Yes
DdA	Doylestown Silt Loam (0% to 3% slopes)	60"-72"	0"-6"	No	C/D	Yes
LkB	Lawrenceville silt loam (3% to 8% slopes)	48"-99"	18"-36"	No	C	No
UnB	Urban Land-duffield complex (0% to 8% slopes)	10"-100"	>80"	No	B	No

Limitations and Resolutions: The soils found within the project limits have varying limitations including possible shallow depth to groundwater and possible shallow depth to bedrock. In order to resolve the groundwater limitation, any standing water should be pumped through a sediment filter bag. To resolve the bedrock limitation, the contractor shall determine whether rock is rippable. If rock is not rippable, blasting will be required. All blasting shall meet all local, county, state and federal regulations.

SITE LOCATION MAP

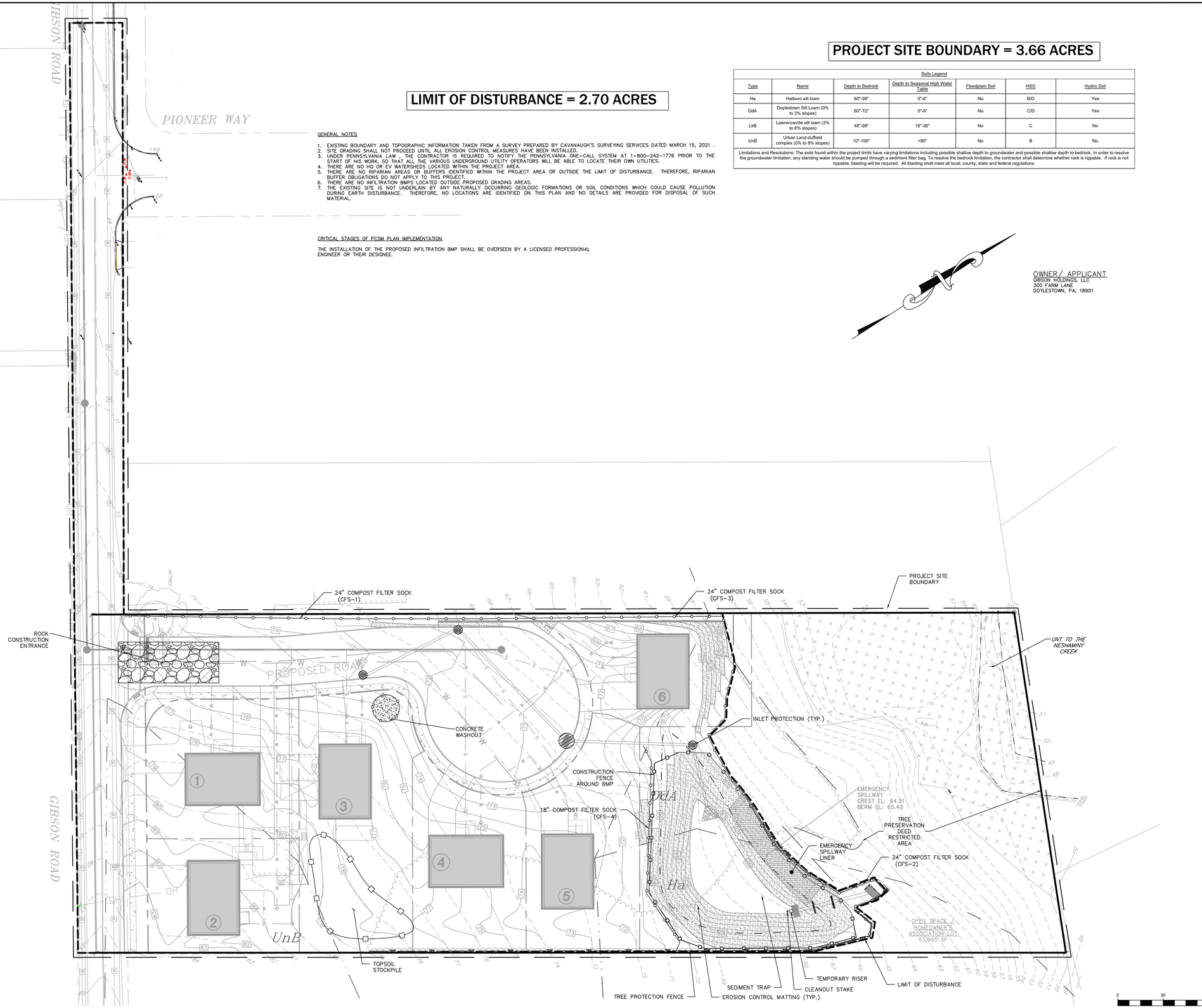
REFERENCE: BEVERLY NJ-PA U.S.G.S. QUADRANGLE MAPS

SCALE: 1"=1,000'

OWNER/ APPLICANT
GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA, 18901

E&S LEGEND

- LIMIT OF DISTURBANCE
- FILTER SOCK
- CONSTRUCTION FENCE
- TREE PROTECTION FENCE
- STABILIZED CONSTRUCTION PAD
- CONCRETE WASHOUT
- SOIL TYPE BOUNDARY
- SOIL TYPE — LkB
- INLET PROTECTION
- PROJECT SITE BOUNDARY
- EROSION CONTROL MATTING
- EMERGENCY SPILLWAY LINER



ACT 187 AS AMENDED

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.

TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
(3) WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
(10) WORKING DAYS IN DESIGN STAGE
-- STOP & CALL --

Pennsylvania One Call System, Inc.
1-800-242-1776

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
10 WORKING DAYS IN DESIGN STAGE
-- STOP & CALL --

Pennsylvania One Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

EROSION AND SEDIMENT CONTROL PLAN

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C5.0_Erosion.DWG

HCE Job	1608
Date	5/27/2021
Scale	1"=30'
Designed	RC
Sheet	14 of 21

Drawing No.
C5.0

SEQUENCE OF CONSTRUCTION

NOTE: SITE DEVELOPMENT OPERATIONS SHOULD BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING GENERAL SEQUENCE OF OPERATIONS. THE CONTRACTOR MAY DEVIATE FROM THE STAGING OF PERMANENT SITE IMPROVEMENT CONSTRUCTION ITEMS, WITH APPROVAL OF THE CONSERVATION DISTRICT INSPECTOR. DEVIATION FROM THE RELATIVE ORDER OF EROSION AND SEDIMENT CONTROL MEASURES SHOULD NOT OCCUR WITHOUT APPROVAL OF THE CONSERVATION DISTRICT INSPECTOR AND SITE ENGINEER.

1. CONTACT THE BUCKS COUNTY CONSERVATION DISTRICT (215-345-7577), BENSALEM TOWNSHIP AND BENSALEM TWP. ENGINEER AT LEAST THREE (3) WORKING DAYS PRIOR TO SITE DISTURBANCE.
2. EACH STAGE OF THE SEQUENCE OF CONSTRUCTION MUST BE COMPLETED PRIOR TO INITIATION OF THE NEXT STAGE OF THE SEQUENCE OF CONSTRUCTION. CONSTRUCTION MAY OVERLAP INTO A SUBSEQUENT PHASE AS LONG AS ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED IN THE PREVIOUS PHASE.
3. INSTALL CONSTRUCTION ENTRANCES AT SITE ACCESS, CONSTRUCTION STAGING AREAS TREE PROTECTION FENCING, CONSTRUCTION FENCING, AND COMPOST FILTER SOCK WHERE SHOWN ON THE PLAN.
4. CONSTRUCT SEDIMENT BASIN.
5. STRIP TOPSOIL AND STOCKPILE WHERE SHOWN ON PLAN. ALL STRIPPED TOPSOIL STOCKPILES SHALL HAVE TEMPORARY SEEDING INSTALLED. ROUGH GRADE SITE, ROADWAY, AND BUILDING PADS. INSTALL TEMPORARY EROSION CONTROL BLANKETS.
6. INSTALL PROPOSED RETAINING WALLS AND BERM WITH EROSION CONTROL MATTING. INSTALL PROPOSED OUTFALL PIPE AND LEVEL SPREADER IN LOCATIONS DEPICTED ON THE PLAN.
7. INSTALL WATER, SANITARY SEWER, AND STORM SEWER SYSTEM STARTING AT THE DOWNSTREAM ENDS AND WORKING UPSTREAM. ALL TRENCHES SHALL BE BACKFILLED AT THE END OF EACH DAY. MAKE UTILITY CONNECTIONS.. INSTALL INLET FILTER BAGS IMMEDIATELY UPON INSTALLATION OF STORM SEWER INLETS.
8. INSTALL CURB, SUBBASE AND BASE COURSE FOR THE ROAD AND DRIVEWAYS.
9. CONSTRUCT BUILDINGS. NO VERTICAL CONSTRUCTION MAY OCCUR UNTIL A STABLE BASE HAS BEEN ESTABLISHED.
10. COMPLETE FINAL GRADING AFTER THE BUILDINGS ARE COMPLETED AND APPLY PERMANENT SEEDING MIXTURE AND INSTALL ALL REQUIRED PLANTINGS.
11. FLUSH ALL AFFECTED STORM DRAINAGE PIPES OF ACCUMULATED SILT.
12. UPON COMPLETE STABILIZATION OF SITE, CONSTRUCT PROPOSED RAIN GARDEN BY EXCAVATING PREVIOUSLY ROUGH-GRADED AREA TO INSTALL BMP. BMP INSTALLATION SHOULD FOLLOW THE BMP-SPECIFIC SEQUENCE PROVIDED. INSTALL PLANTINGS WITHIN BMP AND REMOVE EROSION CONTROL DEVICES. THE SITE SHALL BE CONSIDERED STABILIZED WHEN THE PERMANENT VEGETATION HAS PROVIDED A 70% GROUNDCOVER.
13. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENTATION CONTROLS MUST BE MAINTAINED PROPERLY. MAINTENANCE MUST INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENTATION CONTROLS AFTER EACH STORM EVENT OR ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN-OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RENETTING, MUST BE PERFORMED IMMEDIATELY.

CLEAN FILL NOTE:

IF THE SITE WILL NEED TO HAVE FILL IMPORTED FROM AN OFF SITE LOCATION, THE RESPONSIBILITY FOR PERFORMING ENVIRONMENTAL DUE DILIGENCE AND THE DETERMINATION OF CLEAN FILL WILL RESIDE WITH THE OPERATOR.

CLEAN FILL IS DEFINED AS: UNCONTAMINATED, NON-WATER SOLUBLE, NON-DECOMPOSABLE, INERT, SOLID MATERIAL. THE TERM INCLUDES SOIL, ROCK, STONE, DREDGED MATERIAL, USED ASPHALT, AND BRICK, BLOCK OR CONCRETE FROM CONSTRUCTION AND DEMOLITION ACTIVITIES THAT IS SEPARATE FROM OTHER WASTE AND IS RECOGNIZABLE AS SUCH. THE TERM DOES NOT INCLUDE MATERIALS PLACED IN OR ON THE WATERS OF THE COMMONWEALTH UNLESS OTHERWISE AUTHORIZED. (THE TERM "USED ASPHALT" DOES NOT INCLUDE MILLED ASPHALT OR ASPHALT THAT HAS BEEN PROCESSED FOR RE-USE.)

ENVIRONMENTAL DUE DILIGENCE: INVESTIGATIVE TECHNIQUES, INCLUDING, BUT NOT LIMITED TO, VISUAL PROPERTY INSPECTIONS, ELECTRONIC DATA BASE SEARCHES, REVIEW OF PROPERTY OWNERSHIP, REVIEW OF PROPERTY USE HISTORY, SANBORN MAPS, ENVIRONMENTAL QUESTIONNAIRES, TRANSACTION SCREENS, ANALYTICAL TESTING, ENVIRONMENTAL ASSESSMENTS OR AUDITS. ANALYTICAL TESTING IS NOT A REQUIRED PART OF DUE DILIGENCE UNLESS VISUAL INSPECTION AND/OR REVIEW OF THE PAST LAND USE OF THE PROPERTY INDICATES THAT THE FILL MAY HAVE BEEN SUBJECTED TO A SPILL OR RELEASE OF REGULATED SUBSTANCE. IF THE FILL MAY HAVE BEEN AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE, IT MUST BE TESTED TO DETERMINE IF IT QUALIFIES AS CLEAN FILL. TESTING SHOULD BE PERFORMED IN ACCORDANCE WITH APPENDIX A OF THE DEPARTMENT'S POLICY "MANAGEMENT OF FILL".

EROSION / SEDIMENT CONTROL PLAN STANDARD NOTES

STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET; STOCKPILE SLOPES MUST NOT EXCEED 2:L,

THE OPERATOR/RESPONSIBLE PERSON (O/RP) ON SITE SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY AND COMPLETELY IMPLEMENTED.

IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE O/RP SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES (BMPS) TO ELIMINATE THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION.

THE O/RP SHALL ASSURE THAT AN EROSION AND SEDIMENT CONTROL PLAN HAS BEEN PREPARED, APPROVED BY THE BUCKS COUNTY CONSERVATION DISTRICT AND IS BEING IMPLEMENTED AND MAINTAINED FOR ALL SOIL AND/OR ROCK SPOIL AND BORROW AREAS REGARDLESS OF THEIR LOCATIONS.

ALL PUMPING OF SEDIMENT-LADEN WATER SHALL BE THROUGH A SEDIMENT CONTROL BMP SUCH AS A PUMPED WATER FILTER BAG DISCHARGING OVER UNDISTURBED AREAS.

A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN MUST BE AVAILABLE ON THE PROJECT SITE AT ALL TIMES.

EROSION AND SEDIMENT BMPS MUST BE CONSTRUCTED, STABILIZED AND FUNCTIONAL BEFORE SITE DISTURBANCE BEGINS WITHIN THE TRIBUTARY AREAS OF THOSE BMPS.

AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMP CONTROLS MUST BE REMOVED. AREAS DISTURBED DURING THE REMOVAL OF THE BMPS MUST BE STABILIZED IMMEDIATELY.

AT LEAST SEVEN (7) DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITY, THE O/RP SHALL INVITE ALL CONTRACTORS INVOLVED IN THAT ACTIVITY, THE LANDOWNER, ALL APPROPRIATE MUNICIPAL OFFICIALS, THE EROSION AND SEDIMENT CONTROL PLAN DESIGNER AND THE BUCKS COUNTY CONSERVATION DISTRICT TO A PRE-CONSTRUCTION MEETING. ALSO, AT LEAST THREE DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITY, ALL CONTRACTORS INVOLVED IN THAT ACTIVITY SHALL NOTIFY THE PENNSYLVANIA ONE-CALL SYSTEM INC. AT 1-800-242-1776 TO DETERMINE ANY UNDERGROUND UTILITIES LOCATIONS.

IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITY CEASES, THE O/RP SHALL STABILIZE ANY AREAS DISTURBED BY THE ACTIVITY. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT SPECIFIED RATES. DISTURBED AREAS THAT ARE NOT AT FINISHED GRADE AND WHICH WILL BE RE-DISTURBED WITHIN ONE YEAR MUST BE STABILIZED IN ACCORDANCE WITH TEMPORARY VEGETATIVE STABILIZATION SPECIFICATIONS.
DISTURBED AREAS THAT ARE AT FINISHED GRADE OR WHICH WILL NOT BE RE-DISTURBED WITHIN ONE YEAR MUST BE STABILIZED IN ACCORDANCE WITH PERMANENT VEGETATIVE STABILIZATION SPECIFICATIONS.

AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 70% (PERCENT) VEGETATIVE OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.

UPON THE INSTALLATION OF TEMPORARY SEDIMENT BASIN RISER(S), A QUALIFIED SITE REPRESENTATIVE SHALL CONDUCT AN IMMEDIATE INSPECTION OF THE RISER(S), WHEREUPON THE BUCKS COUNTY CONSERVATION DISTRICT SHALL BE NOTIFIED IN WRITING THAT THE RISER IS SEALED (WATERTIGHT).

AT STREAM CROSSING, A 50-FOOT BUFFER SHALL BE MAINTAINED. ON BUFFERS, CLEARINGS, SOD DISTURBANCES AND EXCAVATIONS, EQUIPMENT TRAFFIC SHOULD BE MINIMIZED. ACTIVITY SUCH AS STACKING LOGS, BURNING CLEARED BRUSH, DISCHARGING RAINWATER FROM TRENCHES, WELDING PIPE SECTIONS, REFUELING AND MAINTAINING EQUIPMENT SHOULD BE AVOIDED WITHIN BUFFER ZONES.

UNTIL A SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS MUST BE MAINTAINED PROPERLY. MAINTENANCE MUST INCLUDE INSPECTIONS OF ALL EROSION CONTROL BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEANOUT, REPAIR, REPLACEMENT, RE-GRADING, RE-SEEDING, RE-MULCHING AND RE-NETTING MUST BE PERFORMED IMMEDIATELY. IF EROSION AND SEDIMENT CONTROL BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED, WILL BE REQUIRED.

SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF ON-SITE IN LANDSCAPED AREAS OUTSIDE OF STEEP SLOPES, WETLANDS, FLOODPLAINS OR DRAINAGE SWALES AND IMMEDIATELY STABILIZED OR PLACED IN SOIL STOCKPILES AND STABILIZED.

ALL BUILDING MATERIAL AND WASTES MUST BE REMOVED FROM THE SITE AND RECYCLED IN ACCORDANCE WITH DEP'S SOLID WASTE REGULATIONS (25 PA CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ.), AND/OR ANY ADDITIONAL LOCAL, STATE OR FEDERAL REGULATIONS. NO BUILDING MATERIALS (USED OR UNUSED) OR WASTE MATERIALS SHALL BE BURNED, BURIED, DUMPED OR DISCHARGED AT THE SITE.

SEEDING NOTES:

TEMPORARY SEEDING :

1. TEMPORARY SEEDING SHALL BE DONE IN AREAS WHERE NO ACTIVITY WORK WILL BE PERFORMED. ANY DISTURBED AREA ON WHICH ACTIVITY HAS CEASED MUST BE SEEDED AND MULCHED IMMEDIATELY.
2. DURING NON-GERMINATING PERIODS, ONLY MULCH MUST BE APPLIED AT THE RECOMMENDED RATES. AREAS MULCHED DURING THE NON-GERMINATING PERIODS, MUST BE LIMED, FERTILIZED, SEEDED, AND MULCHED IMMEDIATELY FOLLOWING THE END OF THE NON-GERMINATING PERIODS.
3. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN ONE (1) YEAR MAY BE SEEDED AND MULCHED WITH A QUICK GROWING TEMPORARY SEED MIXTURE.
4. DISTURBED AREAS WHICH ARE AT EITHER FINISHED GRADE OR WILL NOT BE DISTURBED AGAIN WITHIN ONE (1) YEAR MUST BE SEEDED WITH A PERMANENT SEED MIXTURE AND MULCHED.
5. TEMPORARY SEEDING STEPS:
   A. APPLY AGRICULTURAL LIMESTONE AT A RATE OF ONE (1) TON PER ACRE. (5 POUNDS PER, 1000 SQUARE FEET)
   B. APPLY FERTILIZER AT THE RATE OF 50-50-50 PER ACRE.
   C. WORK THE LIMESTONE AND FERTILIZER INTO THE SOIL.
   D. UTILIZING THE FOLLOWING SEEDING TYPES, RATES AND TIME SCHEDULE :

TEMPORARY SEEDING

SEASON	RATE	TYPE
MARCH 1 TO JUNE 15	1 LB./1000 SF	ANNUAL RYEGRASS
MAY 15 TO SEPT 15	1 LB./1000 SF	SUDAN GRASS
SEPT 15 TO OCT 15	168 LB./AC	WINTER RYE

   E. APPLY HAY OR STRAW MULCH (IN ACCORDANCE WITH SECTION NO. 4) AT A RATE OF THREE (3) TONS PER ACRE.
6. ALL SEED SHALL BE LABELED, DATED AND QUALITY CONSISTENT WITH SECTION NO. 2

PERMANENT SEEDING:

1. DISTURBED AREAS WHICH ARE EITHER AT FINISHED GRADE OR WILL NOT BE DISTURBED AGAIN WITHIN ONE (1) YEAR MUST BE SEEDED WITH A PERMANENT SEED MIXTURE AND MULCHED.
2. SEEDING SHALL BE DONE DURING PERIODS FROM APRIL 15TH TO OCTOBER PT, UNLESS OTHERWISE DIRECTED. IF SEEDING IS DONE AFTER OCTOBER 1ST, DORMANT SEED MUST BE USED AND DISTURBED AREAS MUST BE MULCHED.
3. DISTURBED FINAL GRADED AREAS AND DRAINAGE SWALES WILL BE PERMANENTLY SEEDED AS FOLLOWS:
   A. MINIMUM OF 4" OF TOPSOIL SHALL BE SPREAD OVER ALL AREAS TO BE SEEDED. TOPSOIL SHALL BE FREE OF STONES, STICKS, WASTE MATERIAL AND SIMILAR DEBRIS. FROZEN GROUND SHALL NOT BE SPREAD AS TOPSOIL AND TOPSOIL SHALL NOT BE SPREAD OVER FROZEN GROUND.
   B. A SOIL ANALYSIS IS RECOMMENDED, HOWEVER, IN LIEU OF AN ANALYSIS APPLY AGRICULTURAL LIMESTONE AND FERTILIZER AT RATES RECOMMENDED BELOW (OR AS SUGGESTED BY THE SOIL TEST RESULTS (ONE (1) TEST PER 25 ACRES)).
   C. THE LIMESTONE AND FERTILIZER SHALL BE WORKED INTO THE SOIL TO DEPTHS OF 3 TO 4 INCHES. D. GRASS SHALL NOT BE PLANTED AFTER HEAVY RAIN OR WATERING.
   D. ALL SEED USED SHALL BE LABELED IN ACCORDANCE WITH THE U.S. DEPARTMENT OF AGRICULTURE RULES AND REGULATIONS UNDER THE FEDERAL SEED ACT IN EFFECT AT THE TIME OF PURCHASE. INERT MATTER SHALL NOT EXCEED 15% AND BLUE TAG CERTIFIED SEED SHALL BE SUPPLIED WHEREVER POSSIBLE.
   E. SMOOTH AND FIRM SEED BED WITH CULTIPACKER OR SIMILAR EQUIPMENT PRIOR TO SEEDING. APPLY SEED UNIFORMLY BY BROADCASTING, DRILLING OR HYDRO SEEDING. COVER SEEDS WITH 1/2" OF SOIL WITH SUITABLE EQUIPMENT.
   F. APPLY HAY OR STRAW MULCH (IN ACCORDANCE WITH SECTION NO. 4) AT A RATE OF THREE (3) TONS PER ACRE.

PERMANENT SEEDING FOR NORMAL MOWED LAWN AREAS:

SEASON	RATE	TYPE
MARCH 1 TO JUNE 1 & AUG 15 TO OCT 1 AND RED TOP 12%	2 LBS./1000 SF	KY31 TALL FESCUE
OCT 1 TO MARCH 1 & JUNE 1 TO AUG 1	2 LBS./1000 SF	RED TOP*

(* USE DORMANT SEED, UNIFORMLY APPLIED, WORKING INTO A DEPTH OF 1/4 INCH. THE USE OF MULCH IS REQUIRED. THE USE OF NETTING OR EROSION CONTROL MATS MAY BE REQUIRED.)

PERMANENT SEEDING FOR SPECIAL AREAS
(SWALES, POND EMBANKMENTS, LEVEES, DIVERSION CHANNELS, ETC):

SEASON	RATE	TYPE
MARCH 1 TO JUNE 1 & AUG 15 TO OCT 1 AND RYEGRASS 20%	2 LBS./1000 SF	KY31 TALL FESCUE 80%

NOTE : SEEDING PERIODS AND SPECIFICATIONS MAY VARY DUE TO SITE CONDITIONS AND VARIANCES FROM THE TIME THIS REPORT IS WRITTEN AND APPROVED. IT MAY BE NECESSARY TO ADAPT SEED SPECIFICATION, VARIETIES, AND QUALITIES. FOR SPECIAL CONDITIONS CONSULT "GUIDELINE FOR RECLAMATION OF SEVERELY DISTURBED AREAS", PENNSYLVANIA STATE UNIVERSITY.

4. FERTILIZER : A SOIL ANALYSIS IS RECOMMENDED BUT IN LIEU OF AN ANALYSIS APPLY AGRICULTURAL LIMESTONE AT A RATE OF FOUR (4) TONS/ACRE AND 10-20-20 FERTILIZED AT A RATE OF 50 LBS. PER 1000 SF. THESE MATERIALS WILL BE UNIFORMLY APPLIED AND WORKED INTO THE TOPSOIL TO A DEPTH OF 3 TO 4 INCHES. IMMEDIATELY BEFORE SEEDING, A 1 0- 1 0- 10 FERTILIZER WILL BE WORKED INTO THE SURFACE AT A RATE OF 10 LBS. PER 1000 SF.
5. HYDRO SEEDING: LIME AND SEED SHALL BE AS SPECIFIED ABOVE, AND FERTILIZER SHALL BE APPLIED AT A RATE OF 40-80. CROWN VETCH SHALL BE INOCULATED AT FOUR TIMES THE MANUFACTURER'S RATE. SHOULD FERTILIZER BE APPLIED WITH THE INOCULANT, THE MIXTURE SHALL NOT REMAIN IN A SLURRY FOR MORE THAN ONE HOUR. WOOD CELLULOSE FIBER, APPLIED AT A RATE OF 35 LBS. PER 1000 SF, MAY BE APPLIED AS PART OF THE SLURRY IN LIEU OF MULCHING. SYNTHETIC MULCH BINDER, SUCH AS CURASOL, DCA-70, TERRE-TACK OR AN APPROVED EQUAL SHALL BE USED PER THE MANUFACTURER'S INSTRUCTIONS TO ANCHOR THE MULCH.
6. MULCHING: MULCHING SHALL BE APPLIED AS FOLLOWS:
   A. STRAW - SHALL BE ALL DRIED AND FREE FROM UNDESIRABLE SEEDS AND COURSE MATERIAL, APPLY AT A RATE OF 115 TO 150 LBS. PER 1000 SF OR 3 TONS PER ACRE. MULCHED AREAS SHALL BE CHECKED PERIODICALLY AND IMMEDIATELY AFTER STORMS AND WIND. DAMAGED OR MISSING MULCH SHALL BE REPLACED. A TACKIFIER APPLIED AFTER STRAW IS RECOMMENDED. TACKIFIER MAY BE ASPHALT OR POLYMER SPRAY. APPLY AT A RATE RECOMMENDED BY THE MANUFACTURER WITH SUITABLE EQUIPMENT. IN LIEU OF MANUFACTURERS RECOMMENDATIONS APPLY AT A RATE OF .04 TO .06 GALLONS PER SQUARE YARD.
   B. NETTING / EROSION CONTROL BLANKETS - THE USE AND INSTALLATION OF EROSION CONTROL BLANKETS OR NETTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION AND SHALL BE SELECTED FOR THE PROPER APPLICATION AND CONDITIONS.

UTILITY TRENCHING GUIDELINES:

1. CONSTRUCTION REQUIREMENTS -
   A. LIMIT ADVANCE CLEARING AND GRUBBING OPERATIONS TO A DISTANCE EQUAL TO TWO TIMES THE LENGTH OF PIPE INSTALLATION THAT CAN BE COMPLETED IN ONE DAY.
   B. WORK CREWS AND EQUIPMENT FOR TRENCHING, PLACEMENT OF PIPE, PLUG CONSTRUCTION AND BACKFILLING WILL BE SELF CONTAINED AND SEPARATE FROM CLEARING AND GRUBBING AND SITE RESTORATION AND STABILIZATION OPERATIONS.
   C. LIMIT DAILY TRENCH EXCAVATION TO THE LENGTH OF PIPE PLACEMENT, PLUG INSTALLATION AND BACKFILLING THAT CAN BE COMPLETED THE SAME DAY.
   D. WATER WHICH ACCUMULATES IN THE OPEN TRENCH WILL BE COMPLETELY REMOVED BY PUMPING AS REQUIRED, TO A FACILITY FOR REMOVAL OF SEDIMENTS IN ACCORDANCE WITH PADEP GUIDELINES
   E. ON THE DAY FOLLOWING PIPE PLACEMENT AND TRENCH BACKFILLING, THE DISTURBED AREA WILL BE GRADED TO FINAL CONTOURS AND APPROPRIATE TEMPORARY EROSION AND SEDIMENT POLLUTION CONTROL MEASURES/FACILITIES WILL BE INSTALLED. SEEDING AND MULCHING OF ALL DISTURBED AREAS WILL BE DONE AT THE END OF EACH WEEK.
2. EXCEPTIONS - IN CERTAIN CASES TRENCHES CANNOT BE BACKFILLED UNTIL THE PIPE IS HYDROSTATICALLY TESTED, OR ANCHORS AND OTHER PERMANENT FEATURES ARE INSTALLED IN THESE CASES, ALL OF THE REQUIREMENTS LISTED UNDER ITEM 1 WILL REMAIN IN EFFECT WITH THE FOLLOWING EXCEPTIONS:
   A. DAILY BACKFILLING OF THE TRENCH MAY BE DELAYED FOR SIX DAYS. ALL PRESSURE TESTING AND THE COMPLETE BACKFILLING OF THE OPEN TRENCH MUST BE COMPLETED BY THE SEVENTH WORKING DAY.
   B. IF DAILY BACKFILLING IS DELAYED, THE DISTURBED AREA WILL BE GRADED TO FINAL CONTOURS, APPROPRIATE TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES/FACILITIES WILL BE INSTALLED, AND THE AREAS SEEDED AND MULCHED WITHIN THE NEXT TWO CALENDAR DAYS.

BMP MAINTENANCE

THE CONTRACTOR WILL BE RESPONSIBLE FOR THE PROPER CONSTRUCTION STABILIZATION, AND MAINTENANCE OF ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES AND RELATED ITEMS INCLUDED WITHIN THIS PLAN. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR THE PROPER CONSTRUCTION AND STABILIZATION OF PERMANENT CONTROL MEASURES AND RELATED ITEMS INCLUDED WITHIN THIS PLAN.

DURING CONSTRUCTION THE CONTRACTOR IS RESPONSIBLE FOR PERFORMING INSPECTIONS OF THE BMPS AFTER EACH RUNOFF EVENT AS WELL AS ON A WEEKLY BASIS. THE CONTRACTOR SHALL KEEP A LOG OF ALL INSPECTIONS AND MAINTENANCE PERFORMED ON THE BMPS

THE OWNER WILL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL PERMANENT CONTROL MEASURES.

SOIL SEDIMENT REMOVED FROM ANY TEMPORARY CONTROL MEASURE DURING REGULAR MAINTENANCE WILL BE INCORPORATED BACK INTO THE EARTHWORK AS FILL ON THE SITE. SOIL SEDIMENT MATERIAL SHALL BE DISTRIBUTED ON-SITE WITHOUT CHANGING DRAINAGE PATTERNS DURING A SPECIFIC CONSTRUCTION STAGE.

SILT FENCE AND ROCK FILTERS WILL BE INSPECTED ONCE A WEEK OR AFTER EVERY STORM EVENT, WHICHEVER COMES FIRST. ANY NECESSARY REPAIRS WILL BE MADE IMMEDIATELY. ACCUMULATED SEDIMENTS WILL BE REMOVED AS REQUIRED TO KEEP THE FENCE FUNCTIONAL. DEPOSITS WILL BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE/ FILTER. UNDERCUTTING OR EROSION OF THE TOE ANCHOR OF THE SILT FENCE WILL BE REPLACED IMMEDIATELY WITH ROCK FILTER OUTLETS. ANY MANUFACTURER'S RECOMMENDATIONS WILL BE ADHERED TO FOR REPLACING SILT FENCE DUE TO WEATHERING.

THE CONSTRUCTION ENTRANCE WILL BE INSPECTED AT THE END OF EACH WORK DAY. THE THICKNESS WILL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSION BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL WILL BE MAINTAINED ON THE SITE FOR THIS PURPOSE.

AT THE END OF EACH CONSTRUCTION DAY, ANY SEDIMENT DEPOSITED ON PUBLIC ROADWAYS, WILL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE. WASHING OF THE ROADWAY WITH WATER WILL NOT BE PERMITTED.

LIMITING EXPOSED EXTENT AND DURATION OF DISTURBED AREAS

THE INITIAL PHASE OF THE PROPOSED PROJECT CONSISTS OF ESTABLISHING THE SOIL EROSION CONTROL MEASURES IN A SEQUENCE APPROPRIATE TOWARD LIMITING SOIL EROSION. THE EXTENT OF DISTURBED LAND HAS BEEN LIMITED TO INCLUDE ONLY THOSE AREAS REQUIRED FOR THE DEVELOPMENT OF THE SUBJECT SITE. ALL SEDIMENT AND EROSION CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED. UPON COMPLETION OR TEMPORARY CESSATION OF THE EARTH DISTURBANCE ACTIVITY, OR ANY STAGE THEREOF, THE PROJECT SITE SHALL BE IMMEDIATELY STABILIZED. THE SEQUENCE OF CONSTRUCTION ACTIVITIES IS OUTLINED IN THE SEQUENCE OF CONSTRUCTION CONTAINED HEREIN AND ON THE DRAWINGS.

PROTECTION OF EXISTING DRAINAGE FEATURES AND VEGETATION

THE PROJECT PROPOSES TO MINIMIZE DISTURBANCE TO THE EXISTING VEGETATION AT THE SITE BY ONLY PROPOSING DISTURBANCE IN THE AREA WHERE NEEDED. THE SITE VEGETATION PROPOSED FOR DISTURBANCE IS MAINLY SCRUB VEGETATION AND VINES WHICH ARE CURRENTLY DETRIMENTAL TO THE LARGE TREES ON THE SOUTHERN PROPERTY LINE.

MINIMIZE SOIL COMPACTION

THE PROJECT DESIGN LIMITS THE BULK/ MASS EARTHWORK TO BE PERFORMED AS MUCH AS POSSIBLE. ADDITIONALLY, SOIL COMPACTION WILL NOT BE REQUIRED OTHER THAN IN PROPOSED IMPERVIOUS AREAS.

FEATURES AND MEASURES TO MINIMIZE STORMWATER RUNOFF

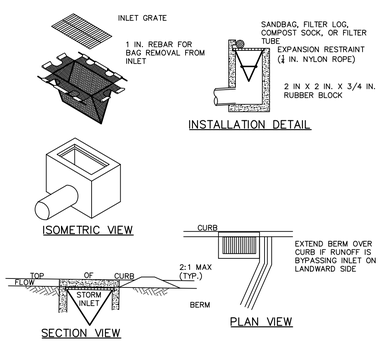
TEMPORARY STABILIZATION: UPON COMPLETION OR TEMPORARY CESSATION OF THE EARTH DISTURBANCE ACTIVITY, OR ANY STAGE THEREOF, THE PROJECT SITE SHALL BE IMMEDIATELY STABILIZED. THE DISTURBED AREAS WILL ALSO BE MULCHED WITH UNROTTED STRAW OR SALT HAY. TEMPORARY STABILIZATION MEASURES ARE SPECIFIED ON SOIL EROSION AND SEDIMENT POLLUTION CONTROL DETAIL PLANS.

PERMANENT STABILIZATION: ALL SLOPES AND DISTURBED AREAS SHALL BE STABILIZED WITH PERMANENT SEEDING AND LANDSCAPING AS SOON AS POSSIBLE AFTER THE FINAL EARTHMOVING AND CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED. AREAS THAT ARE PROPOSED TO HAVE SPECIFIC LINING SHALL BE STABILIZED WITH THE SPECIFIED LINING AS SOON AS THE EARTHMOVING AND CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED. TEMPORARY SOIL EROSION CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL A UNIFORM EROSION RESISTANT PERENNIAL VEGETATIVE COVER OF THE DISTURBED AREA IS ESTABLISHED. PERMANENT STABILIZATION MEASURES ARE SPECIFIED ON THE EROSION AND SEDIMENT POLLUTION CONTROL DETAIL PLANS.

SOLIDS SEPARATION: PRIOR TO ANY SITE DISTURBANCE OR CONSTRUCTION ACTIVITIES, A GRAVEL BUFFER WILL BE INSTALLED AT THE EXISTING DRIVEWAYS TO SERVE AS A CONSTRUCTION ENTRANCE. IN ADDITION, FILTER FABRIC FENCING WILL BE INSTALLED AROUND THE PROJECT AREA, DOWNGRADIENT FROM ANY DISTURBANCE, TO PREVENT SEDIMENT FROM LEAVING THE SITE. FILTER FABRIC SILT FENCING WILL BE CONSTRUCTED AND WILL REMAIN OPERATIONAL UNTIL PERMANENT CONTROL MEASURES ARE IN PLACE.

RECYCLING/ DISPOSAL OF MATERIALS
THE CONSTRUCTION WASTES ANTICIPATED INCLUDE DEMOLITION MATERIALS FROM THE BUILDING AND SITE DEMOLITION AND EXCESS BUILDING MATERIAL SUCH AS CONCRETE, WOOD, ETC.

ALL BUILDING MATERIAL AND WASTES MUST BE REMOVED FROM THE SITE AND RECYCLED IN ACCORDANCE WITH DEP'S SOLID WASTE REGULATIONS (25 PA CODE 260.1 ET SEQ., 271.1 ET SEQ., AND 287.1 ET SEQ.), AND/OR ANY ADDITIONAL LOCAL, STATE OR FEDERAL REGULATIONS. NO BUILDING MATERIALS (USED OR UNUSED) OR WASTE MATERIALS SHALL BE BURNED, BURIED, DUMPED OR DISCHARGED AT THE SITE.



NOTES:

MAXIMUM DRAINAGE AREA = 1/2 ACRE.

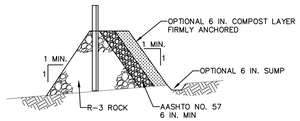
INLET PROTECTION SHALL NOT BE REQUIRED FOR INLET TRIBUTARY TO SEDIMENT BASIN OR TRAP. BERMS SHALL BE REQUIRED FOR ALL INSTALLATIONS.

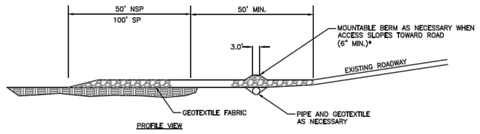
ROLLED EARTHEN BERM SHALL BE MAINTAINED UNTIL ROADWAY IS STONED. ROAD SUBBASE BERM SHALL BE MAINTAINED UNTIL ROADWAY IS PAVED. SIX INCH MINIMUM HEIGHT ASPHALT BERM SHALL BE MAINTAINED UNTIL ROADWAY SURFACE RECEIVES FINAL COAT.
AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS, A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.

INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE OF ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.

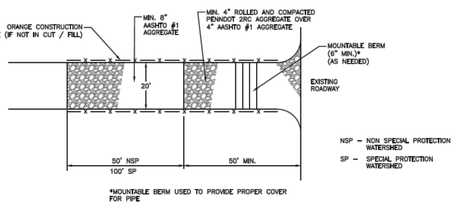
DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

STANDARD CONSTRUCTION DETAIL #4-15
FILTER BAG INLET PROTECTION - TYPE C INLET


OPTIONAL 6 IN. COMPOST LAYER FIRMLY ANCHORED
1 MI



PROFILE VIEW



*MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

PLAN VIEW

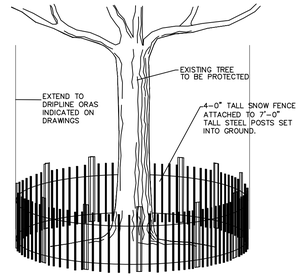
REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.

RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.

MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.

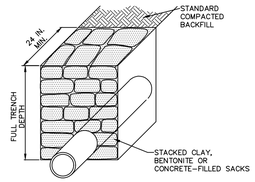
MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

ALTERNATIVE ROCK CONSTRUCTION ENTRANCE

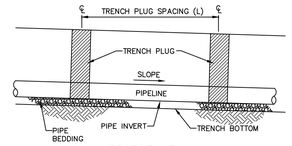


NOTES:
1) FENCE TO BE INSTALLED BEFORE WORK BEGINS. FENCE MUST REMAIN AND BE MAINTAINED THROUGH DURATION OF CONSTRUCTION.
2) ORANGE CONSTRUCTION FENCE MAY BE SUBSTITUTED FOR SNOW FENCE.

TREE PROTECTION FENCING DETAIL



SECTION VIEW



PROFILE VIEW

PA DEP EROSION CONTROL MANUAL TABLE 13.1
MAXIMUM SPACING AND MATERIALS FOR TRENCH PLUGS

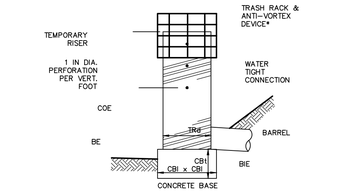
TRENCH SLOPE (%)	SPACING L (FT)	PLUG MATERIAL
< 5	1000	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
5 – 15	500	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
15 – 25	300	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
25 – 35	200	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
35 – 100	100	* CLAY, BENTONITE, OR CONCRETE FILLED SACKS
> 100	50	CEMENT BAGS (WETTED) OR MORTARED STONE

* TOPSOIL MAY NOT BE USED TO FILL SACKS

NOTES:

IMPERVIOUS TRENCH PLUGS ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND, OR OTHER WATER BODY CROSSINGS.

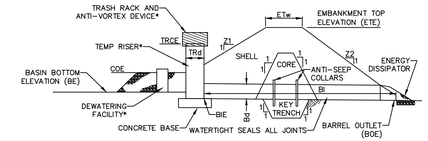
STANDARD CONSTRUCTION DETAIL #13-4
TRENCH PLUG INSTALLATION



* SEE STANDARD CONSTRUCTION DETAIL #7-5, TRASH RACK AND ANTI-VORTEX DEVICE
** LOWEST HOLE AT SEDIMENT CLEAN-OUT ELEVATION

TRAP NO.	TEMPORARY RISER				CONCRETE BASE			BARREL
	DIA TRd (IN)	CREST ELEV TRCE (FT)	MAT'L	CLEAN OUT ELEV. COE (FT)	LENGTH CBI (IN)	WIDTH CBw (IN)	THICK. CBt (IN)	INLET ELEV BIE (FT)
1	15	62.05	CMP	62.5	24	24	12	61.5

STANDARD CONSTRUCTION DETAIL #8-3
SEDIMENT TRAP TEMPORARY RISER



* ALSO REFER TO SEDIMENT BASIN TEMPORARY RISER, EMERGENCY SPILLWAY, ENERGY DISSIPATER, TRASH RACK AND ANTI-VORTEX DEVICE, AND SEDIMENT STORAGE DEWATERING FACILITY DETAILS.

BASIN NO.	Z1 (FT)	Z2 (FT)	TEMPORARY RISER			BARREL				
			DIA TRd (IN)	CREST ELEV TRCE (FT)	MAT'L	DIA Bd (IN)	INLEY ELEV BIE (FT)	MAT'L	LENGTH (FT)	OUTLET ELEV BOE (FT)
1	3	4	15	62.05	CMP	18	61.5	HDPE	52	61.24

EMBANKMENT				CLEANOUT ELEV COE (FT)	BOTTOM ELEV BE (FT)
TOP ELEV ETE (FT)	TOP WIDTH ETw (FT)	KEY TRENCH DEPTH (FT)	KEY TRENCH WIDTH (FT)		
64.5	10	3.0	8.0	62.5	61.5

NOTES:

SEDIMENT BASINS, INCLUDING ALL APPURTENANT WORKS, SHALL BE CONSTRUCTED TO THE DETAIL AND DIMENSIONS SHOWN ON THE E&S PLAN DRAWINGS.

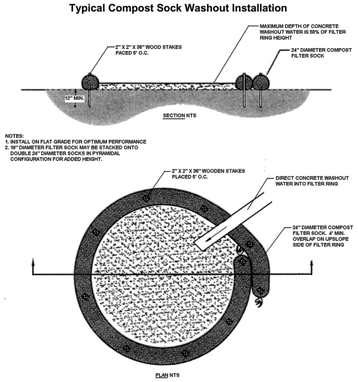
AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO A DEPTH OF TWO FEET PRIOR TO ANY PLACEMENT AND COMPACTION OF EARTHEN FILL. FILL MATERIAL FOR THE EMBANKMENTS SHALL BE FREE OF ROOTS, OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIALS. THE EMBANKMENT SHALL BE COMPACTED IN LAYERED LIFTS OF NOT MORE THAN 6 TO 9 IN. THE MAXIMUM ROCK SIZE SHALL BE NO GREATER THAN 2/3 THE LIFT THICKNESS. UPON COMPLETION, THE EMBANKMENT SHALL BE SEEDED AND MULCHED OR OTHERWISE STABILIZED ACCORDING TO THE SPECIFICATIONS OF THE E&S PLAN DRAWINGS. TREES SHALL NOT BE PLANTED ON THE EMBANKMENT.

ACCESS SHALL BE PROVIDED FOR SEDIMENT REMOVAL AND OTHER REQUIRED MAINTENANCE ACTIVITIES.

A CLEAN OUT STAKE SHALL BE PLACED NEAR THE CENTER OF EACH BASIN. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED THE CLEAN OUT ELEVATION ON THE STAKE AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS. DISPOSE OF MATERIALS REMOVED FROM THE BASIN IN THE MANNER DESCRIBED IN THE E&S PLAN.

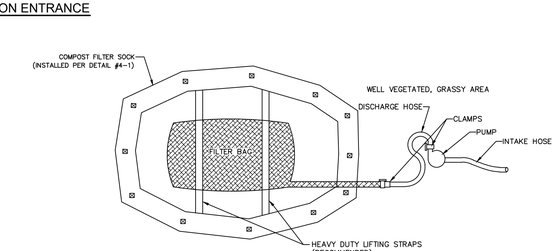
INSPECT ALL SEDIMENT BASINS ON AT LEAST A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. CHECK BASIN EMBANKMENTS, SPILLWAYS, AND OUTLETS FOR EROSION, PIPING AND SETTLEMENT. NECESSARY REPAIRS SHALL BE MADE IMMEDIATELY. DISPLACED RIPRAP WITHIN THE OUTLET ENERGY DISSIPATER SHALL BE REPLACED IMMEDIATELY. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISTURBED AREAS SHALL BE STABILIZED INSIDE THE BASIN BEFORE CONVERSION TO A STORMWATER MANAGEMENT FACILITY. THE DEVICE SHOWN IN STANDARD CONSTRUCTION DETAIL #7-16 MAY BE USED TO DEWATER SATURATED SEDIMENT PRIOR TO ITS REMOVAL. ROCK FILTERS SHALL BE ADDED AS NECESSARY.

STANDARD CONSTRUCTION DETAIL #7-6
SEDIMENT BASIN EMBANKMENT AND SPILLWAY DETAILS
PERFORATED RISER

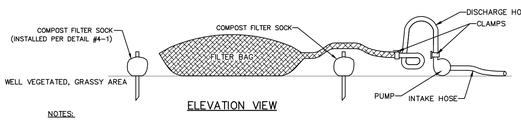


A suitable impervious geomembrane shall be placed at the location of the washout prior to installing the socks.
Adapted from Filtrexx

CONCRETE WASHOUT DETAIL



PLAN VIEW



ELEVATION VIEW

NOTES:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

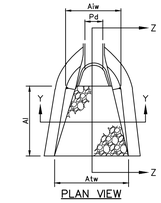
NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

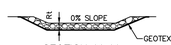
THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

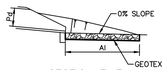
STANDARD CONSTRUCTION DETAIL #3-16
PUMPED WATER FILTER BAG
WITH COMPOST FILTER SOCK



PLAN VIEW



SECTION Y-Y



SECTION Z-Z

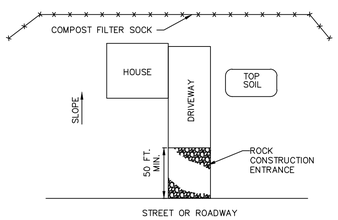
OUTLET NO.	PIPE DIA Pd (IN)	RIPRAP		APRON		
		SIZE R--	THICK. Rt (IN)	LENGTH Al (FT)	INITIAL WIDTH Aiw (FT)	TERMINAL WIDTH Atw (FT)
FES-1	18	4	27	25	4.50	5.33

NOTES:

ALL APRONS SHALL BE CONSTRUCTED TO THE DIMENSIONS SHOWN. TERMINAL WIDTHS SHALL BE ADJUSTED AS NECESSARY TO MATCH RECEIVING CHANNELS.

ALL APRONS SHALL BE INSPECTED AT LEAST WEEKLY AND AFTER EACH RUNOFF EVENT. DISPLACED RIPRAP WITHIN THE APRON SHALL BE REPLACED IMMEDIATELY.

STANDARD CONSTRUCTION DETAIL #9-1
RIPRAP APRON AT PIPE OUTLET
WITH FLARED END SECTION OR ENDWALL



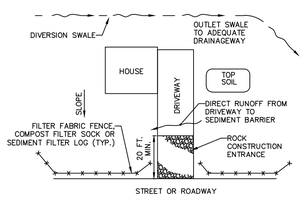
PLAN VIEW

NOTES:

THE AREA DOWNSLOPE OF THE COMPOST FILTER SOCK MAY NOT BE UNDER DEVELOPMENT OR OTHERWISE DISTURBED.

STANDARD CONSTRUCTION DETAIL #10-2
TYPICAL ON-LOT BMPs FOR LOT BELOW ROADWAY

NOT TO SCALE

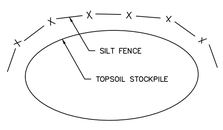


PLAN VIEW

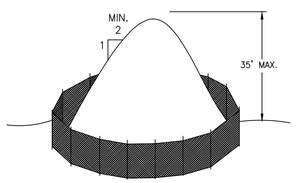
NOTES:

THE UPSLOPE DIVERSION CHANNEL SHOULD BE INSTALLED WHEREVER THE LOT EXTENDS MORE THAN 150 FEET ABOVE THE ROADWAY OR WHERE RUNOFF FORM AREAS ABOVE THE LOT IS NOT OTHERWISE DIVERTED AWAY FROM THE LOT. THE CHANNEL SHOULD BE PROPERLY SIZED AND PROVIDED WITH A SUITABLE PROTECTIVE LINING. THE DESIGNER AND/OR CONTRACTOR MUST EXERCISE CAUTION TO PROTECT ALL DOWNSTREAM PROPERTY OWNERS WHEN SELECTING A DISCHARGE POINT FOR THIS CHANNEL.

STANDARD CONSTRUCTION DETAIL #10-1
TYPICAL ON-LOT BMPs FOR LOT ABOVE ROADWAY



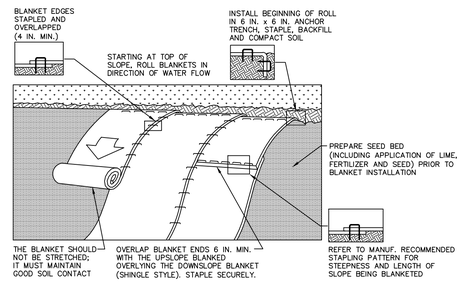
PLAN VIEW



PROFILE

SILT FENCE MUST BE PLACED DOWNSLOPE OF ALL STOCKPILES. IMMEDIATELY APPLY TEMPORARY SEEDING TO ALL STOCKPILES WHICH WILL REMAIN IN PLACE 20 DAYS OR MORE.

STOCKPILE AREA DETAIL



NOTES:

SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

STANDARD CONSTRUCTION DETAIL #11-1
EROSION CONTROL BLANKET INSTALLATION

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
HC holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR ALL EXCAVATIONS, AND 10 WORKING DAYS IN DESIGN STAGE -- STOP & CALL
Pennsylvania One Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT UTILITY COMPANIES PRIOR TO EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

EROSION AND SEDIMENT CONTROL DETAILS

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ROBERT THOMAS CUNNINGHAM PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C5.0_Erosion.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	N.T.S		
Designed	RC		
Sheet	16	of	21

Drawing No.
C5.2

PCSM LEGEND

- LIMIT OF DISTURBANCE
- TP-44 — INFILTRATION TEST / TEST PIT
- TP-43 — TEST PIT
- RAIN GARDEN BASIN
- SOIL TYPE BOUNDARY
- TrB — SOIL TYPE
- DRAINAGE AREA TO PCSM BMP
- PROTECTED SENSITIVE/SPECIAL VALUE FEATURES
- PROPOSED TREE
- PROJECT SITE BOUNDARY
- BMP 3.3 PROTECT EXISTING TREES

PROFESSIONAL ENGINEER'S CERTIFICATION

I, ROBERT T. CUNNINGHAM , ON THIS DATE _____, HEREBY CERTIFY THAT THE SWM SITE PLAN MEETS ALL DESIGN STANDARDS AND CRITERIA OF THE NESHAMINY CREEK WATERSHED ACT 167 STORMWATER MANAGEMENT ORDINANCE OR PLAN.

_____
ROBERT T. CUNNINGHAM, P.E.
PENNSYLVANIA LICENSE NO. PE076424

OWNER'S CERTIFICATION

I,_____, HEREBY ACKNOWLEDGE THAT ANY REVISION TO THE APPROVED SWM SITE PLAN MUST BE APPROVED BY THE TOWNSHIP AND THE A REVISED E&S PLAN MAY BE REQUIRED TO BY SUBMITTED TO THE CONSERVATION DISTRICT. I ALSO ACKNOWLEDGE THE STORMWATER BMPs AREA FIXTURES AND FINAL GRADING CAN NOT BE ALTERED OR REMOVED UNLESS APPROVED BY THE TOWNSHIP.

WITNESS OUR HAND AND SEAL THIS_____DAY OF_____, 202____.

_____
(SIGNATURE)

Soils Legend

Type	Name	Depth to Bedrock	Depth to Seasonal High Water Table	Floodplain Soil	HSG	Hydric Soil
Ha	Hatboro silt loam	60"-99"	0"-6"	No	B/D	Yes
DdA	Doylestown Silt Loam (0% to 3% slopes)	60"-72"	0"-6"	No	C/D	Yes
LkB	Lawrenceville silt loam (3% to 8% slopes)	48"-99"	18"-36"	No	C	No
UnB	Urban Land-duffield complex (0% to 8% slopes)	10"-100"	>80"	No	B	No

Limitations and Resolutions: The soils found within the project limits have varying limitations including possible shallow depth to groundwater and possible shallow depth to bedrock. In order to resolve the groundwater limitation, any standing water should be pumped through a sediment filter bag. To resolve the bedrock limitation, the contractor shall determine whether rock is rippable. If rock is not rippable, blasting will be required. All blasting shall meet all local, county, state and federal regulations.

GENERAL NOTES

1. EXISTING BOUNDARY AND TOPOGRAPHIC INFORMATION TAKEN FROM A SURVEY PREPARED BY CARROLL ENGINEERING CORPORATION DATED FEBRUARY 16, 2017.
2. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
3. UNDER PENNSYLVANIA LAW , THE CONTRACTOR IS REQUIRED TO NOTIFY THE PENNSYLVANIA ONE–CALL SYSTEM AT 1–800–242–1776 PRIOR TO THE START OF HIS WORK, SO THAT ALL THE VARIOUS UNDERGROUND UNTILITY OPERATORS WILL BE ABLE TO LOCATE THEIR OWN UTILITIES.
4. THERE ARE NO HQ OR EV WATERSHEDS LOCATED WITHIN THE PROJECT AREA.
5. THERE ARE NO RIPARIAN AREAS OR BUFFERS IDENTIFIED WITHIN THE PROJECT AREA OR OUTSIDE THE LIMIT OF DISTURBANCE. THEREFORE, RIPARIAN BUFFER OBLIGATIONS DO NOT APPLY TO THIS PROJECT.
6. THE EXISTING SITE IS NOT UNDERLAIN BY ANY NATURALLY OCCURRING GEOLOGIC FORMATIONS OR SOIL CONDITIONS WHICH COULD CAUSE POLLUTION DURING EARTH DISTURBANCE. THEREFORE, NO LOCATIONS ARE IDENTIFIED ON THIS PLAN AND NO DETAILS ARE PROVIDED FOR DISPOSAL OF SUCH MATERIAL.
7. THE STORMWATER FACILITIES SHOWN ON THE PLANS ARE A BASIC AND PERPETUAL PART OF THE STORMWATER MANAGEMENT SYSTEM OF THE PROPOSED SITE LOCATED IN BENSALEM TOWNSHIP, BUCKS COUNTY, , COMMONWEALTH OF PENNSYLVANIA, AND SUCH ARE TO BE PROTECTED AND PRESERVED IN ACCORDANCE WITH THE APPROVED FINAL PLANS BY THE OWNERS, THEIR SUCCESSORS AND ASSIGNS OF THESE LANDS. BENSALEM TOWNSHIP AND/OR ITS AGENTS RESERVE THE RIGHT AND PRIVILEGE TO ENTER UPPON THESE LANDS FROM TIME TO TIME FOR THE INSPECTION OF THESE FACILITIES IN ORDER TO DETERMINE THAT PROPER OPERATION AND MAINTENANCE AND THAT THE STRUCTURAL AND DESIGN INTEGRITY IS BEING MAINTAINED BY THE OWNER. THE STORMWATER FACILITIES AND FINAL GRADING SHOWN ON THESE PLANS MUST BE MAINTAINED AND KEPT IN GOOD WORKING ORDER.
8. AN AS–BUILT PLAN OF ALL STORMWATER BMPs IS REQUIRED UPON THE COMPLETION OF CONSTRUCTION OF THE PUBLIC IMPROVEMENTS.
9. THE STORMWATER O&M AGREEMENT MUST BE TRANSFERRED TO THE HOMEOWNER'S ASSOCIATION ONCE ESTABLISHED.

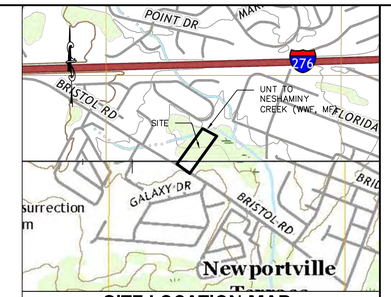
CRITICAL STAGES OF PCSM PLAN IMPLEMENTATION

THE INSTALLATION OF THE PROPOSED INFILTRATION BMP SHALL BE OVERSEEN BY A LICENCSED PROFESSIONAL ENGINEER OR THEIR DESIGNEE.

CONSTRUCTION SEQUENCE FOR PCSM BMPS

REFER TO THE POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS, SHEET 15, FOR CONSTRUCTION SEQUENCE.

PROJECT SITE BOUNDARY = 3.66 ACRES
LIMIT OF DISTURBANCE = 2.70 ACRES



SITE LOCATION MAP

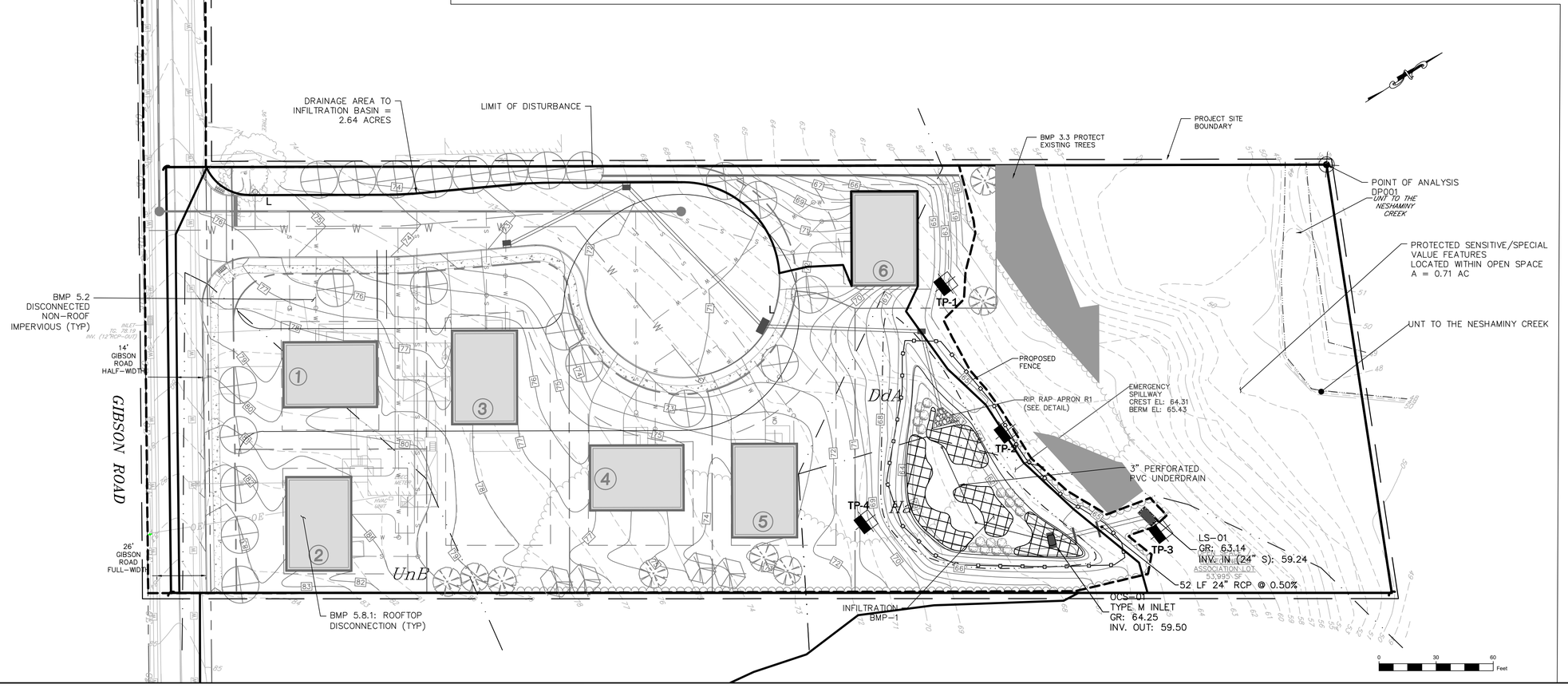
REFERENCE: BEVERLY, NJ-PA U.S.G.S. QUADRANGLE MAP — SCALE: 1"=1,000'

ACT 187 AS AMENDED

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.
TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL THE PENNSYLVANIA ONE CALL SYSTEM AT 1–800–242–1776. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
(3) WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
(10) WORKING DAYS IN DESIGN STAGE
— STOP & CALL —
Pennsylvania One Call System, Inc.
1–800–242–1776

OWNER / APPLICANT
GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA, 18901



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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C5.3_PCSM.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	1"=30'		
Designed	RC		
Sheet	17	of	21

Drawing No.
C5.3

SEEDING NOTES:

TEMPORARY SEEDING :

1. TEMPORARY SEEDING SHALL BE DONE IN AREAS WHERE NO ACTIVITY WORK WILL BE PERFORMED. ANY DISTURBED AREA ON WHICH ACTIVITY HAS CEASED MUST BE SEEDED AND MULCHED IMMEDIATELY.
2. DURING NON-GERMINATING PERIODS, ONLY MULCH MUST BE APPLIED AT THE RECOMMENDED RATES. AREAS MULCHED DURING THE NON-GERMINATING PERIODS, MUST BE LIMED, FERTILIZED, SEEDED, AND MULCHED IMMEDIATELY FOLLOWING THE END OF THE NON-GERMINATING PERIODS.
3. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE REDISTURBED WITHIN ONE (1) YEAR MAY BE SEEDED AND MULCHED WITH A QUICK GROWING TEMPORARY SEED MIXTURE.
4. DISTURBED AREAS WHICH ARE AT EITHER FINISHED GRADE OR WILL NOT BE DISTURBED AGAIN WITHIN ONE (1) YEAR MUST BE SEEDED WITH A PERMANENT SEED MIXTURE AND MULCHED.
5. TEMPORARY SEEDING STEPS:
   A. APPLY AGRICULTURAL LIMESTONE AT A RATE OF ONE (1) TON PER ACRE. (5 POUNDS PER, 1000 SQUARE FEET)
   B. APPLY FERTILIZER AT THE RATE OF 50-50-50 PER ACRE.
   C. WORK THE LIMESTONE AND FERTILIZER INTO THE SOIL.
   D. UTILIZING THE FOLLOWING SEEDING TYPES, RATES AND TIME SCHEDULE :

TEMPORARY SEEDING

SEASON	RATE	TYPE
MARCH 1 TO JUNE 15	1 LB./1000 SF	ANNUAL RYEGRASS
MAY 15 TO SEPT 15	1 LB./1000 SF	SUDAN GRASS
SEPT 15 TO OCT 15	168 LB./AC	WINTER RYE

   E. APPLY HAY OR STRAW MULCH (IN ACCORDANCE WITH SECTION NO. 4) AT A RATE OF THREE (3) TONS PER ACRE.
6. ALL SEED SHALL BE LABELED, DATED AND QUALITY CONSISTENT WITH SECTION NO. 2

PERMANENT SEEDING:

1. DISTURBED AREAS WHICH ARE EITHER AT FINISHED GRADE OR WILL NOT BE DISTURBED AGAIN WITHIN ONE (1) YEAR MUST BE SEEDED WITH A PERMANENT SEED MIXTURE AND MULCHED.
2. SEEDING SHALL BE DONE DURING PERIODS FROM APRIL 15TH TO OCTOBER PT, UNLESS OTHERWISE DIRECTED. IF SEEDING IS DONE AFTER OCTOBER 1ST, DORMANT SEED MUST BE USED AND DISTURBED AREAS MUST BE MULCHED.
3. DISTURBED FINAL GRADED AREAS AND DRAINAGE SWALES WILL BE PERMANENTLY SEEDED AS FOLLOWS:
   A. MINIMUM OF 4" OF TOPSOIL SHALL BE SPREAD OVER ALL AREAS TO BE SEEDED. TOPSOIL SHALL BE FREE OF STONES, STICKS, WASTE MATERIAL AND SIMILAR DEBRIS. FROZEN GROUND SHALL NOT BE SPREAD AS TOPSOIL AND TOPSOIL SHALL NOT BE SPREAD OVER FROZEN GROUND.
   B. A SOIL ANALYSIS IS RECOMMENDED, HOWEVER, IN LIEU OF AN ANALYSIS APPLY AGRICULTURAL LIMESTONE AND FERTILIZER AT RATES RECOMMENDED BELOW (OR AS SUGGESTED BY THE SOIL TEST RESULTS (ONE (1) TEST PER 25 ACRES)).
   C. THE LIMESTONE AND FERTILIZER SHALL BE WORKED INTO THE SOIL TO DEPTHS OF 3 TO 4 INCHES. D. GRASS SHALL NOT BE PLANTED AFTER HEAVY RAIN OR WATERING.
   D. ALL SEED USED SHALL BE LABELED IN ACCORDANCE WITH THE U.S. DEPARTMENT OF AGRICULTURE RULES AND REGULATIONS UNDER THE FEDERAL SEED ACT IN EFFECT AT THE TIME OF PURCHASE. INERT MATTER SHALL NOT EXCEED 15% AND BLUE TAG CERTIFIED SEED SHALL BE SUPPLIED WHEREVER POSSIBLE.
   E. SMOOTH AND FIRM SEED BED WITH CULTIPACKER OR SIMILAR EQUIPMENT PRIOR TO SEEDING. APPLY SEED UNIFORMLY BY BROADCASTING, DRILLING OR HYDRO SEEDING. COVER SEEDS WITH '/2" OF SOIL WITH SUITABLE EQUIPMENT.
   F. APPLY HAY OR STRAW MULCH (IN ACCORDANCE WITH SECTION NO. 4) AT A RATE OF THREE (3) TONS PER ACRE.

PERMANENT SEEDING FOR NORMAL MOWED LAWN AREAS:

SEASON	RATE	TYPE
MARCH 1 TO JUNE 1 & AUG 15 TO OCT 1 AND RED TOP 12%	2 LBS./1000 SF	KY31 TALL FESCUE
OCT 1 TO MARCH 1 & JUNE 1 TO AUG 1	2 LBS./1000 SF	RED TOP*

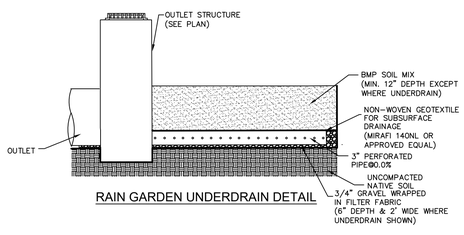
((*) USE DORMANT SEED, UNIFORMLY APPLIED, WORKING INTO A DEPTH OF 1/4 INCH. THE USE OF MULCH IS REQUIRED. THE USE OF NETTING OR EROSION CONTROL MATS MAY BE REQUIRED.)

PERMANENT SEEDING FOR SPECIAL AREAS
(SWALES, POND EMBANKMENTS, LEVEES, DIVERSION CHANNELS, ETC):

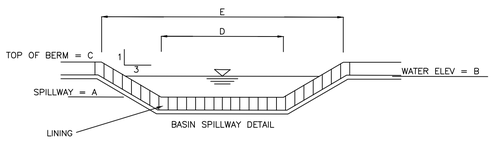
SEASON	RATE	TYPE
MARCH 1 TO JUNE 1 & AUG 15 TO OCT 1 AND RYEGRASS 20%	2 LBS./1000 SF	KY31 TALL FESCUE 80%

NOTE : SEEDING PERIODS AND SPECIFICATIONS MAY VARY DUE TO SITE CONDITIONS AND VARIANCES FROM THE TIME THIS REPORT IS WRITTEN AND APPROVED. IT MAY BE NECESSARY TO ADAPT SEED SPECIFICATION, VARIETIES, AND QUALITIES. FOR SPECIAL CONDITIONS CONSULT "GUIDELINE FOR RECLAMATION OF SEVERELY DISTURBED AREAS". PENNSYLVANIA STATE UNIVERSITY.

4. FERTILIZER : A SOIL ANALYSIS IS RECOMMENDED BUT IN LIEU OF AN ANALYSIS APPLY AGRICULTURAL LIMESTONE AT A RATE OF FOUR (4) TONS/ACRE AND 10-20-20 FERTILIZED AT A RATE OF 50 LBS. PER 1000 SF. THESE MATERIALS WILL BE UNIFORMLY APPLIED AND WORKED INTO THE TOPSOIL TO A DEPTH OF 3 TO 4 INCHES. IMMEDIATELY BEFORE SEEDING, A 1 0- 1 0- 10 FERTILIZER WILL BE WORKED INTO THE SURFACE AT A RATE OF 10 LBS. PER 1000 SF.
5. HYDRO SEEDING: LIME AND SEED SHALL BE AS SPECIFIED ABOVE, AND FERTILIZER SHALL BE APPLIED AT A RATE OF 40-80. CROWN VETCH SHALL BE INOCULATED AT FOUR TIMES THE MANUFACTURER'S RATE. SHOULD FERTILIZER BE APPLIED WITH THE INOCULANT, THE MIXTURE SHALL NOT REMAIN IN A SLURRY FOR MORE THAN ONE HOUR. WOOD CELLULOSE FIBER, APPLIED AT A RATE OF 35 LBS. PER 1000 SF, MAY BE APPLIED AS PART OF THE SLURRY IN LIEU OF MULCHING. SYNTHETIC MULCH BINDER, SUCH AS CURASOL, DCA-70, TERRE-TACK OR AN APPROVED EQUAL SHALL BE USED PER THE MANUFACTURER'S INSTRUCTIONS TO ANCHOR THE MULCH.
6. MULCHING: MULCHING SHALL BE APPLIED AS FOLLOWS:
   A. STRAW - SHALL BE ALL DRIED AND FREE FROM UNDESIRABLE SEEDS AND COURSE MATERIAL, APPLY AT A RATE OF 115 TO 150 LBS. PER 1000 SF OR 3 TONS PER ACRE. MULCHED AREAS SHALL BE CHECKED PERIODICALLY AND IMMEDIATELY AFTER STORMS AND WIND. DAMAGED OR MISSING MULCH SHALL BE REPLACED. A TACKIFIER APPLIED AFTER STRAW IS RECOMMENDED. TACKIFIER MAY BE ASPHALT OR POLYMER SPRAY. APPLY AT A RATE RECOMMENDED BY THE MANUFACTURER WITH SUITABLE EQUIPMENT. IN LIEU OF MANUFACTURERS RECOMMENDATIONS APPLY AT A RATE OF .04 TO .06 GALLONS PER SQUARE YARD.
   B. NETTING / EROSION CONTROL BLANKETS - THE USE AND INSTALLATION OF EROSION CONTROL BLANKETS OR NETTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION AND SHALL BE SELECTED FOR THE PROPER APPLICATION AND CONDITIONS.



RAIN GARDEN UNDERDRAIN DETAIL



BASIN	A	B	C	D	E	VELOCITY	LINING
	(FT)	(FT)	(FT)	(FT)	(FT)	(FPS)	TYPE
1	64.30	64.42	65.42	80.00	86.72	0.89	JUTE MATTING

NOTE:
1. BASIN OUTLET PIPES SHALL BE CONTRUCTED WITH WATER TIGHT JOINTS.
2. BASIN BERM TO BE PLACED IN 8 INCH LIFTS AND COMPACTED TO 95% OF MODIFIED DRY DENSITY AS ESTABLISHED BY ASTMD-1557 PRIOR TO PROCEEDING TO THE NEXT LIFT.
3. SPILLWAY LINING TO BE PLACED FROM 1' INSIDE BASIN TO TOE OF SLOPE OUTSIDE OF BASIN.

RAIN GARDEN SPILLWAY DETAIL

BMP MAINTENANCE PLAN
NOTE: AN ANNUAL REPORT SHALL BE PREPARED AND RETAINED BY THE RESPONSIBLE PARTY STATING THE FOLLOWING MAINTENANCE HAS BEEN PERFORMED.

THE HOMEOWNERS ASSOCIATION IS RESPONSIBLE FOR MAINTENANCE OF THE STORMWATER CONVEYANCE SYSTEM, AND ALL OTHER PROPOSED BMP'S.

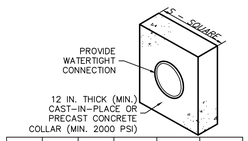
STORMWATER CONVEYANCE SYSTEM

- CATCH BASINS, MANHOLES AND PIPES TO BE INSPECTED FOR CLOGGING AND EXCESSIVE DEBRIS AND SEDIMENT ACCUMULATION AT LEAST ANNUALLY AS WELL AS AFTER EVERY STORM EXCEEDING 1-INCH OF RAINFALL.
- ALL STRUCTURAL COMPONENTS MUST BE INSPECTED FOR CRACKING, SUBSIDENCE, BREACHING, WEARING, AND DETERIORATION AT LEAST ANNUALLY.

RAIN GARDEN BASIN

- RAIN GARDEN BASIN SHOULD BE INSPECTED FOR CLOGGING AND EXCESSIVE DEBRIS AND SEDIMENT ACCUMULATION AT LEAST ANNUALLY AS WELL AS AFTER EVERY STORM EXCEEDING 1-INCH OF RAINFALL.
- WHILE VEGETATION IS BEING ESTABLISHED, PRUNING AND WEEDING MAY BE REQUIRED.
- DETRITUS MAY ALSO NEED TO BE REMOVED EVERY YEAR. PERENNIAL PLANTINGS MAY BE CUT DOWN AT THE END OF THE GROWING SEASON.
- THE RAIN GARDEN BASIN SHOULD BE INSPECTED AT LEAST TWO TIMES PER YEAR FOR SEDIMENT BUILDUP, EROSION, VEGETATIVE CONDITIONS, ETC.
- DURING PERIODS OF EXTENDED DROUGHT, THE RAIN GARDEN MAY REQUIRE WATERING.
- TREES AND SHRUBS SHOULD BE INSPECTED TWICE PER YEAR TO EVALUATE HEALTH.
- ALL RAIN GARDEN BASIN STRUCTURES EXPECTED TO RECEIVE AND/OR TRAP DEBRIS AND SEDIMENT SHOULD BE INSPECTED FOR CLOGGING AND EXCESSIVE DEBRIS AND SEDIMENT ACCUMULATION AT LEAST FOUR TIMES PER YEAR, AS WELL AS AFTER EVERY STORM GREATER THAN 1 INCH.
- MOWING AND/OR TRIMMING OF VEGETATION SHOULD BE PERFORMED AS NECESSARY TO SUSTAIN THE SYSTEM, BUT ALL DETRITUS SHOULD BE REMOVED FROM THE RAIN GARDEN BASIN.
- VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR EROSION.
- VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR UNWANTED GROWTH OF EXOTIC/INVASIVE SPECIES.
- VEGETATIVE COVER SHOULD BE MAINTAINED AT A MINIMUM OF 95 PERCENT. IF VEGETATIVE COVER HAS BEEN REDUCED BY 10%, VEGETATION SHOULD BE REESTABLISHED.

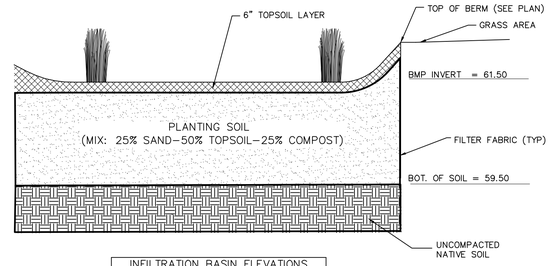
RAIN GARDEN LANDSCAPE MAINTENANCE
THIS RAIN GARDEN IS DESIGNED TO BECOME NATURALIZED OVER TIME AND WILL REQUIRE LESS MAINTENANCE AS TIME GOES ON.
MOWING - ESTABLISH AND MAINTAIN A NO-MOW ZONE THAT ENCOMPASSES THE RAIN GARDEN FLOOR AND SIDE SLOPES. MOW THE NO-MOW ZONE 1X/YEAR TO A MINIMUM HEIGHT OF 6". (ANNUALLY IN LATE APRIL/ EARLY MAY). RAKE MOWN MATERIAL AND COMPOST OR DISPOSE OF OFF SITE.
INSPECTIONS - INSPECT BASIN AND NO-MOW ZONES FOR INVASIVE SPECIES SUCH AS PURPLE LOOSESTRIFE, PHRAGMITES, HONEYSUCKLE, ETC. (ANNUALLY IN JULY)
CLEANING - REMOVE TRASH AND DEBRIS (JANUARY & APRIL)



BASIN OR TRAP NO.	PIPE SIZE (IN)	S (IN)	NO. OF COLLARS	RISER TO FIRST COLLAR (FT)	COLLAR SPACING (FT)
1	18	66	2	5.97	12.92

NOTES:
1. ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATERTIGHT.
2. COLLAR SIZE AND SPACING SHALL BE AS INDICATED WITHIN TABLE.
3. ANTI-SEE COLLARS SHALL NOT BE LOCATED CLOSER THAN 2 FEET TO A PIPE JOINT.

STANDARD CONSTRUCTION DETAIL #7-16
CONCRETE ANTI-SEEP COLLAR FOR PERMANENT BASINS OR TRAPS



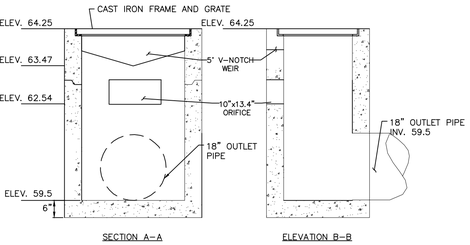
INFILTRATION BASIN ELEVATIONS		
#	BMP INVERT	BOTTOM OF SOIL
1	61.50	59.50

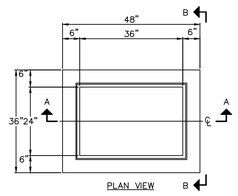
RAIN GARDEN BASIN DETAIL

CONSTRUCTION SEQUENCE FOR PCSM BMPS

SITE SPECIFIC CONSTRUCTION SEQUENCE
1. REFER TO SHEET C6.2 FOR CONSTRUCTION SEQUENCE.
2. ONCE ALL UPSTREAM MEASURES FOR THE BMP HAVE BEEN STABILIZED, THE INDIVIDUAL BMP MAY BE CONSTRUCTED PER THE SEQUENCES IDENTIFIED BELOW.

RAIN GARDEN BASIN CONSTRUCTION SEQUENCE
1. IF ANY UNFAVORABLE CONDITIONS ARE ENCOUNTERED DURING THE INSTALLATION OF THE RAIN GARDENS (I.E. GROUNDWATER AND/OR BEDROCK PINNACLES OF CARBONATE BEDROCK, ETC.), THE OWNER/ENGINEER SHOULD BE NOTIFIED IMMEDIATELY SINCE THE PROPOSED RAIN GARDENS MAY NEED TO BE RELOCATED TO A MORE SUITABLE LOCATION ON THE PROPERTY.
2. INSTALL TEMPORARY SEDIMENT CONTROL BMPS AS SHOWN ON THE PLANS.
3. EXISTING SUB-GRADE IN BIOINFILTRATION AREAS SHALL NOT BE COMPACTED OR SUBJECTED TO EXCESSIVE CONSRUCTION EQUIPMENT TRAFFIC.
4. INITIAL EXCAVATION CAN BE PERFORMED DURING ROUGH SITE GRADING BUT SHALL NOT BE CARRIED TO WITHIN ONE FEET OF THE FINAL BOTTOM ELEVATION. FINAL EXCAVATION SHOULD NOT TAKE PLACE UNTIL ALL DISTURBED AREAS IN THE DRAINAGE AREA HAVE BEEN STABILIZED. RAIN GARDEN BED AREAS MAY BE USED AS TEMPORARY SEDIMENT FACILITIES PROVIDED THAT THE PROPOSED FINISH ELEVATION OF THE BED IS 12 INCHES LOWER THAN THE BOTTOM ELEVATION OF THE SEDIMENT TRAP. IF SEDIMENT FACILITIES ARE LOCATED WITHIN 12 INCHES OF BMP ELEVATION, CONTRACTOR SHALL EXCAVATE MATERIAL TO A DEPTH 36 INCHES BELOW FINAL GRADE AND REPLACE WILL 12 INCHES OF CLEAN, LIGHTLY COMPACTED SOIL PRIOR TO PLACING PLANTING SOIL.
5. WHERE EROSION OF SUB-GRADE HAS CAUSED ACCUMULATION OF FINE MATERIALS AND/OR SURFACE PONDING IN THE GRADED BOTTOM, THIS MATERIAL SHALL BE REMOVED WITH LIGHT EQUIPMENT AND THE UNDERLYING SOILS SCARIFIED TO A MINIMUM DEPTH OF 6 INCHES WITH A YORK RAKE OR EQUIVALENT BY LIGHT TRACTOR.
6. BRING SUBGRADE OF BIOINFILTRATION AREA TO LINE, GRADE AND ELEVATIONS INDICATED. FILL AND LIGHTLY REGRADE ANY AREAS DAMAGED BY EROSION, PONDING OR TRAFFIC.
7. UPON COMPLETION OF THE SUBGRADE WORK, THE ENGINEER SHALL BE NOTIFIED AND SHALL INSPECT AT THE ENGINEER'S DISCRETION BEFORE PROCEEDING WITH INSTALLATION.
8. PLANTING SOIL SHALL BE PLACED IMMEDIATELY AFTER APPROVAL OF SUBGRADE. ANY ACCUMULATION OF DEBRIS OR SEDIMENT THAT TAKES PLACE AFTER APPROVAL OF SUBGRADE SHALL BE REMOVED PRIOR TO INSTALLATION OF PLANTING SOIL AT NO EXTRA COST TO THE OWNER.
9. INSTALL PLANTING SOIL IN 18 INCH MAXIMUM LIFTS AND LIGHTLY COMPACT (TAMP WITH BACKHOE OR BY HAND). KEEP EQUIPMENT MOVING TO A MINIMUM. DO NOT OVER COMPACT. INSTALL PLANTING SOIL TO GRADES SHOWN ON PLANS.
10. PLANT TREES AND SHRUBS ACCORDING TO RAIN GARDEN DETAILS AND NOTES.
11. PROTECT RAIN GARDENS FROM SEDIMENT AT ALL TIMES. HAYBALES, DIVERSION BERMS AND/OR OTHER APPROPRIATE MEASURES SHALL BE USED AT THE TOE OF THE SLOPES THAT ARE ADJACENT TO THE RAIN GARDENS TO PREVENT SEDIMENT FROM WASHING INTO THESE AREAS DURING SITE DEVELOPMENT.
12. WHEN SITE IS FULLY VEGETATED AND THE SOIL MANTLE IS STABILIZED THE PLAN DESIGNER SHALL BE NOTIFIED AND SHALL INSPECT THE RAIN GARDEN DRAINAGE AREA AT THE ENGINEER'S DISCRETION BEFORE THE AREA IS BROUGHT ONLINE AND SEDIMENT CONTROL DEVICES REMOVED.
13. CONTINUOUS MOISTURE FOR 4-6 WEEKS MUST BE INSURED TO ALLOW PROPER GERMINATION, IF RAIN DOES NOT OCCUR CONTRACTOR SHALL PROVIDE SUPPLEMENTAL IRRIGATION TO NEWLY SEEDED AREAS PER INSTRUCTIONS INCLUDED IN SEEDING SPECIFICATION.





NOTES:
1. OUTLET STRUCTURES SHALL BE AS DETAILED IN PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION, CURRENT EDITION (PDT PUB #72M) RC-34M, "INLETS, CONCRETE TOP UNITS CAST-IN-PLACE AND PRECAST".
2. STEPS SHALL BE PROVIDED WHENEVER STRUCTURE EXCEEDS 4 FEET IN DEPTH.
3. THE CONTRACTOR SHALL PROVIDE CUT SHEETS TO ENGINEER TO REVIEW PRIOR TO CONSTRUCTION.

RAIN GARDEN OUTLET STRUCTURE DETAIL

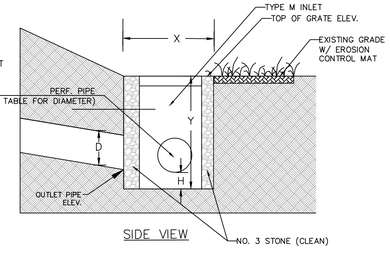
MINIMIZE IMPERVIOUS AREAS
THE PROJECT HAS LIMITED IMPERVIOUS AREAS PROPOSED TO THE MAXIMUM EXTENT POSSIBLE. THE SITE PLAN HAS CLUSTERED THE DEVELOPMENT TO REDUCE THE EXTENT OF PROPOSED ROADWAYS AND THE DRIVEWAYS ARE THE MINIMUM ACCEPTABLE LENGTH.

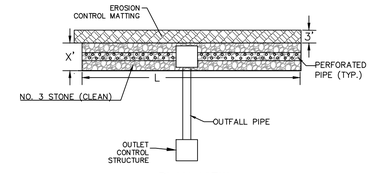
PROTECTION OF EXISTING DRAINAGE FEATURES AND VEGETATION
THE LIMIT OF DISTURBANCE IS MINIMIZED TO REDUCE THE DISTURBANCE TO THE EXISTING FEATURES. THE EXISTING VEGETATION AROUND THE PERIMETER OF THE SITE IS TO REMAIN TO THE MAXIMUM EXTENT POSSIBLE. THERE IS NO PROPOSED DISTURBANCE TO DRAINAGE FEATURES.

MINIMIZE LAND CLEARING
THE PROJECT HAS LIMITED THE SOIL DISTURBANCE AREA TO THE MAXIMUM EXTENT POSSIBLE AND LAND CLEARING IS LIMITED TO THE AREAS SHOWN ON THE PLAN.

STRUCTURAL AND NON-STRUCTURAL BMPS TO DECREASE STORRMWATER RUNOFF
RE-VEGETATE DISTURBED AREAS: ALL DISTURBED AREAS WILL BE PERMANENTLY SEEDED OR LANDSCAPED. ADDITIONALLY, NEW TREES WILL BE PLANTED THROUGH THE SITE TO REDUCE THE THERMAL IMPACTS OF IMPERVIOUS SURFACES AND REDUCE RUNOFF VOLUME THROUGH TRANSPIRATION.

ROOFTOP DISCONNECTION: DISCONNECTING ROOF LEADERS FROM CONVENTIONAL STORMWATER CONVEYANCE SYSTEMS ALLOWS ROOFTOP RUNOFF TO BE COLLECTED AND MANAGED ON SITE. ROOFTOP RUNOFF CAN BE DIRECTED TO DESIGNATED AREAS FOR ON-SITE STORAGE, TREATMENT AND VOLUME CONTROL. THE PROPOSED ROOF LEADERS FOR EACH DWELLING UNIT WILL DISCHARGE TO VEGETATED AREAS.





SWF OUTFALL	L	D	OUTFALL PIPE ELEV.	TOP OF GRATE ELEV.	PERF. PIPE DIAMETER	H	Y	X
#	FT	IN	--	--	IN	FT	FT	FT
001	10	18	59.24	63.14	18	0.50	3.00	5.00

LEVEL SPEADER

CONSTRUCTION SEQUENCE FOR LEVEL SPREADER:
1. INSTALL AND MAINTAIN PROPER EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION AS PER THE PENNSYLVANIA EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL (MARCH 2000, OR LATEST EDITION).
2. EXCAVATE LEVEL SPREADER BOTTOM TO A UNIFORM, LEVEL SUBGRADE FREE FROM ROCKS AND DEBRIS. EXCAVATION EQUIPMENT SHOULD BE PLACED OUTSIDE THE LIMITS OF THE LEVEL SPREADER.
3. COMPLETELY WRAP LEVEL SPREADER WITH NONWOVEN GEOTEXTILE. (IF SEDIMENT AND/OR DEBRIS HAVE ACCUMULATED IN LEVEL SPREADER BOTTOM, REMOVE PRIOR TO GEOTEXTILE PLACEMENT.) GEOTEXTILE ROLLS SHOULD OVERLAP BY A MINIMUM OF 24 INCHES WITHIN THE TRENCH. FOLD BACK AND/OR CUT EXCESS GEOTEXTILE DURING STONE PLACEMENT.
4. INSTALL CONTINUOUSLY PERFORATED PIPE, OBSERVATION WELLS/INLETS, AND ALL OTHER LEVEL SPREADER STRUCTURES. CONNECT INCOMING PIPES TO STRUCTURES AS INDICATED ON PLANS.
5. PLACE UNIFORMLY GRADED, CLEAN-WASHED AGGREGATE IN 6-INCH LIFTS, LIGHTLY COMPACTING BETWEEN LIFTS.
6. INSTALL EROSION CONTROL BLANKET DOWNSTREAM OF LEVEL SPREADER AND SECURE AS PER MANUFACTURER'S RECOMMENDATIONS.
7. DO NOT REMOVE EROSION AND SEDIMENT CONTROL MEASURES UNTIL SITE IS FULLY STABILIZED.

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net
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REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR EXCAVATION, EXCEPT FOR 10 WORKING DAYS IN DESIGN STAGE
— STOP & CALL —
Pennsylvania One Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND MUST BE VERIFIED BY THE CONTRACTOR, PER PA. ACT 187 TO AVOID DAMAGE OR DELAY DURING EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT THOMAS CUNNINGHAM
Expires 9/30/2022
PE-076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C5.3_PCSM.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	N.T.S		
Designed	RC		
Sheet	18	of	21

Drawing No.
C5.4

LANDSCAPE REQUIREMENTS CHART - BENSALEM TOWNSHIP

Subdivision Ordinance Item	Requirement	Plan Proposed
S.O. 201-10(c)(2) Planting - Street Trees	Street trees shall be planted at intervals of no more than 20 feet; planted outside of right-of-way Gibson Road: 224 - 60 (right-of way area) = 164' 164/40 = 5 trees Internal Road: 710' 670/20 = 17 trees	5 Shade Trees 0 Existing Tree 17 Shade Trees
S.O. 201-10(c)(10) Lot Trees	Any subdivision or land development requires two (2) trees per dwelling unit. 6dwelling units 6 x 2 = 12 trees	8 Ornamental Trees 4 Evergreen Trees
SWM 196-62 Stormwater Management; Grading and Landscaping	All detention basins side slopes and bottom shall be seeded with appropriate seed mixture. A suitable naturalized, native plant screening shall be provided around all detention basins.	520 Grasses (Plugs) 3 Shade Trees 4 Ornamental Trees 17 Shrubs
Total	Total Landscape Proposed	25 Shade Trees 12 Ornamental Trees 4 Evergreen Trees 17 Shrubs 520 Perennials

LUMINAIRE SCHEDULE - AMERICAN ELECTRIC LIGHTING - American Revolution LED - 247L

Symbol	Label	Qty	Catalog Number	Description	File	Lumens per Lamp	LLF	Watts	Mounting Ht.
●	L	2	247L 20LEDE70 XXXX 4K R2 AY HSB	247L American Revolution LED with R2 distribution, Acrylic Optics, House Side Shield, Black	247L 20LEDE70 _XXXX_4K_R2 _AY_HSB.ies	Absolute	1.0	45	12'

PLANT SCHEDULE

Plan Symbol	Quantity	Botanical Name	Common Name	Min. Planting Caliper/ Height	Remarks	Comments
Shade Trees						
GB	9	*Ginkgo biloba 'Princeton Sentry'*	Princeton Sentry' Ginkgo	2 1/2" cal.	B&B	Full, straight leader
TC	6	*Tilia cordata 'Greenspire'*	Greenspire' Littleleaf Linden	2 1/2" cal.	B&B	Full, straight leader
TD	3	*Taxodium distichum*	Bald Cypress	2 1/2" cal.	B&B	Full, straight leader
ZS	7	*Zelkova serrata*	Japanese Zelkova	2 1/2" cal.	B&B	Full, straight leader
Evergreen Trees						
PS	4	*Pinus strobus*	White Pine	6'	B&B	Symmetrical, branched to ground
Ornamental Trees						
AC	5	*Amelanchier canadensis*	Serviceberry	8'	B&B	Single-stem
CC	3	*Cercis canadensis 'Forest Pansy'*	'Forest Pansy' Redbud	2 1/2" cal.	B&B	Full specimen
CV	2	*Chionanthus virginicus*	White Fringetree	2 1/2" cal.	B&B	Full specimen
MV	2	*Magnolia virginiana*	Sweetbay Magnolia	2 1/2" cal.	B&B	Multi-stem, min. 5 stems
Shrubs						
CS	12	*Cornus sericea*	Red Twig Dogwood	24-30"	CONT	Heavy, full specimen
IV	5	*Ilex verticillata*	Winterberry	24-30"	CONT	Heavy, full specimen
Perennials						
PV	520	*Panicum virgatum 'Shenandoah'*	Shenandoah' Switchgrass	-	plug	Plant 24" on center

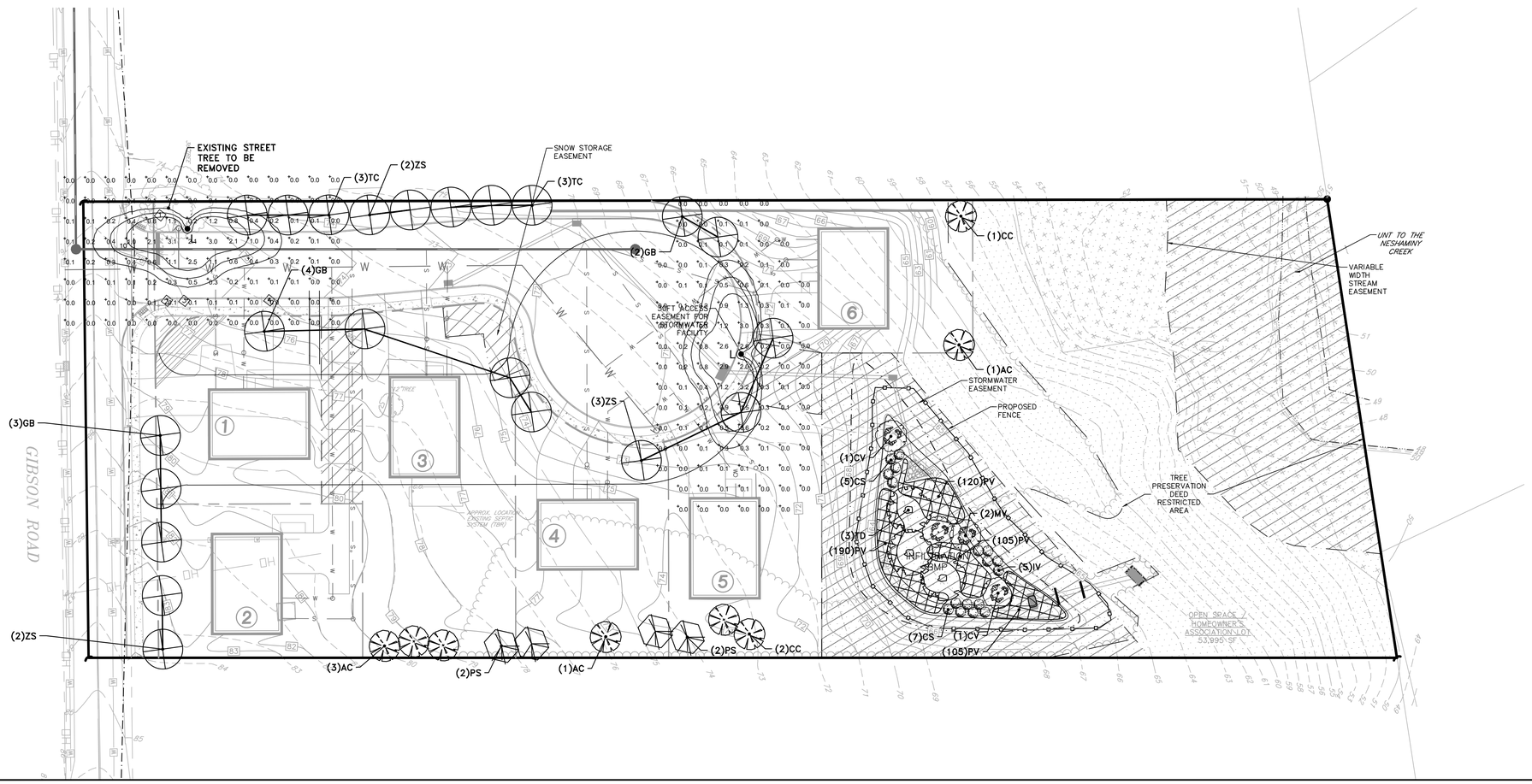
LANDSCAPE LEGEND

Street Tree

Lot Landscape

Detention Basin Planting

LIGHTING TEMPLATE



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1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

LANDSCAPE AND LIGHTING PLAN

RACHEL S. VAHEY, RLA
PA LIC. NO LA001672

File No.
1608_C6.0_Landscape.DWG

HCE Job	1608		
Date	5/27/2021		
Scale	1"=30'	Designed	RC
Sheet	19 of 21		

Drawing No.
C6.0

GENERAL LANDSCAPE PLANTING NOTES:

PLANTING MATERIALS

1. NAMES OF PLANTS AS DESCRIBED ON THIS PLAN CONFORM TO THOSE GIVEN IN "STANDARDIZED PLANT NAMES", 1942 EDITION PREPARED BY THE AMERICAN JOINT COMMITTEE ON HORTICULTURAL NOMENCLATURE. NAMES OF PLANT VARIETIES NOT INCLUDED THEREIN CONFORM TO NAMES GENERALLY ACCEPTED IN NURSERY TRADE.
2. STANDARDS FOR TYPE, SPREAD, HEIGHT, ROOT BALL AND QUALITY OF NEW PLANT MATERIAL SHALL BE IN ACCORDANCE WITH GUIDELINES AS SET FORTH IN THE "AMERICAN STANDARD FOR NURSERY STOCK", PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN. PLANT MATERIAL SHALL HAVE NORMAL HABIT OF GROWTH AND BE HEALTHY, VIGOROUS, AND FREE FROM DISEASES AND INSECT INFESTATION.
3. NEW PLANT MATERIAL SHALL BE NURSERY GROWN UNLESS SPECIFIED OTHERWISE. ALL PLANTS SHALL BE SET PLUMB AND SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS THE PLANT'S ORIGINAL GRADE BEFORE DIGGING. PLANT MATERIAL OF THE SAME SPECIES AND SPECIFIED AS THE SAME SIZE SHOULD BE SIMILAR IN SHAPE, COLOR AND HABIT. THE LANDSCAPE ARCHITECT HAS THE RIGHT TO REJECT PLANT MATERIAL THAT DOES NOT CONFORM TO THE TYPICAL OR SPECIFIED HABIT OF THAT SPECIES.
4. THE CONTRACTOR SHALL NOT MAKE SUBSTITUTIONS. IF THE SPECIFIED LANDSCAPE MATERIAL IS NOT OBTAINABLE, THE CONTRACTOR SHALL SUBMIT PROOF OF NON-AVAILABILITY TO THE LANDSCAPE ARCHITECT AND OWNER TOGETHER WITH A WRITTEN PROPOSAL FOR USE OF AN EQUIVALENT MATERIAL.
5. THE LANDSCAPE ARCHITECT MAY REVIEW PLANT MATERIALS AT THE SITE, BEFORE PLANTING, FOR COMPLIANCE WITH REQUIREMENTS FOR GENUS, SPECIES, VARIETY, SIZE, AND QUALITY. THE LANDSCAPE ARCHITECT RETAINS THE RIGHT TO FURTHER REVIEW PLANT MATERIALS FOR SIZE AND CONDITION OF BALLS AND ROOT SYSTEM, INSECTS, INJURIES, AND LATENT DEFECTS, AND TO REJECT UNSATISFACTORY OR DEFECTIVE MATERIAL AT ANY TIME DURING PROGRESS OF WORK. THE CONTRACTOR SHALL REMOVE REJECTED PLANT MATERIALS IMMEDIATELY FROM PROJECT SITE AS DIRECTED BY THE LANDSCAPE ARCHITECT OR OWNER.

PLANTING SOILS

1. REUSE SURFACE SOILS STOCKPILED ON SITE, VERIFYING COMPLIANCE WITH PLANTING SOIL AND TOPSOIL CRITERIA IN THIS SPECIFICATION THROUGH TESTING. CLEAN SURFACE SOIL OF ALL ROOTS, PLANTS, SOD, AND GRAVEL OVER 1" IN DIAMETER AND DELETERIOUS MATERIALS. IF ON-SITE SOILS ARE TO BE USED FOR PROPOSED PLANTING, THE CONTRACTOR SHALL DEMONSTRATE, THROUGH SOIL TESTING, THAT ON-SITE SOILS MEET THE SAME CRITERIA AS INDICATED IN NOTES PLANS AND SPECIFICATIONS
2. SUPPLEMENT WITH IMPORTED OR MANUFACTURED TOPSOIL FROM OFF SITE SOURCES WHEN TOPSOIL AND PLANTING SOIL QUANTITIES ARE INSUFFICIENT. OBTAIN SOIL DISPLACED FROM NATURALLY WELL-DRAINED SITES WHERE TOPSOIL OCCURS AT LEAST 4" DEEP. DO NOT OBTAIN FROM AGRICULTURAL LAND, BOGS, MARSHES OR CONTAMINATED SITES.
3. IF DEPTH OF PLANTING SOILS AND TOPSOIL IS NOT INDICATED IN PLANS OR DETAILS, A MINIMUM 18" DEPTH SHALL BE PROVIDED FOR ALL TREES AND LARGE SHRUBS; MINIMUM 12" DEPTH SHALL BE PROVIDED FOR GROUNDCOVERS, HERBACEOUS AND MEADOW OR ORNAMENTAL GRASS AREAS AND A MINIMUM 6" LAYER SHALL BE INSTALLED IN ALL LAWN AREAS. TOPSOIL AND PLANTING SOIL DEPTH INDICATED ON PLANS AND PLANTING DETAILS AND NARRATIVE SPECIFICATIONS SHALL GOVERN DEPTH WHEN PROVIDED.
4. WHERE PLANTING AREAS ARE PROPOSED FOR FORMER PAVED OR GRAVEL AREAS, BEDS SHALL BE EXCAVATED TO A MINIMUM 30" DEPTH AND, AT A MINIMUM, BE BACKFILLED WITH BOTTOM LAYER OF SANDY LOAM (ORGANIC CONTENT LESS THAN 2%) OVER WHICH TOPSOIL AND PLANTING SOILS WILL BE PLACED AT DEPTHS INDICATED IN PLANS, DETAILS AND NOTES.
5. IF THE QUANTITY OF SOILS FROM THE SITE IS NOT ADEQUATE TO FILL PLANTING AREAS TO THE DEPTH INDICATED IN THE PLANS AND DETAILS, CONTRACTOR SHALL FURNISH PLANTING SOILS THAT ARE FREE OF BROKEN GLASS, PAINT CHIPS, PLASTIC, DELETERIOUS MATERIALS, ROOTS, WEEDS, BOULDERS, COBBLES AND GRAVEL OVER 1" IN DIAMETER AND COMPLY WITH THE FOLLOWING CRITERIA:
   -SOILS SHALL MEET ALL APPLICABLE SOIL REMEDIATION STANDARDS
   -ORGANIC CONTENT: 2-5% IN NATIVE SOILS; UP TO 10% IN AMENDED SOILS
   -SOLUBLE SALTS: LESS THAN 0.5 MM HOS/CM
   -SOIL PH: 4.5-7% TO BE AMENDED PER SOIL TEST RESULTS
   -PHYSICAL (SIEVE) ANALYSIS/ SOIL TEXTURE
   SAND: 40-60% SILT: 25-60% CLAY: 5-20%
   -NOT MORE THAN 1% OF MATERIAL SHALL BE RETAINED BY A #4 SIEVE.
6. ALL PLANTING SOILS SHALL BE SUBMITTED FOR TESTING TO THE STATE COOPERATIVE EXTENSION SERVICE, OR APPROVED EQUAL, PRIOR TO DELIVERY TO THE SITE. CONTRACTOR SHALL FURNISH SOIL SAMPLES AND SOIL TEST RESULTS TO LANDSCAPE ARCHITECT OR OWNER AT A RATE OF ONE SAMPLE PER 500 CUBIC YARDS TO ENSURE CONSISTENCY ACROSS THE TOTAL VOLUME OF PLANTING SOIL REQUIRED. TEST RESULTS SHALL EVALUATE FOR ALL CRITERIA LISTED IN THIS SPECIFICATION. IF TESTING AGENCY DETERMINES THAT THE SOILS ARE DEFICIENT IN ANY MANNER AND MAY BE CORRECTED BY ADDING AMENDMENTS, THE CONTRACTOR SHALL FOLLOW STATED RECOMMENDATIONS FOR SOIL IMPROVEMENT AND FURNISH SUBMITTALS FOR ALL AMENDMENTS PRIOR TO DELIVERY OF SOIL TO THE PROJECT SITE.
7. IF SOIL ORGANIC CONTENT IS INADEQUATE, SOIL SHALL BE AMENDED WITH COMPOST OR ACCEPTABLE, WEED FREE, ORGANIC MATTER. ORGANIC AMENDMENT SHALL BE WELL COMPOSTED, PH RANGE OF 6-8; MOISTURE CONTENT 35-55% BY WEIGHT 100% PASSING THROUGH 1" SIEVE; SOLUBLE SALT CONTENT LESS THAN 0.5 MM HOS/CM; MEETING ALL APPLICABLE ENVIRONMENTAL CRITERIA FOR CLEAN FILL; FREE OF BROKEN GLASS, PAINT CHIPS, PLASTIC, DELETERIOUS MATERIALS, ROOTS, WEEDS, BOULDERS, COBBLES AND GRAVEL OVER 1" IN DIAMETER
8. SCARIFY AND/OR TILL ALL COMPACTED SUBSOILS PRIOR TO ADDING PLANTING SOIL OR TOPSOIL. PLANTING SOILS AND TOPSOIL SHALL BE PLACED IN 12-18" LIFTS THAT ARE LOOSELY COMPACTED. NO SOILS SHALL BE PLACED IN A FROZEN OR MUDDY CONDITION.

DELIVERY, STORAGE, AND HANDLING

1. PACKAGED MATERIALS: PACKAGED MATERIALS SHALL BE DELIVERED IN CONTAINERS SHOWING WEIGHT, ANALYSIS, AND NAME OF MANUFACTURER. MATERIALS SHALL BE PROTECTED FROM DETERIORATION DURING DELIVERY, AND WHILE STORED AT SITE.
2. TREES AND SHRUBS: THE CONTRACTOR SHALL PROVIDE TREES AND SHRUBS DUG FOR THE GROWING SEASON FOR WHICH THEY WILL BE PLANTED. DO NOT PRUNE PRIOR TO DELIVERY UNLESS OTHERWISE DIRECTED BY THE LANDSCAPE ARCHITECT. DO NOT BEND OR BIND-TIE TREES OR SHRUBS IN SUCH A MANNER AS TO DAMAGE BARK, BREAK BRANCHES, OR DESTROY NATURAL SHAPE. PROVIDE PROTECTIVE COVERING DURING TRANSIT. DO NOT DROP OR BREAK BALLED STOCK DURING DELIVERY OR HANDLING.
3. ALL PLANTS SHALL BE BALLED AND BURLAPPED OR CONTAINER GROWN AS SPECIFIED. NO CONTAINER GROWN STOCK WILL BE ACCEPTED IF IT IS ROOT BOUND. ALL ROOT BALL WRAPPING AND BINDING MATERIAL MADE OF SYNTHETICS OR PLASTICS SHALL BE REMOVED FROM THE TOP OF THE BALL AT THE TIME OF PLANTING, IF THE PLANT IS SHIPPED WITH A WIRE BASKET AROUND THE ROOT BALL, THE WIRE BASKET SHALL BE CUT AND FOLDED DOWN 8" INTO THE PLANTING HOLE. WITH CONTAINER-GROWN STOCK, THE CONTAINER SHALL BE REMOVED AND THE ROOT BALL SHALL BE CUT THROUGH THE SURFACE IN TWO LOCATIONS.
4. THE CONTRACTOR SHALL HAVE TREES AND SHRUBS DELIVERED TO SITE AFTER PREPARATIONS FOR PLANTING HAVE BEEN COMPLETED AND PLANT IMMEDIATELY. IF PLANTING IS DELAYED MORE THAN 6 HOURS AFTER DELIVERY, THE CONTRACTOR SHALL SET TREES AND SHRUBS IN SHADE, PROTECT FROM WEATHER AND MECHANICAL DAMAGE AND KEEP ROOTS MOIST BY COVERING WITH MULCH, BURLAP OR OTHER ACCEPTABLE MEANS OF RETAINING MOISTURE.

INSTALLATION

1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UNDERGROUND UTILITY AND SEWER LINES PRIOR TO THE START OF EXCAVATION ACTIVITIES. NOTIFY THE PROJECT ENGINEER AND OWNER IMMEDIATELY OF ANY CONFLICTS WITH PROPOSED PLANTING LOCATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE.
2. THE CONTRACTOR TO STAKE OUT PLANTING LOCATIONS, FOR REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT AND/OR OWNER BEFORE PLANTING WORK BEGINS. THE LANDSCAPE ARCHITECT AND/OR OWNER SHALL DIRECT THE CONTRACTOR IN THE FINAL PLACEMENT OF ALL PLANT MATERIAL AND LOCATION OF PLANTING BEDS TO ENSURE COMPLIANCE WITH DESIGN INTENT UNLESS OTHERWISE INSTRUCTED.
3. NO PLANT SHALL BE PUT INTO THE GROUND BEFORE FINISHED GRADING HAS BEEN COMPLETED AND APPROVED BY THE PROJECT LANDSCAPE ARCHITECT OR PROJECT ENGINEER.
4. ALL LANDSCAPED AREAS TO BE CLEARED OF ROCKS, STUMPS, TRASH AND OTHER UNSIGHTLY DEBRIS. ALL FINE GRADED AREAS SHOULD BE HAND RAKED SMOOTH ELIMINATING ANY CLUMPS AND UNEVEN SURFACES PRIOR TO PLANTING OR MULCHING.
5. ALL PLANT MATERIAL SHALL BE INSTALLED AS PER DETAILS, NOTES AND CONTRACT SPECIFICATIONS. THE LANDSCAPE ARCHITECT MAY REVIEW INSTALLATION AND MAINTENANCE PROCEDURES.
6. THE CONTRACTOR SHALL KEEP AREA CLEAN DURING DELIVERY AND INSTALLATION OF PLANT MATERIALS. REMOVE AND DISPOSE OF OFF-SITE ANY ACCUMULATED DEBRIS OR UNUSED MATERIALS. REPAIR DAMAGE TO ADJACENT AREAS CAUSED BY LANDSCAPE INSTALLATION OPERATIONS.
7. AFTER PLANT IS PLACED IN TREE PIT LOCATION, ALL TWINE HOLDING ROOT BALL TOGETHER SHOULD BE COMPLETELY REMOVED AND THE BURLAP SHOULD BE PULLED DOWN SO 1/3 OF THE ROOT BALL IS EXPOSED. SYNTHETIC BURLAP SHOULD BE COMPLETELY REMOVED AFTER INSTALLATION.
8. MULCH SHOULD NOT BE PILED UP AROUND THE TRUNK OF ANY PLANT MATERIAL. NO MULCH OR TOPSOIL SHOULD BE TOUCHING THE BASE OF THE TRUNK ABOVE THE ROOT COLLAR.
9. ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24-HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL THEN BE WATERED WEEKLY OR AS REQUIRED BY SITE AND WEATHER CONDITIONS TO MAINTAIN VIGOROUS AND HEALTHY PLANT GROWTH.
10. AFTER COMPLETION OF A PROJECT, ALL EXPOSED GROUND SURFACES THAT ARE NOT PAVED WITHIN THE CONTRACT LIMIT LINE, AND THAT ARE NOT COVERED BY LANDSCAPE PLANTING OR SEEDING AS SPECIFIED, SHALL BE COVERED BY A SHREDDED HARDWOOD BARK OR APPROVED EQUAL MULCH THAT WILL PREVENT SOIL EROSION AND THE EMANATION OF DUST.

GUARANTEE

1. NEW PLANT MATERIAL SHALL BE GUARANTEED TO BE ALIVE AND IN VIGOROUS GROWING CONDITION FOR A PERIOD OF 18 MONTHS FOLLOWING ACCEPTANCE BY THE OWNER. PLANT MATERIAL FOUND TO BE UNHEALTHY, DYING OR DEAD DURING THIS PERIOD, SHALL BE REMOVED AND REPLACED IN KIND BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

LAWN SEED NOTES:

1. PRIOR TO SEEDING, AREA IS TO BE TOPSOILED, FINE GRADED, AND RAKED OF ALL DEBRIS LARGER THAN 2" DIAMETER.
2. THE FOLLOWING SEED MIX SHALL BE SOWN AT THE RATES AS DEPICTED:

RED FESCUE	1 1/2 LBS./1,000 SF
PERENNIAL RYEGRASS	1 LBS./1,000 SF
KENTUCKY BLUEGRASS	1 1/2 LBS./1,000 SF
SPREADING FESCUE	1 LBS./1,000 SF

3. SEED MIX SHALL BE MULCHED WITH SALT HAY OR UNROTTED SMALL GRAIN STRAW AT A RATE OF 2 TONS/AC OR 90 LBS/1,000 SF
4. SEEDING DATES FOR THIS MIXTURE SHALL BE AS FOLLOWS:
   SPRING: APRIL 1 – MAY 31
   FALL: AUGUST 16 – OCTOBER 31
5. GERMINATION RATES WILL VARY AS TO TIME OF YEAR FOR SOWNG. CONTRACTOR TO IRRIGATE SEEDED AREA UNTIL AN ACCEPTABLE STAND OF COVER IS ESTABLISHED BY OWNER.

TREE PROTECTION NOTES:

1. ALL EXISTING SHADE TREES WITHIN THE LIMITS OF TREE PROTECTION FENCING AND AS DIRECTED BY THE LANDSCAPE ARCHITECT SHALL BE PROTECTED THROUGHOUT THE DURATION OF WORK.
2. DEMOLITION AND GRADING WORK ADJACENT TO PROTECTED TREES SHALL BE PERFORMED BY A QUALIFIED PERSON WITH A MINIMUM OF FIVE (5) YEARS EXPERIENCE IN WORKING WITH EXCAVATION EQUIPMENT. CONTRACTOR TO PROTECT ROOT MASS AGAINST DAMAGE DURING EXCAVATION. ANY TREE ROOTS THAT ARE DISTURBED, BROKEN OR CUT SHALL BE PRUNED BACK WITH CLEAN SHARP TOOLS.
3. TO MINIMIZE DISTURBANCE OF VEGETATION TO REMAIN, ALL TREE STUMPS TO BE REMOVED WITHIN 10' OF TREE PROTECTION FENCE SHALL BE REMILLED USING A STUMP GRINDER.
4. ALL EXPOSED TREE ROOTS SHALL BE THOROUGHLY IRRIGATED ON A DAILY BASIS UNTIL BACKFILLING CAN OCCUR AS DIRECTED BY THE PROJECT LANDSCAPE ARCHITECT.
5. ALL WORK TO BE PERFORMED UNDER THE DIRECT SUPERVISION OF EITHER THE OWNER'S REPRESENTATIVE OR PROJECT LANDSCAPE ARCHITECT. NOTIFY OWNER A MINIMUM OF 48 HOURS PRIOR TO ANY EARTHWORK / EXCAVATION WORK.

GENERAL LIGHTING NOTES:

1. PROVIDE A CONCRETE BASE FOR EACH LIGHT POLE AT THE LOCATIONS INDICATED ON THE CONSTRUCTION DRAWNGS AND IN ACCORDANCE WITH PROJECT PLANS AND SPECIFICATIONS RELATING DIRECTLY TO CAST-IN-PLACE CONCRETE.
2. CONTRACTOR TO COORDINATE INSTALLATION OF UNDERGROUND FEEDER CABLE FOR EXTERIOR LIGHTING WITH EXISTING AND PROPOSED UTILITIES, SITE DRAINAGE SYSTEMS, AND PAVING. CONTRACTOR SHALL PROMPTLY NOTIFY THE OWNER'S REPRESENTATIVE SHOULD ANY UTILITIES, NOT SHOWN ON THE PLANS, BE FOUND DURING EXCAVATIONS.
3. CONTRACTOR TO OPERATE EACH LUMINAIRE AFTER INSTALLATION AND CONNECTION. INSPECT FOR IMPROPER CONNECTIONS AND OPERATION.
4. AIM AND ADJUST ALL LUMINAIRES TO PROVIDE ILLUMINATION LEVELS AND DISTRIBUTION AS INDICATED ON THE CONSTRUCTION DRAWNGS OR AS DIRECTED BY THE LANDSCAPE ARCHITECT AND/OR OWNER.
5. INSTALLATION OF ALL LIGHTING FIXTURES, POLES, FOOTINGS, AND FEEDER CABLE TO BE COORDINATED WITH ALL SITE WORK TRADES TO AVOID CONFLICT WITH FINISHED AND PROPOSED WORK.
6. ALL SITE LIGHTING RELATED WORK AND MATERIALS SHALL COMPLY WITH CITY, COUNTY, AND OTHER APPLICABLE GOVERNING AUTHORITY REQUIREMENTS.
7. SITE ELECTRICAL CONTRACTOR TO COORDINATE LOCATION OF EASEMENTS, UNDERGROUND UTILITIES AND DRAINAGE BEFORE DRILLING POLE BASES.
8. SITE ELECTRICAL CONTRACTOR TO COORDINATE POWER SOURCE WITH LIGHT FIXTURES TO INSURE ALL SITE LIGHTING IS OPERATING EFFECTIVELY, EFFICIENTLY AND SAFELY.
9. SITE ELECTRICAL CONTRACTOR SHALL CONFIRM THAT LIGHT FIXTURES MATCH SPECIFICATIONS ON THE PLANS.
10. REFER TO ELECTRIFICATION PLAN BY OTHERS FOR PROVIDING ADEQUATE POWER FOR SITE LIGHTING.
11. SITE ELECTRICAL CONTRACTOR SHALL EXAMINE AND VERIFY THAT SOIL CONDITIONS ARE SUITABLE TO SUPPORT LOADS EXERTED UPON THE FOUNDATIONS DURING EXCAVATION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY UNSATISFACTORY CONDITIONS.
12. POLE FOUNDATIONS SHALL NOT BE POURED IF FREE STANDING WATER IS PRESENT IN EXCAVATED AREA.
13. ELECTRICIAN AND INSTALLATION OF WALL MOUNTED FIXTURES SHALL BE COORDINATED WITH THE ARCHITECTURAL, STRUCTURAL, AND SITE DRAWINGS FOR SAFETY AND TO PROVEN EXPOSED WIRING.
14. THE FIXTURE MOUNTING HEIGHT IS MEASURED FROM FINISHED GRADE TO TOP OF THE FIXTURE. THE MOUNTING HEIGHT SHALL CONFORM TO THE DESIGN HEIGHT LISTED ON THE LIGHTING SCHEDULE AND SHALL BE LESS THAN 20 FEET.
15. PROPOSED LIGHTING SHALL CONFORM TO THE IESNA STANDARDS FOR A FULL CUTOFF FIXTURE.
16. ALL LIGHTS SHALL BE INSTALLED A MINIMUM OF THREE (3) FEET FROM THE FACE OF CURBING.
17. THE APPLICANT WILL BE REQUIRED TO INSTALL THE APPROPRIATE WIRELESS CONTROL NODE AS WELL AS BE RESPONSIBLE FOR ALL FINANCIAL OBLIGATIONS TO CONNECT THE INSTALLED STREET LIGHTS TO THE TOWNSHIP'S MONITORING SYSTEM. PRIOR TO PRODUCT ORDER, THE APPLICANT SHALL COORDINATE WITH BENSALEM TOWNSHIP'S PUBLIC WORKS DEPARTMENT AND STREET LIGHTING ENGINEER TO VERIFY ORDER SPECIFICATION.
18. LIGHTING SUBSTITUTION REQUIREMENTS:
   A. ALL LIGHTING SUBSTITUTIONS MUST BE MADE WITHIN 14 DAYS PRIOR TO THE BID DATE TO PROVIDE AMPLE TIME FOR REVIEW AND TO ISSUE AN ADDENDUM INCORPORATING THE SUBSTITUTION WITH THE FOLLOWING REQUIREMENTS:
   B. ANY SUBSTITUTION TO LIGHTING FIXTURES, POLES, ETC. MUST BE APPROVED BY THE OWNER, ENGINEER AND THE TOWNSHIP.
   C. COMPUTER PREPARED PHOTOMETRIC LAYOUT OF THE PROPOSED LIGHTED AREA WHICH INDICATES BY ISO FOOTCANDLE THE SYSTEM'S PERFORMANCE. ANY COST ASSOCIATED WITH REVIEW AND/OR APPROVAL OF THE SUBSTITUTIONS SHALL BE ENTIRELY BORNE BY THE CONTRACTOR.
   D. A PHOTOMETRIC REPORT FROM A NATIONAL INDEPENDENT TESTING LABORATORY WITH REPORT NUMBER, DATE, FIXTURE CATALOG NUMBER, LUMINAIRE AND LAMP SPECIFICATIONS; IES CALCULATIONS, CANDLEPOWER TABULATIONS, ZONE LUMEN SUMMARY, ISOLUX PLOT, AND CATALOGUE CUTS. CATALOGUE CUTS MUST IDENTIFY, BUT NOT LIMITED TO, OPTICS, LAMP TYPE, DISTRIBUTION TYPE, REFLECTOR, LENS, BALLASTS, WATTAGE, VOLTAGE, FINISH AND HOUSING DESCRIPTION.
   E. POLE MANUFACTURER AASHTO CALCULATIONS INDICATING THE POLE AND ANCHOR BOLTS BEING SUBMITTED ARE CAPABLE OF SUPPORTING THE POLE AND FIXTURE SYSTEMS BEING UTILIZED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
   F. THE UNDERWRITERS LABORATORY LISTING AND FILE NUMBER FOR THE SPECIFIC FIXTURE(S) TO BE UTILIZED.
   G. A COLOR PHOTOGRAPH THAT CLEARLY SHOWS THE REPLACEMENT FIXTURE POLE MOUNTED, THE FIXTURE'S COLOR, FINISH, AND PHYSICAL CHARACTERISTICS.
   H. LIGHTING LAYOUT AND LEVELS COMPLY WITH THE ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) SAFETY STANDARDS AND ALL OTHER LOCAL CODES AND/OR REQUIREMENTS.

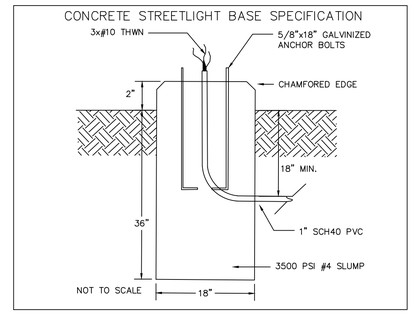
BASIN MAINTENANCE

THIS BASIN IS DESIGNED TO BECOME NATURALIZED OVER TIME AND WILL REQUIRE LESS MAINTENANCE AS TIME GOES ON.

MOWING – ESTABLISH AND MAINTAIN A NO-MOW ZONE THAT ENCOMPASSES THE BASIN FLOOR AND SIDE SLOPES. MOW THE NO-MOW ZONE 1X/YEAR TO A MINIMUM HEIGHT OF 6". (ANNUALLY IN LATE APRIL/ EARLY MAY). RAKE MOWN MATERIAL AND COMPOST OR DISPOSE OF OFF SITE.

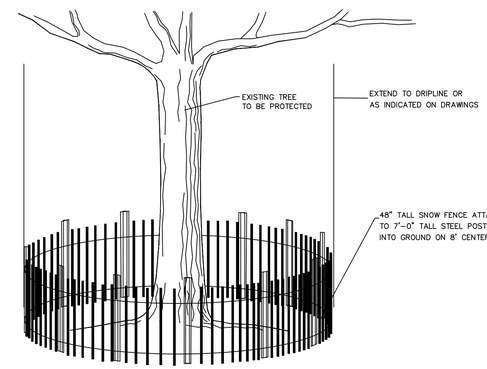
INSPECTIONS – INSPECT BASIN AND NO-MOW ZONES FOR INVASIVE SPECIES SUCH AS PURPLE LOOSESTRIFE, PHRAGMITES, HONEYSUCKLE, ETC. (ANNUALLY IN JULY). IF INVASIVE SPECIES ARE FOUND REMOVE PER RECOMMENDED STANDARDS FOR SPECIFIC SPECIES FOLLOWING GUIDELINES BY PA DCNR (DEPT OF CONSERVATION & NATURAL RESOURCES).

CLEANING – REMOVE TRASH AND DEBRIS (JANUARY & APRIL)



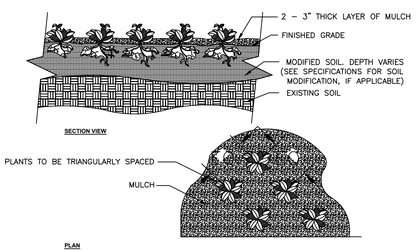
NOTE: THE INFORMATION ILLUSTRATED IN THE LIGHT POLE FOUNDATION DETAIL HAS BEEN PROVIDED FOR GENERAL REFERENCE AND PRELIMINARY COST ESTIMATE PURPOSES. LIGHT POLE FOUNDATIONS SHOULD BE DESIGNED AND DETAILED BY A LICENSED STRUCTURAL ENGINEER BASED ON EXISTING SOIL CONDITIONS, LOCAL DESIGN STANDARDS AND MANUFACTURERS RECOMMENDATIONS.

LIGHT POLE FOUNDATION



NOTE: FENCE TO BE INSTALLED & LOCATION APPROVED BY LANDSCAPE PROFESSIONAL BEFORE WORK BEGINS. FENCE MUST REMAIN AND BE MAINTAINED THROUGH DURATION OF CONSTRUCTION.

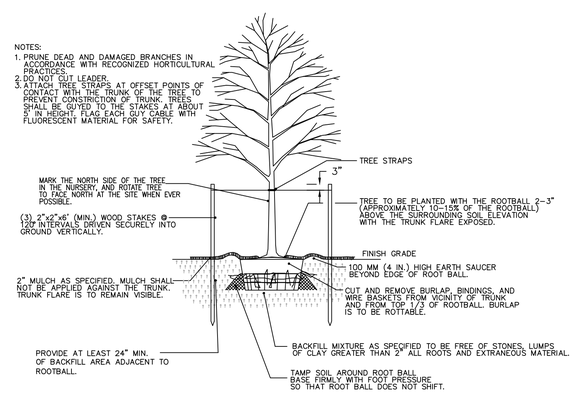
TREE PROTECTION FENCING DETAIL



Notes:
1- See planting legend for groundcover/perennial species, size, and spacing dimension.
2- Small roots (2" or less) that grow around, up, or down the root ball periphery are considered a normal condition in container production and are acceptable however they should be eliminated at the time of planting. Roots on the periphery can be removed at the time of planting. (See root ball shaving container detail).
3- Settle soil around root ball of each groundcover prior to mulching.

GROUNDCOVER/ PERENNIAL PLANTING

NOT TO SCALE



ORNAMENTAL AND SHADE TREE PLANTING/ STAKING DETAIL

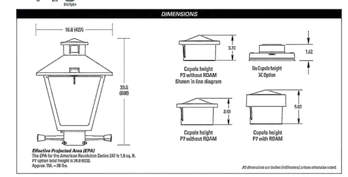
American Revolution LED
Series 247L

PRODUCT OVERVIEW

Features:
- Colonial LED lantern, replaces HID models up to 150W HPS for street and area lighting applications
- Ten (10) LED performance packages deliver just the right amount of light for any given application up to 8000 lumens
- Available in color temperature choices of 2700K, 3000K, 4000K, and 5000K
- Four (4) distinct light distribution options provide design flexibility; available in Type R, Type RS, Type RV, and Type V
- Available with acrylic or polycarbonate lens
- Die-cast aluminum housing, engineered for sturdy lifelong performance
- Die-cast aluminum hood features a trigger latch (TL) option and captive thumb screws for fast, easy electrical and optical chamber access
- Standard paint finish is smooth / gloss
- Housing is seven pole-mounted and designed for use with a 3" tall by 2-3/8" to 3" diameter tenon, and secured by three set screws
- Rated 85K LED life; greater than 100,000 hours at 25°C
- Complies with all applicable ANSI C136 standards.
- CSA listed and suitable for up to 40° C ambient
- Surge protection device (standard) exceeds ANSI/IEEE C62.41-2002 Category C High (10kV/10kA) and ANSI C136.2-2015 Enhanced (10kV/5kA). 20KV Option exceeds ANSI/IEEE C62.41-2002 Category C High. (10kV/10kA) and ANSI C136.2-2015 Extreme (20kV/10kA)
- Equipped with LED electronic 0-10V dimmable driver

Applications:
Streetscapes
Walkways
Pathways
Parks

DIMENSIONS



American Revolution Series 247L LED

AEL American Electric Lighting

American Revolution LED
Series 247L

ORDERING INFORMATION

Example: 247L P3D AS 40K R3 AY

Series	Performance Package			Voltage	Color Temperature (CCT)
247L American Revolution LED	Package	Input Watts	Lumens (nominal)	4R 120-277V	27K 2700K
	P10	12	1,400	8R 347V, 480V	30K 3000K
	P15	16	2,000		40K 4000K
	P20	23	2,500		50K 5000K
	P25	31	3,400		
	P30	40	3,850		
	P35	33	3,700		
	P40	39	4,400		
	P45	46	5,000		
	P50	64	6,400		
	P55	77	7,300		

Distribution	Optics	Options
R2 Type II	AY Acrylic	Paint *
R3 Type III	PY Polycarbonate	[black] Black (standard), smooth / gloss
R4 Type IV		BRZ Bronze, smooth / gloss
R5 Type V		DGR Dark Bronze, smooth / gloss
		WHI White, smooth / gloss
		GZ Bronze, smooth / gloss

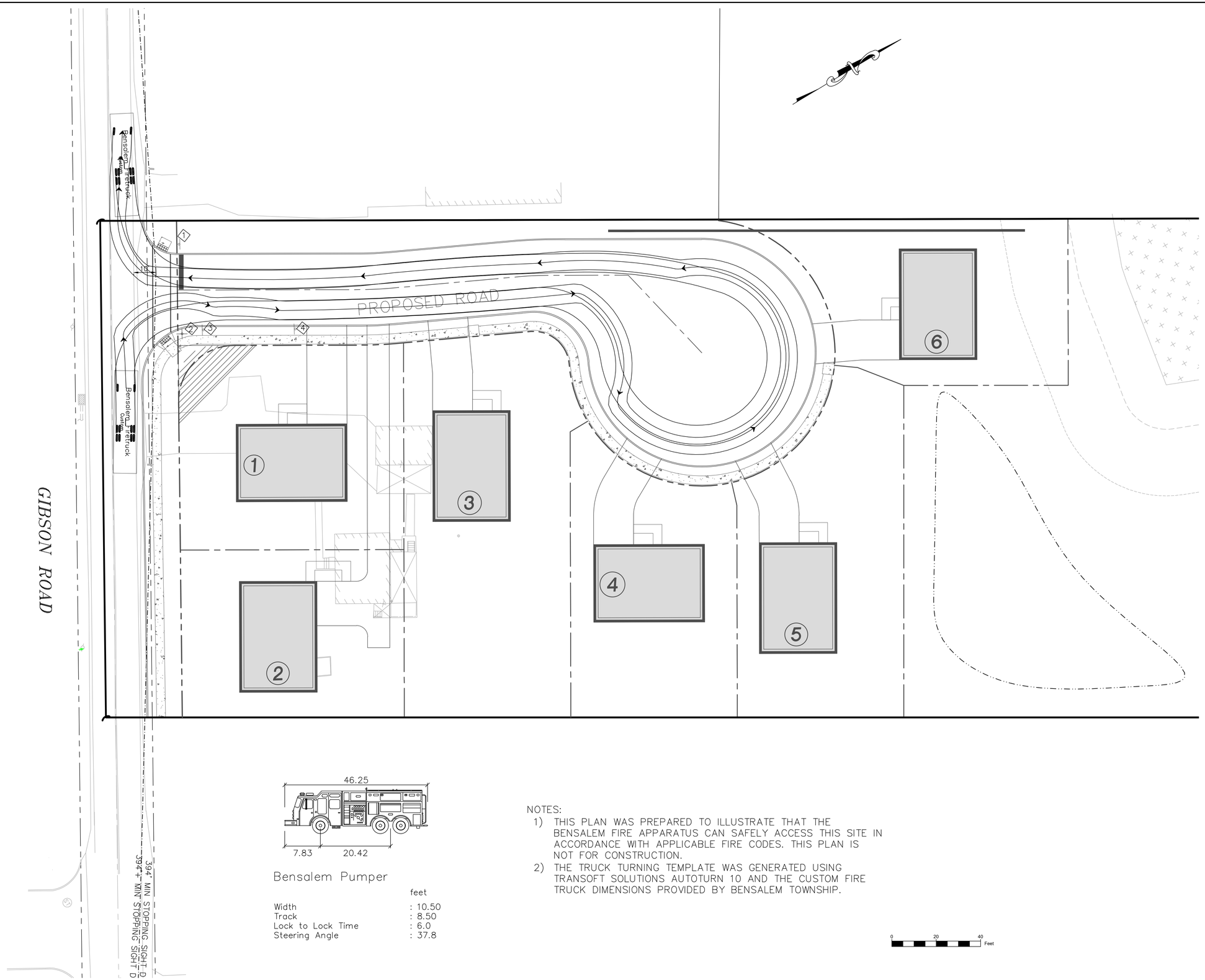
Controls	Miscellaneous	House-Side Shields
[blank] 3 pin NEMA photocontrol (standard)	SJ Stainless steel hardware	HS1B House-Side Black
AB Box photocontrol receptacle	TL Tool-less hinge	HS1W House-Side White
PY1 7 pin NEMA photocontrol	NL1U V to 1" NEMA label	
PCS/L** Coded Strain Lamp Life Photocontrol, 120-277V	NL2U 2" x 2" NEMA label	Provisioned Leads
PCS4/L** Coded Strain Lamp Life Photocontrol, 347V	JBL Not CSA Listed	L10 10' provision leads
PCS8/L** Coded Strain Lamp Life Photocontrol, 480V	LBR* Ladder Rest	L15 15' provision leads
PCS12/L** Coded strain photocontrol, 120-277V (Not CSA Listed)	RCC** NEMA Cupola Cap	L10 10' provision leads
	RCP Box Cupola	L20 20' provision leads
AD Field adjustable output module	CR Epoxy Fine Coat Finish	L25 25' provision leads
DALI DALI driver (special request)	20KV 10kA surge protection device	L30 30' provision leads
PSD Post-night dimming	FPDrv Factory programmable driver	
SW Shorting cap		Special Packaging
SWG* Shorting cap (not CSA listed)		SSP Sample pack (SPS)

Note: Check the OPTIONS MATRIX on Page 3 for compatibility & restrictions

AEL American Electric Lighting
AEL Manufacturing, 3800 Columbus Road, Granville, OH 43023
americanelectriclighting.com
© 2018 Acuity Brands Lighting, Inc. All Rights Reserved. 247L Rev. 11/10/20

Warranty: Five-year limited warranty. Complete warranty terms located at americanelectriclighting.com/terms-conditions/
Actual performance may differ as a result of end-user environmental and application. Product life expectancy is based on operation under laboratory conditions at 25 °C. Specifications subject to change without notice.
Please contact your sales representative for the latest product information.

LIGHT FIXTURE CUTSHEET



Bensalem Pumper

	feet
Width	: 10.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

NOTES:

1) THIS PLAN WAS PREPARED TO ILLUSTRATE THAT THE BENSALEM FIRE APPARATUS CAN SAFELY ACCESS THIS SITE IN ACCORDANCE WITH APPLICABLE FIRE CODES. THIS PLAN IS NOT FOR CONSTRUCTION.
2) THE TRUCK TURNING TEMPLATE WAS GENERATED USING TRANSOFT SOLUTIONS AUTOTURN 10 AND THE CUSTOM FIRE TRUCK DIMENSIONS PROVIDED BY BENSALEM TOWNSHIP.

0 20 40 Feet

Holmes Cunningham LLC
409 E. Butler Ave., Unit 5
Doylestown, PA 18901
(215) 586-3330
www.hcengineering.net

Holmes cunningham ENGINEERING

REVISIONS

Date	Description
12/02/2021	REVISED PER TOWNSHIP REVIEW
7/15/2022	REVISED PER TOWNSHIP & PENNDOT COMMENTS

CALL BEFORE YOU DIG!!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION PURPOSES AND
10 WORKING DAYS IN DESIGN STAGE
— STOP & CALL —
Pennsylvania One-Call
Call System, Inc.
1-800-242-1776

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT ALL UTILITY COMPANIES PRIOR TO ANY EXCAVATION.

1515 GIBSON SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PA

TRUCK TURN PLAN

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ROBERT THOMAS CUNNINGHAM
PE076424

ROBERT T. CUNNINGHAM, P.E.
PROFESSIONAL ENGINEER PE076424

File No.
1608_C8.0_TruckTurn.DWG

HCE Job	1608
Date	5/27/2021
Scale	1"=20'
Designed	RC
Sheet	21 of 21

Drawing No.
C7.0

	DISTRICT	COUNTY	TOWNSHIP	BOROUGH	ROUTE	SECTION	TOTAL SHEETS
—	6-0	BUCKS	BENSALEM	—	2025	–	8

STATE PROJECT NUMBER										
SYS	S.R. or W.O.					SPUR	PHA	SECTION	DIST.	CO.
	0	2	0	2	5	–	–		6	0

DRAWINGS FOR CONSTRUCTION FOR

ROADWAY IMPROVEMENTS ASSOCIATED WITH 1515 GIBSON ROAD SUBDIVISION

ALONG GIBSON ROAD (S.R. 2025)

STATE ROUTE 2025 **SECTION** –

IN BUCKS **COUNTY**

FROM STA. 0+00.00 TO STA. 2+54.00 LENGTH 254.00 FT. 0.048 MI.

S.R. 2025 FROM SEG. 0402 OFFSET 1,529 TO SEG. 0402 OFFSET 1,783

DRAWING LIST

NUMBER	TITLE	SUBMISSION/REVISION DATE
SHEET 1	COVER SHEET	7-15-22
SHEET 2	INDEX SHEET	7-15-22
SHEET 3	SIGNING AND PAVEMENT MARKING PLAN	7-15-22
SHEET 4	ROADWAY IMPROVEMENT PLAN	7-15-22
SHEET 5	GRADING AND DRAINAGE PLAN	7-15-22
SHEET 6	DRIVEWAY PROFILE AND TRUCK TURNING MOVEMENTS	7-15-22
SHEET 7	PROFILES AND DETAILS	7-15-22
SHEET 8	MAINTENANCE AND PROTECTION OF TRAFFIC PLAN	7-15-22

NOTES:
DRAINAGE INSTALLED BY THIS PERMIT IS THE PRIMARY RESPONSIBILITY OF THE LOCAL GOVERNMENT TO MAINTAIN OR REPLACE.
PRIVATE CO-PERMITEE IS RESPONSIBLE FOR PROVIDING FUNDING TO THE LOCAL GOVERNMENT TO OFFSET FUTURE MAINTENANCE.
COSTS ASSOCIATE WITH THE PERMITTED DRAINAGE FACILITIES.

ACT 121 AS PER THE LATEST
AMENDMENT OF PA ACT 287 OF 1974,
EFFECTIVE OCTOBER 9, 2008

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TO OBTAIN ADDITIONAL UTILITY INFORMATION OR TO ARRANGE FOR FIELD LOCATION OF EXISTING UTILITIES BEFORE EXCAVATION, CALL THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776. THE UTILITY COMPANIES SHOWN MAY OR MAY NOT HAVE UTILITY LINES IN THE AREA.

CALL BEFORE YOU DIG !!
PENNSYLVANIA LAW REQUIRES
(3) WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND
(10) WORKING DAYS IN DESIGN STAGE
— STOP & CALL —
Pennsylvania One Call System, Inc.
1-800-242-1776

PA ONE-CALL SERIAL NUMBER: 20221963205

File No. 1608_K0.0_COVER SHEET.DWG

Holmes Cunningham LLC
409 East Butler Avenue
Unit 5
New Britain, PA 18901
(215) 586-3330
www.hcengineering.net

KRISTIN R. HOLMES, P.E.
PA PE073604

1515 GIBSON ROAD SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

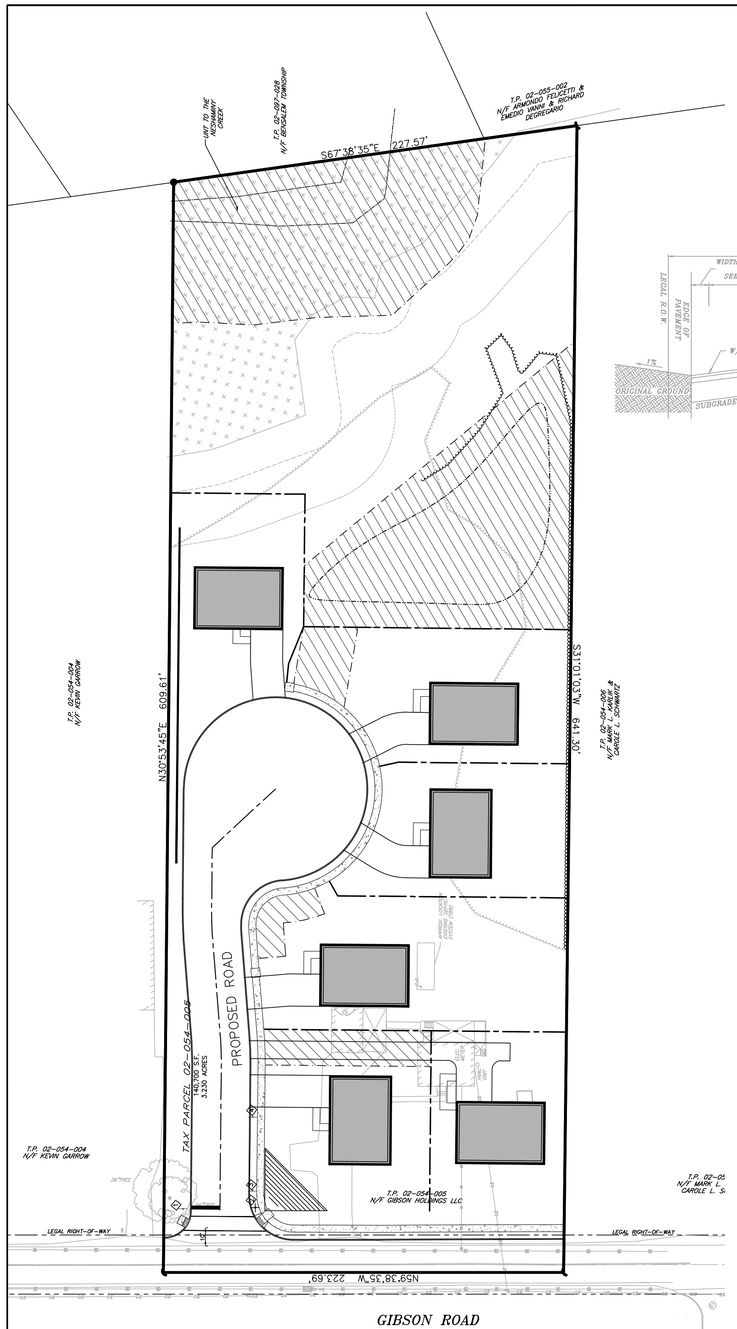
COVER SHEET

HCE Job #	1608
Date	12/02/2021
Scale	NOT TO SCALE
Designed	RS
Sheet	1 of 8

Drawing No. K0.0

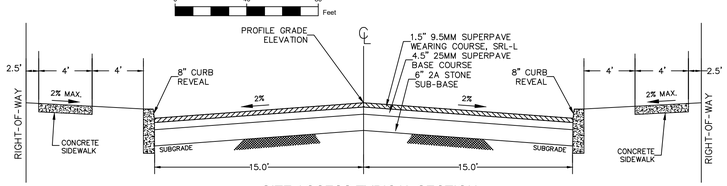
DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	–	2 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS



INDEX MAP

0 40 80 Feet

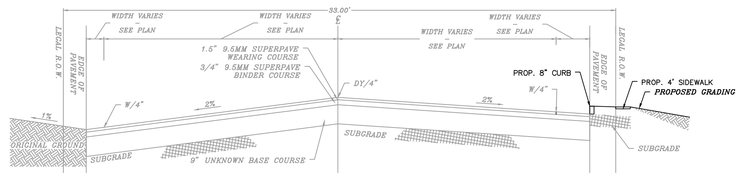


SITE ACCESS TYPICAL SECTION

N.T.S.

GENERAL NOTES:

1. SITE BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY CAVANAUGH SURVEYING SERVICES DATED MARCH 15, 2021.
2. LEGAL RIGHT-OF-WAY INFORMATION WAS OBTAINED FROM PENNDOT RIGHT-OF-WAY RECORD FOR SOUTH MAIN STREET LAST REVISED NOVEMBER 7, 1938.
3. THE SUBJECT PROPERTY IS ENTIRELY WITHIN FLOOD ZONE "X" – I.E., OUTSIDE THE 500 YEAR FLOOD PLAIN AS SHOWN ON THE F.E.M.A. FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR BUCKS COUNTY, MAP NO. 42017C0443J & 42017C0506J.
4. CURRENT PERMIT IS ONLY FOR THE DRIVEWAYS AND WORK THAT WILL BE DONE WITHIN (AND DIRECTLY ADJACENT TO) THE LEGAL RIGHT-OF-WAY OF SR 2025.



S.R. 2025 TYPICAL SECTION

N.T.S.

NOTE: PROPOSED PAVEMENT SECTION MUST BE AS SHOWN ON THE PLANS, OR AS FOUND IN THE FIELD, WHICHEVER IS GREATER.

ACT 187 AS AMENDED

UTILITY LOCATIONS AS SHOWN ON THIS PLAN ARE APPROXIMATE AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR, PER PA. ACT 187 TO CONTACT THE UTILITY COMPANIES FOR MORE ACCURATE LOCATION PRIOR TO ANY EXCAVATION.

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Pennsylvania One Call System, Inc.
1-800-242-1776

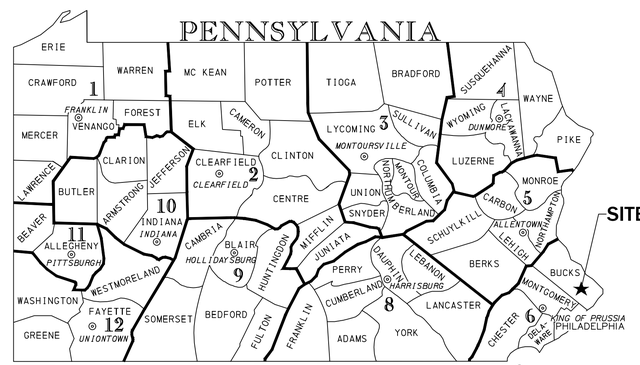
PA ONE-CALL SERIAL NUMBER: 20221963205

APPLICANT / OWNER:

BILL LAPHEN
GIBSON HOLDINGS, LLC
300 FARM LANE
DOYLESTOWN, PA 18901

UTILITY NOTES

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS IN A MANNER WHICH WILL NOT NEGATIVELY AFFECT ANY EXISTING USERS OF THESE UTILITIES.
2. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, UTILITY LOCATIONS AND INVERTS PRIOR TO CONSTRUCTION. ANY CONDITIONS FOUND TO DIFFER FROM THOSE SHOWN BY THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING PENNSYLVANIA ONE CALL SYSTEM AS REQUIRED BY PA ACT 121, AS PER THE LATEST AMENDMENT OF PA ACT 287 OF 1974, EFFECTIVE OCTOBER 9, 2008, THREE (3) WORKING DAYS PRIOR TO DIGGING. CALL TOLL FREE 1-800-242-1776. CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT ALL CONSTRUCTION IS COMPLETED IN ACCORDANCE WITH THE LATEST OSHA REQUIREMENTS.

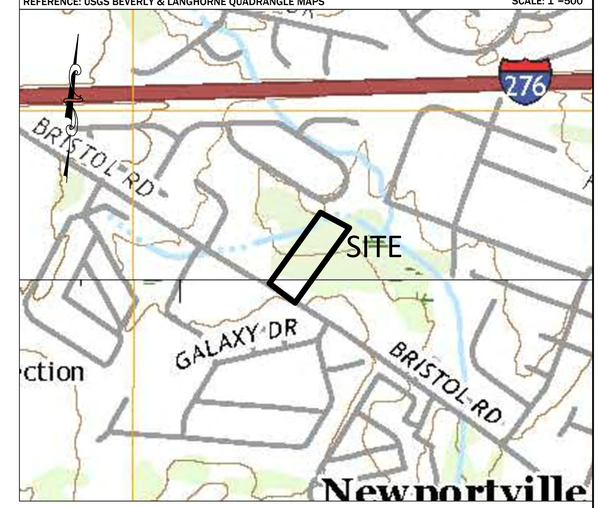


NOT TO SCALE

6 DISTRICT
DISTRICT OFFICE
PROJECT LOCATION

SITE LOCATION MAP

REFERENCE: USGS BEVERLY & LANGHORNE QUADRANGLE MAPS — SCALE: 1"=500'



GENERAL PERMIT NOTES:

1. THE EXISTING SPEED LIMIT ON GIBSON ROAD (S.R. 2025) IS POSTED AT 40 MPH.
2. THE RIGHT-OF-WAY IS FREE ACCESS.
3. ALL WORK IN PENNDOT RIGHT-OF-WAY TO BE BUILT IN ACCORDANCE WITH:
   A. PENNDOT PUBLICATION 408, CONSTRUCTION SPECIFICATIONS
   B. PENNDOT PUBLICATION 72M
   C. PENNDOT PUBLICATION 213 (67 PA CODE, CHAPTER 212)
   D. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) – LATEST PENNDOT ADOPTED EDITION
4. THE PERMITTEE IS SUBJECT TO ALL THE CONDITIONS, AGREEMENTS, RESTRICTIONS, AND REGULATIONS PRESCRIBED BY THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, (SEE IN PARTICULAR 67 PA. CODE, CHAPTER 212, 441 AND 459 AND STATE HIGHWAY LAW, 36 P.S. SECTION 670 – 411, 420 AND 421) AND SUBJECT TO THE PLANS, SPECIAL CONDITIONS, OR RESTRICTIONS HEREIN SET FORTH OR ATTACHED HERETO.
5. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO GRADE ADJUST/RELOCATE OR HAVE ADJUSTED OR RELOCATED BY THE APPROPRIATE UTILITY COMPANY, ALL MANHOLES, VALVE COVERS, ETC. WHICH FALL WITHIN THE PROJECT LIMITS. THE COST OF THIS WORK SHALL BE INCLUDED IN VARIOUS ITEMS IN THE HIGHWAY CONSTRUCTION CONTRACT.
6. THE PERMITEE SHALL ENSURE THAT THE SIGHT DISTANCE AT THE DRIVEWAYS SERVICING OTHER PROPERTIES OR AT OTHER INTERSECTIONS IS NOT REDUCED (UNLESS EXISTING AND PROPOSED VALUES EXCEED THE DESIRABLE VALUES SPECIFIED IN THE PENNSYLVANIA CODE, TITLE 67, TRANSPORTATION, CHAPTER 441.8.H.1) AS A RESULT OF THE WORK PERFORMED IN ACCORDANCE WITH THE STATE HIGHWAY OCCUPANCY PERMIT.
7. NO UNSUITABLE MATERIAL IS TO BE USED IN ANY PORTION OF THE DRAINAGE CONSTRUCTION. REMOVE ANY SUBGRADE THAT CANNOT BE PROPERLY COMPACTED AND THAT IS UNSUITABLE MATERIAL. UNDERCUTTING AND/OR SUBGRADE STABILIZATION MAY BE REQUIRED.
8. ALL INLETS, MANHOLES, VALVE BOXES, ETC. EXPOSED WILL BE PROTECTED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE.
9. ACCESS TO ALL EXISTING PROPERTIES MUST BE MAINTAINED AT ALL TIMES DURING THE DURATION OF THE CONSTRUCTION.
10. EXCESS EXCAVATED MATERIALS AND UNSUITABLE MATERIAL SHALL BE DELIVERED TO A LAWFUL SITE LOCATION IN ACCORDANCE WITH PUBLICATION 408, CURRENT EDITION WITH LATEST REVISIONS.
11. ALL DISTURBED GRASS/LANDSCAPE AREAS OUTSIDE OF THE DRAINAGE CONSTRUCTION AREAS MUST BE RETURNED TO THE ORIGINAL CONDITION OR BETTER. INSTALL TOPSOIL, SEEDING AND MULCH AT A RATE OF 3 TONS PER ACRE WITH MULCHING (STRAW) FOR DISTURBED AREAS TO THE SATISFACTION OF THE BUCKS COUNTY WATER & SEWER AUTHORITY.
12. SEGMENT AND OFFSET INFORMATION FOR S.R. 2025 WAS OBTAINED FROM PENNDOT'S ONLINE VIDEO LOG WEBSITE http://www.dot7.state.pa.us/VideoLog/Map/AOI/MapFS.htm
13. ALL CONSTRUCTION DETAILED ITEMS WILL REQUIRE SHOP DRAWINGS TO BE SUBMITTED TO HOLMES CUNNINGHAM ENGINEERING, LLC. ALL SHOP DRAWINGS WILL BE REVIEWED FOR THOROUGHNESS, ACCURACY, AND COMPLIANCE BY OUR STAFF. ALL CONSTRUCTION MATERIALS SHOULD BE SUPPLIED BY MANUFACTURES LISTED IN PENNDOT PUBLICATION 35, BULLETIN 15.
14. CALL THE DISTRICT TRAFFIC ENGINEER AT LEAST 3-DAYS PRIOR TO THE START OF WORK.
15. ALL EXISTING VEGETATION MUST BE CUT SO THAT IT IS AT LEAST 5-FEET BEHIND THE FACE OF CURB AND 20-FEET ABOVE THE PAVEMENT.
16. NO TRAFFIC RESTRICTION OR LANE CLOSURES ARE PERMITTED BETWEEN THE HOURS OF 6:00 AM TO 9:00 AM AND 3:00 PM TO 6:00 PM, MONDAY THROUGH FRIDAY AND LEGAL HOLIDAYS.
17. ANY INFORMATION APPEARING ON THESE DRAWINGS RELATED TO THE UNDERGROUND UTILITY LINES OF A USER, SUCH AS A PUBLIC UTILITY, HAS BEEN INCORPORATED HERON, PURSUANT TO THE PENNSYLVANIA GENERAL ASSEMBLY ACT NO. 121, AS PER THE LATEST AMENDMENT OF PA ACT 287 OF 1974, EFFECTIVE OCTOBER 9, 2008.
18. MODIFICATIONS TO EXISTING DRAINAGE STRUCTURES MAY RESULT IN THE NEED TO REPLACE THE STRUCTURE. REPLACEMENT WILL BE AT THE DISCRETION OF THE INSPECTOR-IN-CHARGE.
19. THE FOLLOWING PENNDOT ROADWAY CONSTRUCTION (RC) DETAILS ARE TO BE UTILIZED IN THE CONSTRUCTION OF THIS PROJECT:

STD. DWG. NO.	DATE	DESCRIPTION
RC-27M	06/01/2010	PLAIN CONCRETE PAVEMENT WIDENDED PAVING
RC-30M	12/17/2019	SUBSURFACE DRAINS
RC-39M	02/19/2021	STORM WATER MANHOLES
RC-45M	02/19/2021	INLET TOPS, GRATES, AND FRAMES
RC-46M	02/19/2021	INLET BOXES
RC-64M	02/19/2021	CURBS AND GUTTERS
RC-67M	02/19/2021	CURB RAMPS AND SIDEWALKS
TC-8600	06/13/2013	PAVEMENT MARKINGS

20. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE PENNSYLVANIA ONE-CALL SYSTEM (PHONE: 1-800-242-1776) THREE WORKING DAYS IN ADVANCE ON ANY EXCAVATION FOR THE MARK-OUT OF THE LOCATION OF UTILITIES AND NOTIFICATION OF COMMENCEMENT OF WORK. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN ALL UTILITY MARKINGS WITHIN THE PROJECT LIMITS FOR THE DURATION OF THE PROJECT. IF UTILITY MARKINGS ARE OBLITERATED, THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING PA ONE-CALL FOR MARK-OUT.
21. THE CONTRACTOR SHOULD CONTACT THE ENGINEER BEFORE PROCEEDING WITH CONSTRUCTION IF THERE ARE ANY DIFFERENCES BETWEEN THE FIELD CONDITIONS AND BASE SURVEY SHOWN ON THE PLANS.
22. ANY DAMAGED OR SUBSTANDARD CURB WITHIN THE LIMITS OF WORK SHALL BE REPLACED AS NECESSARY.
23. THE CONTRACTOR MUST COMPLY WITH ALL U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS AS REVISED 1995. (OSHA 2226) ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH PENNDOT SPECIFICATION PUBLICATION 408, CURRENT EDITION WITH LATEST REVISIONS AND SHALL MEET OR EXCEED THE LOCAL MUNICIPALITIES STANDARD SPECIFICATIONS FOR CONSTRUCTION.
24. BARRICADES, LIGHTING DEVICES, AN OTHER TRAFFIC CONTROL MEASURES SHALL BE PLACED IN ACCORDANCE WITH AND SHALL CONFORM TO PENNDOT SPECIFICATIONS PUBLICATION 408, CURRENT EDITION WITH LATEST REVISIONS, M.U.T.C.D. STANDARDS, AND PENNDOT PUBLICATION 213, "WORK ZONE TRAFFIC CONTROL GUIDELINES", CURRENT EDITION WITH LATEST REVISIONS.
25. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE ANY DEBRIS AND FLUSH OUT ALL EXISTING AND PROPOSED STORM DRAINAGE FACILITIES WITHIN THE PROJECT LIMITS, AT THE COMPLETION OF CONSTRUCTION.
26. A PRE-CONSTRUCTION MEETING SHALL BE HELD BETWEEN PENNDOT, APPLICANT, THE CONTRACTOR, THE ENGINEER, AND ALL UTILITY COMPANIES TO CLARIFY AND COORDINATE ALL CONSTRUCTION DETAILS.
27. IF IT IS NECESSARY TO RELOCATE OR CONNECT INTO EXISTING UTILITIES WITHIN PENNDOT AND/OR TOWNSHIP RIGHT-OF-WAY, IT WILL BE THE RESPONSIBILITY OF THE UTILITY OR THEIR APPOINTED CONTRACTOR TO OBTAIN THE NECESSARY PERMITS FROM PENNDOT AND/OR THE BOROUGH.
28. MAINTENANCE AND PROTECTION OF TRAFFIC DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE FIGURES FROM PENNDOT PUBLICATION 213, "WORK ZONE TRAFFIC CONTROL GUIDELINES", CURRENT EDITION WITH LATEST REVISIONS.
29. THIS PERMIT MAY BE RESTRICTED ON WORKING HOURS AND TIMES FOR HOLIDAYS, WEEKENDS, AND SPECIAL OR UNFORESEEN EVENTS AND WILL REQUIRE APPROVAL FROM THE COUNTY PERMIT OFFICE PRIOR TO WORKING DURING THESE PERIODS.
30. FOR PERMITS REQUIRING A STATE INSPECTOR, FOLLOWING THE PERMITTEE'S REQUEST TO BEGIN CONSTRUCTION, ALL WORK WITHIN THE RIGHT-OF-WAY SHALL BE COMPLETED WITHOUT TIME INTERRUPTIONS.
31. MATERIAL CERTIFICATION MUST BE PROVIDED BY AN APPROVED MANUFACTURER LISTED IN THE DEPARTMENT'S PUBLICATION 25 BULLETIN 15, FOR ALL MATERIALS AND STRUCTURES WITHIN PENNDOT RIGHT-OF-WAY.
32. ALL SLOPE MEASUREMENTS WILL BE INSPECTED/VERIFIED WITH A 2-FOOT SMART LEVEL.
33. CONTRACTOR WILL NOTIFY THE PENNDOT PRESS OFFICE AT 610-871-4555 A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CLOSING OF A TRAVEL LANE.
34. AN UP-TO-DATE COPY OF THE PENNDOT RC STANDARDS WILL BE PROVIDED TO THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

File No. 1605_K0.1_INDEX SHEET.DWG

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KRISTIN R. HOLMES, P.E.
PA PE073604

1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

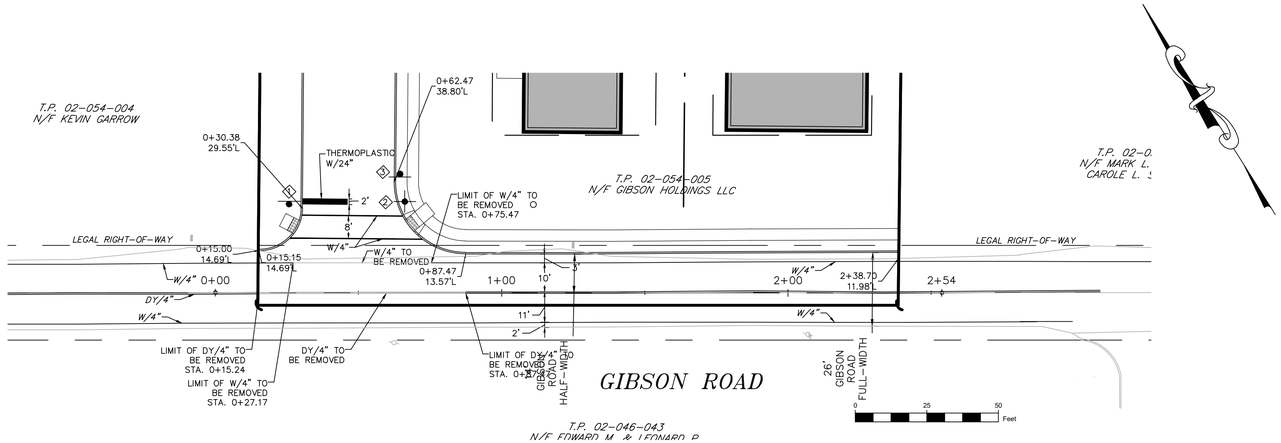
INDEX SHEET

HCE Job #	1608
Date	12/02/2021
Scale	AS SHOWN
Designed	RS
Sheet	2 of 8

Drawing No. K0.1

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	3 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS



PAVEMENT MARKING GENERAL NOTES

1. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE DEPARTMENTS PUBLICATION 408/2020.
2. ALL PAVEMENT MARKINGS SHALL BE REFLECTORIZED.
3. THE CONTRACTOR SHALL PREPARE THE PAVEMENT SURFACE FOR THE PROPER ADHESION, ANY SWEEPING OR REMOVAL OF THE DEBRIS, GRAVEL, DIRT OR OTHER FOREIGN MATERIALS SHALL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE NEW PAVEMENT MARKINGS, AND NO SEPARATE PAYMENTS SHALL BE MADE THEREFORE.
4. THE CONTRACTOR SHALL REMOVE ALL PREVIOUS PAVEMENT MARKINGS, WHICH IN THE OPINION OF THE ENGINEER CONFLICT WITH THE NEW PAVEMENT MARKINGS, UNLESS SPECIFICALLY STATED OTHERWISE THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE NEW PAVEMENT MARKINGS, AND NO SEPARATE PAYMENT SHALL BE MADE THEREFORE.
5. PRIOR TO APPLICATION, THE CONTRACTOR SHALL FIELD VERIFY AND LOCATE ALL PAVEMENT MARKINGS TO THE SATISFACTION OF THE ENGINEER.
6. ALL MARKINGS IMPROPERLY APPLIED, LOCATED, OR DAMAGED BY VEHICLES DRIVING OVER THEM BEFORE THEY ARE COMPLETELY DRY SHALL BE COMPLETELY REMOVED AND CORRECTLY REAPPLIED, AT THE SOLE EXPENSE OF THE CONTRACTOR.
7. WITHIN THE LIMITS OF WORK AND THE PENNDOT LEGAL RIGHT-OF-WAY ALL INAPPROPRIATE SIGNS AND SIGNS NOT LABELED TO REMAIN, TO BE RESET OR TO BE RELOCATED SHALL BE REMOVED BY THE CONTRACTOR ALL DISCREPANCIES SHALL BE BROUGHT TO THE ENGINEER FOR RESOLUTION.
8. ALL PROPOSED SIGNS MUST COMPLY WITH PENNDOT PUBLICATION 408/2020, AND PENNDOT PUBLICATION 236M, APPROVED SIGNS, DATED NOVEMBER 19, 2013.
9. ALL TRAFFIC LANE LINES (EXCEPT LONG LINES), PEDESTRIAN CROSSWALKS, GORE AREAS, MEDIAN AREAS, LEGENDS, AND STOP BARS SHALL BE COMPRISED OF HOT THERMOPLASTIC PAVEMENT MARKINGS IN BITUMINOUS PAVEMENT AREAS PER PENNDOT PUBLICATION 408/2020, SECTION 0960.
10. ALL PAVEMENT MARKINGS AND LEGENDS SHALL BE APPLIED DURING THE NIGHT HOURS OF 9:00 PM TO 5:00 AM. ALL EFFORTS WILL BE MADE BY THE CONTRACTOR TO PREVENT VEHICLES FROM CROSSING OVER THE PAVEMENT MARKINGS AND LEGENDS BEFORE THEY ARE COMPLETELY DRY. THE CONTRACTOR WILL STRICTLY FOLLOW PUBLICATION 213, FIGURE 15 TO CONTROL TRAFFIC DURING THE PAVEMENT MARKING OPERATIONS.
11. THE CONTRACTOR IS RESPONSIBLE TO REPLACE ALL EXISTING PAVEMENT MARKINGS (SHOWN TO REMAIN ON THE PAVEMENT MARKING PLANS) AND PROPOSED PAVEMENT MARKINGS THAT WERE DAMAGED OR REMOVED DURING CONSTRUCTION.
12. ALL EXISTING PAVEMENT MARKINGS WHICH ARE NO LONGER APPROPRIATE SHALL BE ERADICATED BY THE CONTRACTOR. IN AREAS WHERE MILLING AND/OR OVERLAYING WILL NOT OCCUR, PAVEMENT MARKINGS ARE TO BE ERADICATED COMPLETELY BY SANDBLASTING TO THE SATISFACTION OF THE ENGINEER. THE CONTRACTOR SHALL PLACE ALL REQUIRED NEW PAVEMENT MARKINGS.
13. ALL PAVEMENT MARKINGS MUST BE IN ACCORDANCE WITH THE TC-8600 SERIES DRAWINGS.
14. ERADICATION OF PAVEMENT MARKINGS MUST BE DONE USING A PENNDOT APPROVED METHOD AND THE METHOD UTILIZED IS AT THE DISCRETION OF THE PENNDOT FIELD REPRESENTATIVE.

LEGEND

W/24" – 24" WHITE
W/4" – 4" WHITE
– PROPOSED SIGN
– EXISTING SIGN
– RELOCATED SIGN
T.B.RM. – TO BE REMOVED
T.B.RL. – TO BE RELOCATED

S.R. 2025 PENNDOT SIGN DATA SPREADSHEET

OWNER P – PENNDOT M – MUNICIPALITY A – APPLICANT	IN – INSTALL NEW RI – REPLACE INSTALLATION REL – RELOCATE INSTALLATION RM – REMOVE ER – EXISTING TO REMAIN	SR	DESCRIPTION/ NOMENCLATURE	SIGN TYPE/DESCRIPTION	SEGMENT	OFFSET	WIDTH	HEIGHT	ASCENDING/ DESCENDING/ INTERSECTION	LEFT/RIGHT/ OVERHEAD	PLAN SYMBOL
M	IN	2025	R1-1	STOP			30"	30"	I	L	1
M	IN	2025	D3-1	STREET SIGN					I	L	2
M	IN	2025	W14-2	NO OUTLET			30"	30"	I	L	3

File No. 1608_K1.0_SIGNPAVE.DWG

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1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

SIGNING AND PAVEMENT MARKING PLAN

HCE Job #	1608
Date	12/02/2021
Scale	1" = 25'
Designed	RS
Sheet	3 of 8

Drawing No. K1.0

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	4 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS

CONSTRUCTION NOTES:

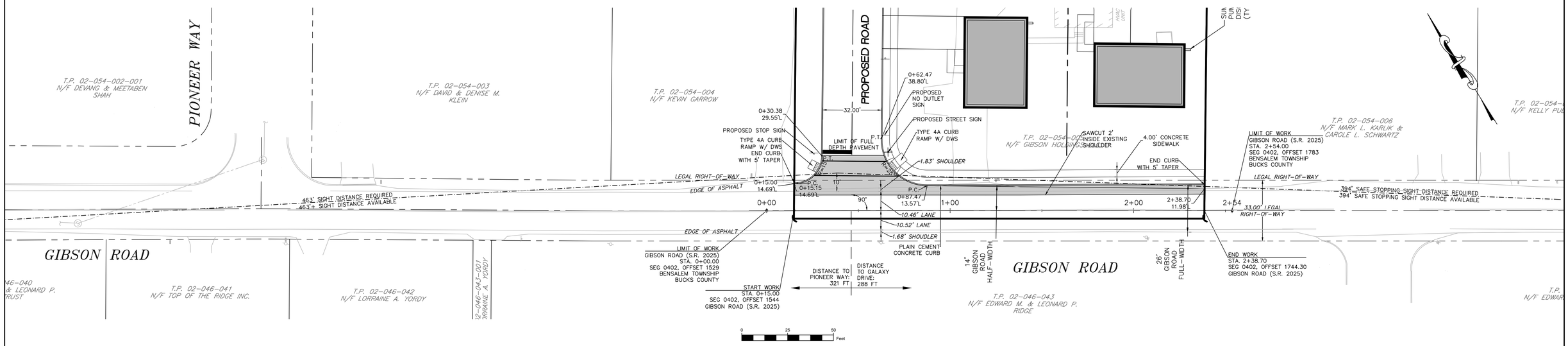
1. ALL MANHOLES, VALVE BOXES, ETC. EXPOSED BY MILLING OR OTHER OPERATIONS WILL BE PROTECTED BY THE CONTRACTOR UNTIL THE FINAL BITUMINOUS WEARING COURSE IS APPLIED.
2. ALL GAS VALVES, WATER VALVES, WATER METERS AND MANHOLES (STORM, SANITARY, TELEPHONE AND ELECTRIC) WITHIN THE PAVEMENT WIDENING WILL BE RESET TO THE PROPOSED FINISHED GRADE.
3. IT IS THE RESPONSIBILITY OF THE PERMITTEE TO MAKE ADJUSTMENTS TO THE AFFECTED DRIVEWAYS.
4. NO UNSUITABLE MATERIAL IS TO BE USED IN ANY PORTION OF THE ROADWAY CONSTRUCTION. REMOVE ANY SUBGRADE THAT CANNOT BE PROPERLY COMPACTED AND TREAT IT AS UNSUITABLE MATERIAL. UNDERCUTTING AND/OR SUBGRADE STABILIZATION MAY BE REQUIRED.
5. EXCESS EXCAVATED MATERIALS AND UNSUITABLE MATERIAL SHALL BE DELIVERED TO A LAWFUL SITE LOCATION IN ACCORDANCE WITH SECTION 203.3 OF PUBLICATION 408/2020.
6. ALL UTILITY RELOCATION PERMITS TAKE PRECEDENCE OVER THE UTILITY RELOCATION POSITIONS SHOWN ON THE HOP PLANS.
7. AN 8" REVEAL MUST BE PROVIDED FOR ALL PROPOSED CURBING WITHIN THE LEGAL RIGHT-OF-WAY.
8. ALL DISTURBED GRASS/LANDSCAPE AREAS OUTSIDE THE ROADWAY IMPROVEMENT AREAS MUST BE RETURNED TO THE ORIGINAL CONDITION OR BETTER. INSTALL TOPSOIL & SEEDING, 4" THICK WITH MULCHING (STRAW) FOR DISTURBED AREAS TO THE SATISFACTION OF THE BUCKS COUNTY CONSERVATION DISTRICT.
9. THE SPEED LIMIT FOR GIBSON ROAD (S.R. 2025) IS 40 MPH.
10. SEE SIGNING AND PAVEMENT MARKING PLANS FOR SIGN PLACEMENT AND RELOCATION.
11. ANY DAMAGED OR SUBSTANDARD CURB WITHIN THE LIMITS OF WORK SHALL BE REPLACED AS NECESSARY.
12. ALL SLOPE MEASUREMENTS WILL BE INSPECTED/VERIFIED WITH A 2 FOOT SMART LEVEL.
13. ALL SIGHT DISTANCE OBSTRUCTIONS (INCLUDING BUT NOT LIMITED TO TO EMBANKMENTS AND VEGETATION) SHALL BE REMOVED BY THE PERMITTEE TO PROVIDE A MINIMUM OF 352 FEET OF CONTINUOUS SAFE STOPPING SIGHT DISTANCE TO THE LEFT AND 463 FEET OF CONTINUOUS SIGHT DISTANCE TO THE RIGHT FOR A DRIVER EXITING THE PROPOSED LOCAL ROAD ONTO THE STATE HIGHWAY. THE DRIVER MUST BE CONSIDERED TO BE POSITIONED 10 FEET FROM THE NEAR EDGE OF THE CLOSEST HIGHWAY THROUGH TRAVEL LANE AT AN EYE HEIGHT OF THREE FEET-SIX INCHES (3'-6") ABOVE THE PAVEMENT SURFACE. THE POINT SIGHTED BY THE EXITING DRIVER SHALL BE THREE FEET-SIX INCHES (3'-6") ABOVE THE PAVEMENT SURFACE LOCATED IN THE CENTER OF THE CLOSEST HIGHWAY TRAVEL LANE DESIGNATED FOR USE BY APPROACHING TRAFFIC. THIS SIGHT DISTANCE SHALL BE MAINTAINED BY THE PERMITTEE. SEE K5.0 PROFILES FOR SIGHT DISTANCE PROFILES.
14. ALL PROPOSED PEDESTRIAN FACILITIES REFLECTED ON THESE PLANS, THAT ARE OUTSIDE OF PENNDOT LEGAL RIGHT-OF-WAY, SHALL BE CONSTRUCTED TO COMPLY WITH THE REQUIREMENTS OF THE U.S. ACCESS BOARD, PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG) OF THE ACCESSIBILITY GUIDELINES OF BUILDINGS AND FACILITIES (ADAG). PENNDOT DESIGN MANUAL PART 2, CHAPTER 6, AND PENNDOT STANDARDS FOR ROADWAY CONSTRUCTION (PUBLICATION 72M, RC-67M) PROVIDE GUIDANCE ON ADA ACCESSIBLE DESIGN FOR PEDESTRIAN FACILITIES AND CAN BE UTILIZED FOR REFERENCE.

LEGEND

SITE SYMBOLS	GRADING SYMBOLS
CURB LINE	EXISTING CONTOUR — 315
EXISTING EDGE OF PAVEMENT LINE	PROPOSED CONTOUR — 315
PROPERTY LINE	EXISTING SPOT ELEVATION — 315.2 x
LEGAL RIGHT-OF-WAY LINE	PROPOSED SPOT ELEVATION — BC=315.27 TC=315.94
PROPOSED FULL DEPTH PAVEMENT	PROPOSED SLOPE — 2.0%
SAWCUT LINE	PROPOSED GRADING EASEMENT

UTILITY SYMBOLS

EXISTING SANITARY SEWER
EXISTING WATER MAIN



File No. 1608_K2.0_RIPLAN.DWG

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER KRISTIN RANDI HOLMES PE 073604

KRISTIN R. HOLMES, P.E.
PA PE073604

1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

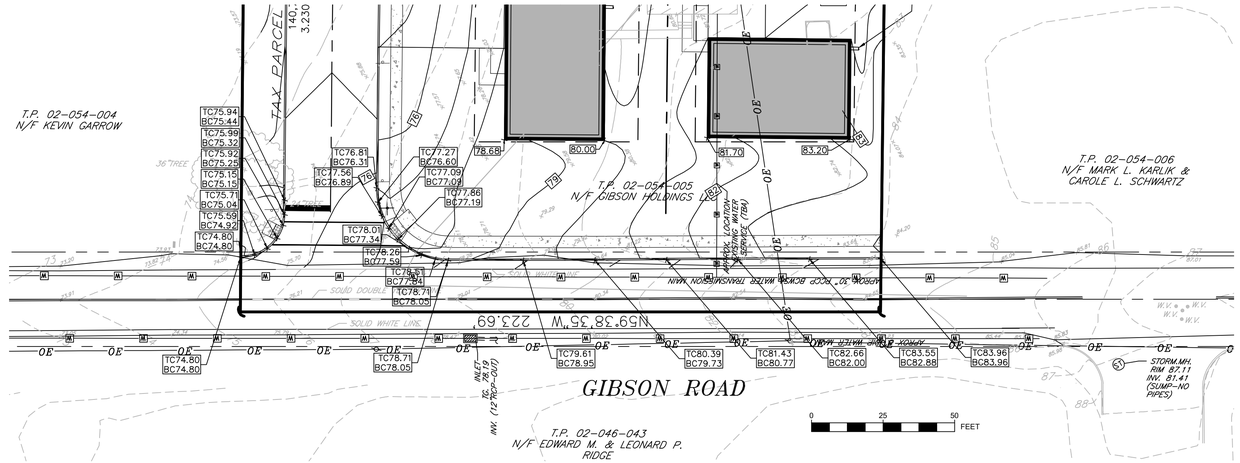
ROADWAY IMPROVEMENT PLAN

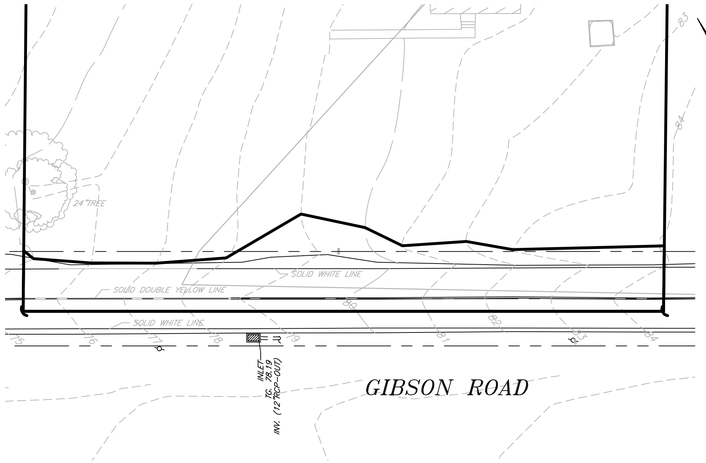
HCE Job #	1608
Date	12/02/2021
Scale	1"=25'
Designed	RS
Sheet	4 of 8

Drawing No. K2.0

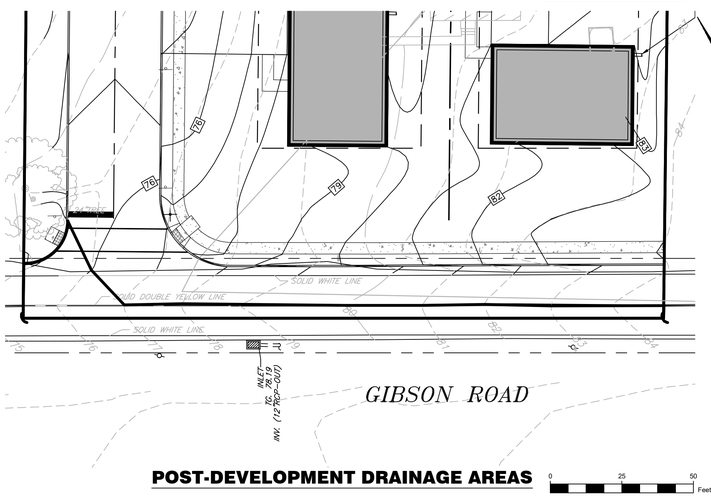
DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	5 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS





PRE-DEVELOPMENT DRAINAGE AREAS



POST-DEVELOPMENT DRAINAGE AREAS

Gibson Road						
Drainage Summary						
Development Status	Drainage Area	Impervious Area	Pervious Area	Drainage Area	Runoff Coefficient "c"	CFS (Q=CIA)
	sf	sf	sf	ac		
PRE	5,051	4,328	723	0.116	0.86	0.72
POST	1,545	1,545	0	0.035	0.95	0.24

Notes:

1) A weighted "c" value was calculated for each drainage area.

2) Runoff Factors for the Rational Equation per Table 10.2.1 of PennDOT publication 13M (DM-2) Impervious c = 0.95, Pervious c = 0.35

3) Rainfall intensities were taken from the intensity-duration-frequency curve, which is based on Pennsylvania Department of Transportation (PADOT) standards.

DRAINAGE CONSTRUCTION NOTES:

1. ALL INLETS, MANHOLES, VALVE BOXES, ETC. EXPOSED BY MILLING OR OTHER OPERATIONS WILL BE PROTECTED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETED.
2. NO UNSUITABLE MATERIAL IS TO BE USED IN ANY PORTION OF THE DRAINAGE CONSTRUCTION. REMOVE ANY SUBGRADE THAT CANNOT BE PROPERLY COMPACTED AND TREAT IT AS UNSUITABLE MATERIAL. UNDERCUTTING AND/OR SUBGRADE STABILIZATION MAY BE REQUIRED.
3. EXCESS EXCAVATED MATERIALS AND UNSUITABLE MATERIAL SHALL BE DELIVERED TO A LAWFUL SITE LOCATION IN ACCORDANCE WITH PUBLICATION 408, CURRENT EDITION WITH LATEST REVISIONS.
4. ALL DISTURBED GRASS/LANDSCAPE AREAS OUTSIDE THE DRAINAGE CONSTRUCTION AREAS MUST BE RETURNED TO THE ORIGINAL CONDITION OR BETTER. INSTALL TOPSOIL & SEEDING, 4-INCHES THICK WITH MULCHING (STRAW) FOR DISTURBED AREAS TO THE SATISFACTION OF THE BUCKS COUNTY CONSERVATION DISTRICT.
5. THE SPEED LIMIT FOR GIBSON ROAD (S.R. 2025) IS POSTED AT 40 MPH.
6. ANY DAMAGED OR SUBSTANDARD CURB WITHIN THE LIMITS OF WORK SHALL BE REPLACED AS NECESSARY.
7. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE EXISTING LOCATION AND/OR ELEVATION OF FEATURES AS SHOWN ON THESE PLANS ARE BASED ON A SURVEY PREPARED BY CAVANAUGH SURVEYING SERVICES. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
8. ALL STORM SEWERS AND STRUCTURES LOCATED OUTSIDE OF THE PENNDOT RIGHT-OF-WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH BENSALEM TOWNSHIP STANDARDS.
9. ALL STORM SEWERS AND STRUCTURES LOCATED WITHIN THE PENNDOT RIGHT-OF-WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH PENNDOT PUBLICATION 408, CURRENT EDITION WITH LATEST REVISIONS, AND PENNDOT PUBLICATION 72M, CURRENT EDITION WITH LATEST REVISIONS.
10. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLE SIZE, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
11. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR REVIEW AND APPROVAL BY THE OWNER FOR BASIN PIPES, CONNECTIONS, OUTLET STRUCTURES, CATCH BASINS, MANHOLES AND OTHER STORM STRUCTURES.
12. ALL STORMWATER AND DRAINAGE FACILITIES ARE A PERMANENT PART OF THE DEVELOPMENT AND SHALL NOT BE REMOVED, ALTERED, OR MODIFIED WITHOUT PRIOR APPROVAL FROM BENSALEM TOWNSHIP.
13. BENSALEM TOWNSHIP SHALL HAVE THE RIGHT TO ENTER PRIVATE PROPERTY TO INSPECT AND REPAIR, IF NECESSARY, ANY STORMWATER MANAGEMENT OR DRAINAGE FACILITY.
14. THE STORMWATER MANAGEMENT BASINS WILL BE OWNED AND MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.
15. ALL STORM PIPES LOCATED OUTSIDE OF PAVED AREAS SHALL HAVE A MINIMUM OF TWO (2) FEET OF COVER.

EXISTING LEGEND

EXISTING

CONTOUR — 185 —
SPOT ELEVATION 185.2 x
TOP/BOTTOM CURB x TC 154.75 BC 154.25
EDGE OF PAVEMENT
PROPERTY/R.O.W. LINE
EASEMENT
FENCE
STORM SEWER Ex.Storm MH Ex.Inlet
SANITARY SEWER Ex.San MH
WATER MAIN, VALVE
FIRE HYDRANT FH
UTILITY POLE, OVERHEAD ELECTRIC OE U-POLE
GAS MAIN, VALVE G G.V.
TRAFFIC SIGNAGE
LIGHT POLE
TREE
WOODLANDS

PROPOSED LEGEND

CURB LINE
R.O.W. LINE
EASEMENT
BASIN/ RAIN GARDEN
BUILDING SETBACK
BUILDING
TRAFFIC SIGNAGE
WOODLANDS

DRAINAGE LEGEND

EXISTING STORM PIPE
EXISTING INLET Ex.Inlet
EXISTING MANHOLE
PROPOSED STORM PIPE
PROPOSED YARD INLET CB-X GR. 185.56 INV 180.00
PROPOSED CURB INLET CB-X GR. 185.56 INV 180.00
PROPOSED MANHOLE MH-X RIM 185.56 INV 180.00

Spread of Flow Calculation

PROJECT NAME: SR 2025 GIBSON ROAD — 1608

Variables

Sx1 = Roadway Cross-Slope (ft/ft)
Sx2 = Proposed Access/Curb Slope (ft/ft)
Sl = Longitudinal Slope (ft/ft)
N = Roughness Coefficient
T = Flow Width
Ku = constant 0.56
Q = Flow (cfs)
I= Rainfall intensity of 10-year storm of 5 minute duration(in/hr)

Equations

Gutter Spread - Along Curb	Gutter Spread - Along Embankment
Sx = Roadway Cross-Slope (ft/ft)	Sx = (Sx1*Sx2)/(Sx1+Sx2)
T = [(Q*N)/(Ku*Sx^(1.67)*Sl^(0.5)]^0.375	T = [(Q*N)/(Ku*Sx^(1.67)*Sl^(0.5)]^0.375
Encroachment = T	Encroachment = T*(Sx2/(Sx1*Sx2))

Q(net) = Q(catchment area) + Q(bypass area)

Drainage Area	Curb (Y/N)	Area (acres)	C	Equivalent Area	I	Q (catchment area)	Q (Bypass area)	Q (net area)	Q (Bypass to Downstream Structure)	Sx1	Sx2	N	Sl	Sx	T	Shoulder Width	Travel Lane Width	Max. Encroachment	Proposed Encroachment	Acceptable?
Proposed Driveway Centerline	N	0.116	0.95	0.110	6.3	0.69	0.00	0.69	0.00	0.034		0.013	0.043	0.034	3.19	3.0	10.5	8.3	3.2	YES

Note: As per Chapter 10.3.A.2 of PennDOT publication 13M (DM-2), for curbed sections, the maximum encroachment of water on the roadway pavement shall not exceed half of a through traffic lane during a 10-year storm of 5 minute duration.The maximum depth at the curb shall be 25 mm (1 in) below the top of the curb.

*Capacity calculated using Efficiency Curve figures 10.3.1(English) through 10.3.4 (English) and Table 10.3.1 Capacity of Type C Inlet, unless otherwise noted.

**Maximum capacity of 18" pipe at 0.5% slope

File No. 1608_K3.0_DRAINAGE.DWG

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KRISTIN R. HOLMES, P.E.
PA PE073604

1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

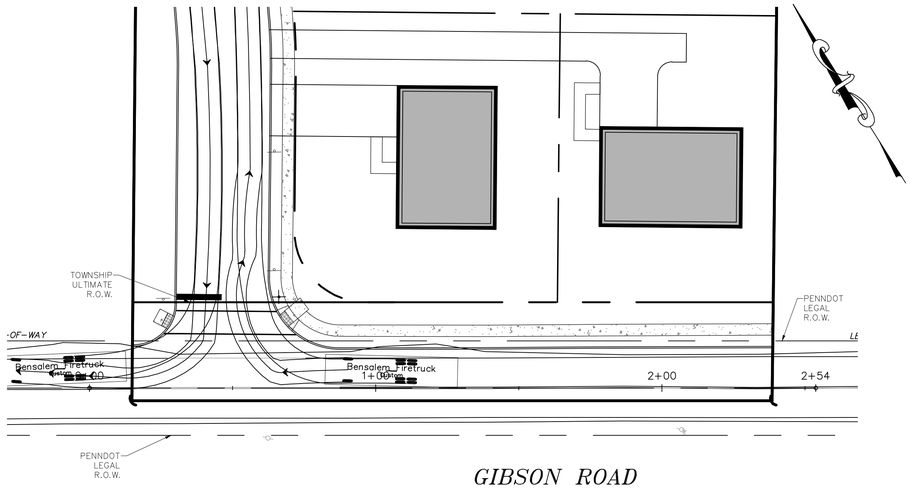
GRADING AND DRAINAGE PLAN

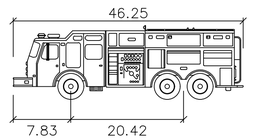
HCE Job #	1608
Date	12/02/2021
Scale	AS SHOWN
Designed	RS
Sheet	5 of 8

Drawing No. K3.0

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	6 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS





Bensalem Pumper

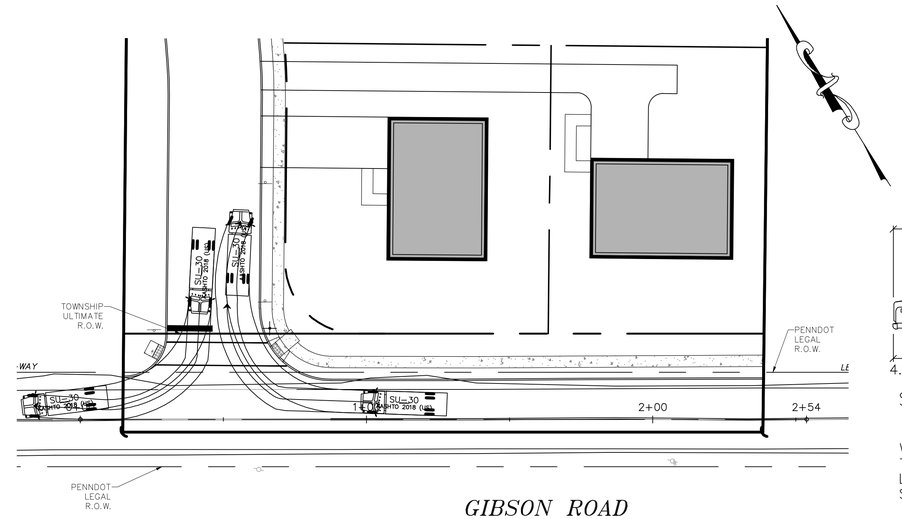
	feet
Width	: 10.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

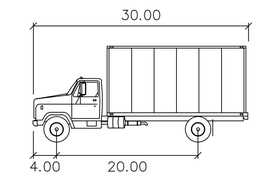
GIBSON ROAD

TRUCK TURNING MOVEMENTS
1515 GIBSON ROAD SUBDIVSION ROAD

NOTE: FIRETRUCK USED FOR TURNING MOVEMENTS.

0 25 50 Feet





SU-30

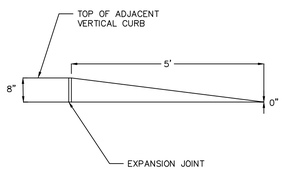
	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

GIBSON ROAD

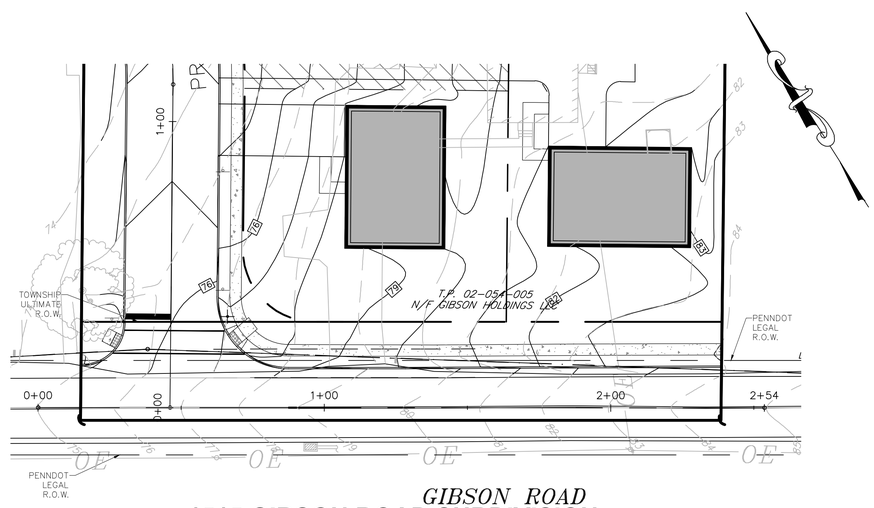
TRUCK TURNING MOVEMENTS
1515 GIBSON ROAD SUBDIVSION ROAD

NOTE: SU-30 USED FOR TURNING MOVEMENTS.

0 25 50 Feet



CURB TAPER DETAIL

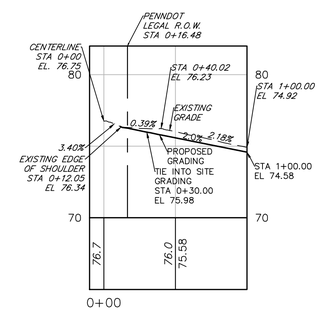


GIBSON ROAD

1515 GIBSON ROAD SUBDIVISION
ROAD PLAN
LOCATED AT STA. 0+46.11

SCALE: 1"=25'

0 25 50 Feet



1515 GIBSON ROAD SUBDIVISION
ROAD PROFILE
LOCATED AT STA. 0+46.11

SCALE: H: 1"=50' V: 1"=5'

0 50 100 Feet 0 5 10 Feet

File No. 1608_K4.0_TruckTurn.DWG

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1515 GIBSON ROAD SUBDIVISION
TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

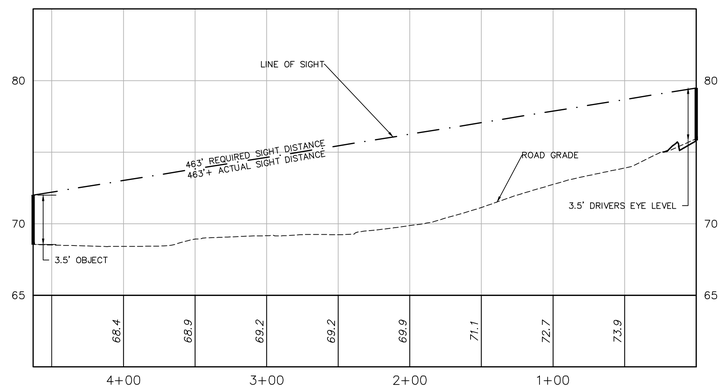
DRIVEWAY PROFILE AND TRUCK TURNING MOVEMENTS

HCE Job #	1608
Date	12/02/2021
Scale	AS SHOWN
Designed	RS
Sheet	6 of 8

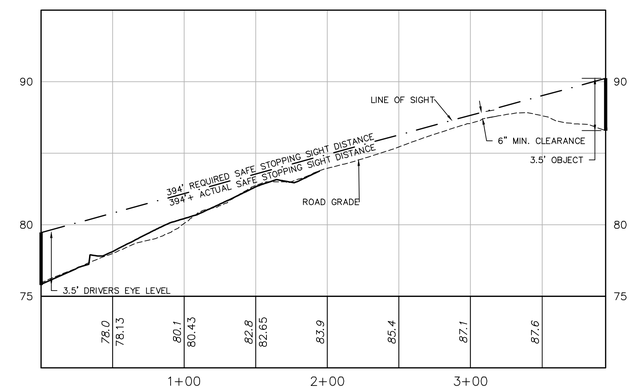
Drawing No. K4.0

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	7 OF 8
BENSALEM TOWNSHIP				

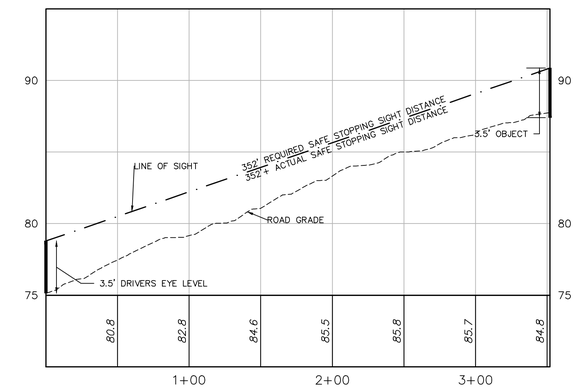
REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS



PROPOSED ROAD – EXITING LOOKING RIGHT PROFILE

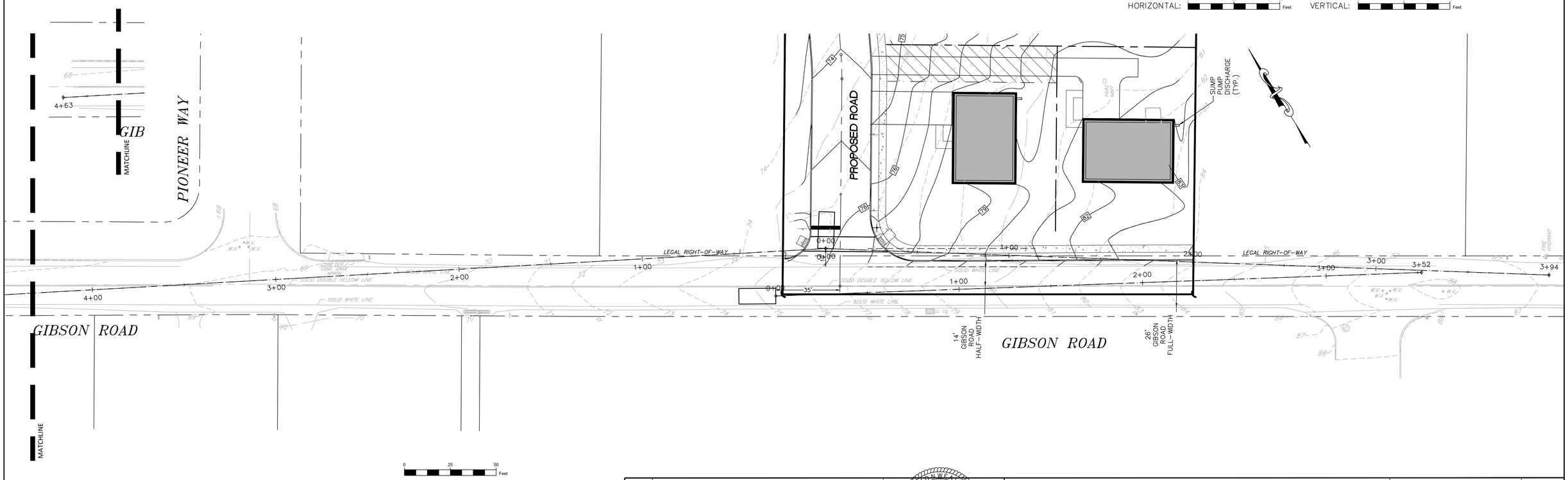


PROPOSED ROAD – EXITING LOOKING LEFT PROFILE



GIBSON ROAD – ENTERING PROFILE

HORIZONTAL: 0 50 100 Feet VERTICAL: 0 5 10 Feet



File No. 1608_K5.0_Profiles.DWG

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1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

SIGHT DISTANCE PLAN AND PROFILES

HCE Job #	1608
Date	12/02/2021
Scale	AS SHOWN
Designed	RS
Sheet	7 of 8

Drawing No. K5.0

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	BUCKS	2025	-	8 OF 8
BENSALEM TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY
1	PLAN REVISIONS	12/22/21	EC
2	REVISIONS BASED ON PENNDOT COMMENTS	7/15/22	RS

PATA 102

1. For operations of 15 minutes or less:

   a) The ROAD WORK sign is not required.

   b) All channelizing devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.

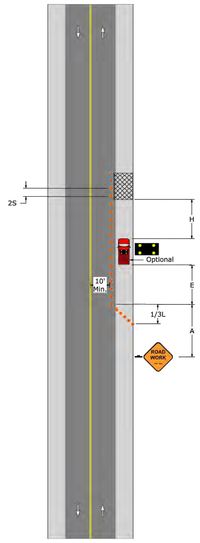
2. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.

Signs
W20-1

Sign Spacing, Channelizing Device Spacing, Buffer Space, and Roll Ahead Space					
Speed	Channelizing Devices Spacing	Sign Spacing		Buffer Space	Roll Ahead Space
		Urban	Rural		
S (MPH)	2S (Feet)	A (Feet)	A (Feet)	E (Feet)	H (Feet)
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number of Channelizing Devices		
Speed	Shoulder Taper: 1/3L	
S (MPH)	Length (Feet)	Minimum Number Of Devices
25	45	6
30	60	6
35	85	6
40	110	6
45	180	6
50	200	6
55	220	6

PATA 102



PATA 101-A

1. The shadow vehicle and TTC devices are not required if the work space is outside the highway right-of-way, behind barrier, more than 2' behind curb, or 15' or more from the edge of the roadway.

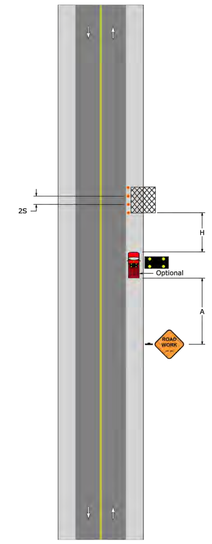
2. For operations of 60 minutes or less, all TTC devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.

3. When a shadow vehicle is not used, distance A is measured from the ROAD WORK sign.

Signs
W20-1

Sign Spacing, Channelizing Device Spacing, and Roll Ahead Space				
Speed	Channelizing Devices Spacing	Sign Spacing		Roll Ahead Space
		Urban	Rural	
S (MPH)	2S (Feet)	A (Feet)	A (Feet)	H (Feet)
25	50	100 - 200	500 - 800	150
30	60	100 - 200	500 - 800	150
35	70	100 - 200	500 - 800	150
40	80	350 - 500	500 - 800	150
45	90	350 - 500	500 - 800	150
50	100	350 - 500	500 - 800	250
55	110	350 - 500	500 - 800	250

PATA 101-A



PATA 107

1. Flaggers shall be clearly visible to traffic for a minimum distance of E.

2. For operations of 15 minutes or less:

   a) The ROAD WORK, ONE LANE ROAD, and FLAGGER SYMBOL signs are not required.

   b) All channelizing devices may be eliminated if a shadow vehicle is present and the operation does not proceed against normal traffic flow.

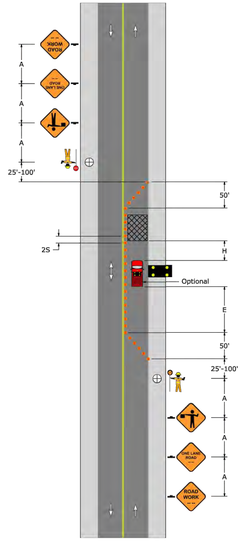
3. When a shadow vehicle is not used, distance E is measured from the end of the taper to the beginning of the work space.

Signs		
W20-1	W20-4	W20-7

Sign Spacing, Channelizing Device Spacing, Buffer Space, and Roll Ahead Space					
Speed	Channelizing Devices Spacing	Sign Spacing		Buffer Space	Roll Ahead Space
		Urban	Rural		
S (MPH)	2S (Feet)	A (Feet)	A (Feet)	E (Feet)	H (Feet)
25	50	100 - 200	500 - 800	155	150
30	60	100 - 200	500 - 800	200	150
35	70	100 - 200	500 - 800	250	150
40	80	350 - 500	500 - 800	305	150
45	90	350 - 500	500 - 800	360	150
50	100	350 - 500	500 - 800	425	250
55	110	350 - 500	500 - 800	495	250

Taper Lengths and Minimum Number Of Channelizing Devices		
Speed	50' Per Lane Taper	
S (MPH)	Length (Feet)	Minimum Number Of Devices
25	50	6
30	50	6
35	50	6
40	50	6
45	50	6
50	50	6
55	50	6

PATA 107



GENERAL NOTES:

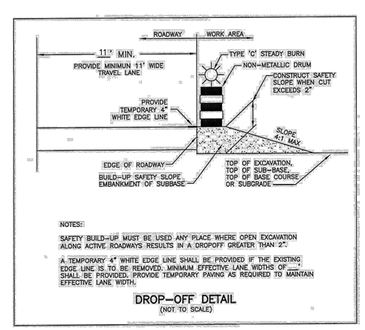
1. MAINTENANCE AND PROTECTION OF TRAFFIC DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE PATA FIGURES 101-A, 102 AND 107 IN ENNDOT PUBLICATION 213, "WORK ZONE TRAFFIC CONTROL GUIDELINES", AMENDED MARCH 2021, AND TITLE 67 PA CODE, CHAPTER 212, "OFFICIAL TRAFFIC CONTROL DEVICES", MOST CURRENT EDITION WITH LATEST REVISIONS..
2. THIS WORK CONSISTS OF THE MAINTENANCE OF TRAFFIC AND THE PROTECTION OF THE TRAVELING PUBLIC APPROACHING THE CONSTRUCTION AREA AND WITHIN THE LIMITS OF CONSTRUCTION.
3. FURNISH, ERECT, PLACE AND MAINTAIN TRAFFIC CONTROL SIGNS AND DEVICES AND MAINTAIN TRAFFIC DURING THE HOURS OF CONSTRUCTION AND AT ALL OTHER TIMES IN ACCORDANCE WITH THE METHODS INDICATED ON THESE DRAWINGS, AND;
   A. THE SPECIAL PROVISIONS OF THE CONTRACT.
   B. PA CODE, TITLE 67, CHAPTER 203, WORK ZONE TRAFFIC CONTROL.
   C. PA CODE, TITLE 67, CHAPTER 211, OFFICIAL TRAFFIC CONTROL DEVICES.
   D. DOT PUBLICATION NO. 35, APPROVED CONSTRUCTION MATERIALS.
   E. DOT PUBLICATION NO. 408, SPECIFICATIONS.
4. THE ENGINEER WILL INSPECT ALL TRAFFIC CONTROL DEVICES PRIOR TO THE START OF WORK.
5. NO TRAFFIC RESTRICTIONS OR LANE CLOSURES ARE PERMITTED ON LEGAL HOLIDAYS AND/OR BETWEEN THE HOURS OF 6:00AM TO 9:00AM AND 3:00PM TO 6:00PM, MONDAY THROUGH FRIDAY.
6. NOTIFY THE LOCAL MUNICIPALITY WHEN A SIGNALIZED INTERSECTION FALLS WITHIN THE WORK ZONE. DO NOT FLAG A SIGNALIZED INTERSECTION WITHOUT THE MUNICIPALITY PLACING THE SIGNAL ON FLASH.
7. USE "ROAD WORK" LEGEND IN LIEU OF "ROAD CONSTRUCTION" LEGEND ON ALL APPLICABLE SIGNS.
8. REMOVE ALL SHORT-TERM WZTC SIGNING UPON COMPLETION OF THAT DAY'S WORK PERIOD.
9. DO NOT STOP TRAFFIC FLOW WITHIN THE WORK AREA FOR MORE THAN A 5-MINUTE PERIOD AT ANY ONE TIME.
10. THE USE OF PATA FIGURE 102 WILL BE AT THE DISCRETION OF THE PENNDOT FIELD REPRESENTATIVE ONLY.
10. THE CONTRACTOR MUST NOTIFY THE DISTRICT 6-0 TRAFFIC MANAGEMENT CENTER (TMC) TWO (2) DAYS IN ADVANCE OF ANY PROPOSED LANE OR SHOULDER RESTRICTIONS OR ROAD CLOSURES, AND FIFTEEN (15) MINUTES PRIOR TO START OF WORK. THE CONTRACTOR MUST NOTIFY THE TMC WHEN THE ROAD IS RESTORED TO NORMAL OPERATION. THE TMC PHONE NUMBER IS (610) 205-6934.
11. ACCESS TO ALL DRIVEWAYS WILL BE MAINTAINED AT ALL TIMES.

SEQUENCE OF CONSTRUCTION:

1. SET TRAFFIC CONTROL AND MAINTENANCE AND PROTECTION MEASURES AS DEFINED IN FIGURE 101-A FOR MAINTENANCE AND PROTECTION OF TRAFFIC THROUGHOUT THE DURATION OF IMPROVEMENTS ALONG GIBSON ROAD (S.R. 2025). FIGURE 102 OR FIGURE 107 WILL BE UTILIZED AT THE DISCRETION OF THE PENNDOT FIELD REPRESENTATIVE. IF SHOULDER WIDTH DOES NOT PERMIT.
2. PROVIDE TEMPORARY W/4" EDGE LINE IF NECESSARY.
3. EXCAVATE AREA OF EXISTING DRIVEWAY TO BE REMOVED.
4. INSTALL PROPOSED CURB AND CURB RAMPS.
5. INSTALL PROPOSED PAVEMENT SECTION.
6. ERADICATE EXISTING PAVEMENT MARKINGS THAT ARE NO LONGER NECESSARY.
7. PLACE ALL FINAL PAVEMENT MARKINGS AND INSTALL PROPOSED SIGNS PER THE PLACEMENTS OF THE SIGNING AND PAVEMENT MARKING PLAN.

DROP OFF NOTES:

1. THE FOLLOWING CONDITIONS AND TREATMENTS APPLY TO DROP OFFS CREATED BY CONSTRUCTION, MAINTENANCE OR PERMIT/UTILITY OPERATIONS.
2. DRAINAGE DITCHES ARE NOT CONSIDERED AS DROP OFFS IN THIS SECTION.
3. WHEN CHANNELIZING DEVICES ARE USED FOR A DROP OF CONDITION, A MINIMUM OF 2 DEVICES ARE REQUIRED.
4. IF A DROP OFF IS GREATER THAN 6-INCHES OR THE DISTANCE FROM THE DROP OFF TO THE EDGE OF THE TRAVEL LANE IS SUCH THAT CHANNELIZING DEVICES MUST BE PLACED BELOW GRADE, POSITION THE DEVICES ON A STABLE PLATFORM SO THAT THE BOTTOMS ARE AT GRADE.
5. TEMPORARY CONCRETE MEDIAN BARRIERS MAY BE USED AT THE DEPARTMENTS DISCRETION.
6. SPACING OF CHANNELIZING DEVICES FOR DROP OFFS:
   A. SPACE ALL CHANNELIZING DEVICES 2-TIMES THE NORMAL SPEED LIMIT (IN FEET) OR CLOSER, AS DIRECTED.
7. DROP OFFS BETWEEN THE EDGE OF THE TRAVEL LANE AND SHOULDER:
   A. IF A DROP OFF LESS THAN OR EQUAL TO 2-INCHES EXISTS BETWEEN THE EDGE OF THE TRAVEL LANE AND THE SHOULDER, CHANNELIZING DEVICES ARE NOT REQUIRED.
   B. A DROP OFF GREATER THAN 2-INCHES IS NOT PERMITTED. PAVE OR PLACE TEMPORARY BACKFILL (4:1 MAX SLOPE) AT COMPLETION OF EACH WORK DAY.
   C. INSTALL "LOW SHOULDER" SIGNS (W8-11), AT INTERVALS NOT EXCEEDING 2-MILES, THROUGHOUT THE DROP OFF CONDITION TO SUPPLEMENT THE CHANNELIZING DEVICES.
8. DROP OFFS IN OR BEYOND THE SHOULDER:
   A. IF A DROP OFF LESS THAN OR EQUAL TO 2-INCHES EXISTS IN OR BEYOND THE SHOULDER AREA, CHANNELIZING IN OR BEYOND THE SHOULDER AREA, INSTALL CHANNELIZING DEVICES THROUGHOUT THE DROP OFF CONDITION UNLESS THE DROP OFF IS:
      - OUTSIDE THE RIGHT-OF-WAY, OR;
      - BEHIND THE GUIDERAIL, OR;
      - BEHIND CURB, OR;
      - 15-FEET OR MORE FROM THE EDGE OF ROADWAY



DROP-OFF DETAIL
(NOT TO SCALE)

File No. 1608_K6.0_MPT FIGS.DWG

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1515 GIBSON ROAD SUBDIVISION

TMP # 02-054-005
1515 GIBSON ROAD
BENSALEM TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

MAINTENANCE AND PROTECTION OF TRAFFIC

HCE Job #	1608
Date	12/02/2021
Scale	NOT TO SCALE
Designed	RS
Sheet	8 of 8

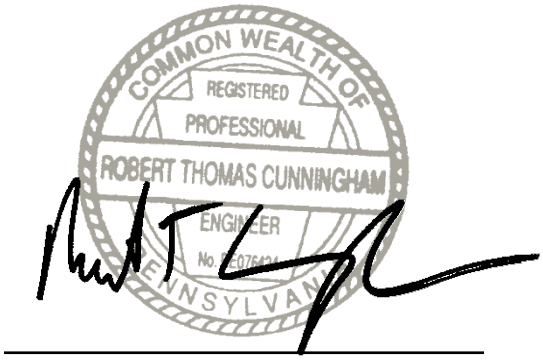
Drawing No. K6.0

POST CONSTRUCTION STORMWATER MANAGEMENT PLAN NARRATIVE

1515 GIBSON ROAD SUBDIVISION

1515 Gibson Road
TMP# 02-054-005
Bensalem Township, Bucks County, PA

Prepared For:
Gibson Holdings LLC
300 Farm Lane
Doylestown, PA 18901



Robert Cunningham, P.E.
PA License No. PE 076424

Revised July 15, 2022
May 27, 2021
HCE Job 1608

TABLE OF CONTENTS

Page

INTRODUCTION **1**

General Project Information 1
Plan Preparer 1

EXISTING CONDITIONS **1**

Existing Site Description 1
Existing Stormwater Management 1
Chapter 93 Classification and TMDL Status 1

PROPOSED CONDITIONS **2**

Proposed Development 2
Proposed Stormwater Management 2

DESIGN METHODOLOGY **2**

Stormwater Management Design – Peak Rate Control 2
Stormwater Management Design – Volume Control 2

PROPOSED POST CONSTRUCTION STORMWATER MANAGEMENT PRACTICES **3**

Past, Present and Proposed Land Uses 4
Topography 4
Soil Types and Limitations 4
Existing Geologic Formation and Soil Conditions 5

BEST MANAGEMENT PRACTICES (BMPs) **5**

Non-Structural BMPs 5
Structural BMPs 5
BMP Maintenance 5

CRITICAL STAGES OF PCSM PLAN IMPLEMENTATION **6**

THERMAL IMPACTS ANALYSIS **6**

INFILTRATION TESTING **6**

CONCLUSION **6**

LIST OF FIGURES

FIGURE	DESCRIPTION
1	Site Location Map
2	Pre Development Drainage Area Map
3	Post Development Drainage Area Map
4	Inlet Drainage Area Map

LIST OF APPENDICES

APPENDIX	DESCRIPTION
A	Stormwater Peak Rate Calculations
B	Stormwater Volume Calculations
C	On-Site Storm Sewer Calculation

INTRODUCTION

This report addresses the engineering design of the stormwater conveyance and management systems for the site. These facilities have been designed in accordance with regulations set forth by the Bensalem Township Stormwater Management Ordinance and the regulations of the Pennsylvania Department of Environmental Protection.

General Project Information

The Gibson Road Redevelopment consists of the construction of 6 homes on a 3.22-acre tract. The total limit of disturbance is 2.70 acres. The site is T.M.P. # 02-054-005 and is located at 1515 Gibson Road, Bensalem Township, Bucks County. The site contains an existing a vacant single-family dwelling and detached garage with associated parking and driveway. The rest of the site consists of fields and woodlands with mild slopes.

Plan Preparer

The Post Construction Stormwater Management Plan has been prepared by Mr. Robert Cunningham, P.E. of Holmes Cunningham Engineering, Doylestown, PA. Holmes Cunningham Engineering is a civil engineering consulting firm established in 2013 with partners that have over 25 years combined experience in the land development engineering field.

EXISTING CONDITIONS

Existing Site Description

The existing 3.22-acre site is currently developed with a single-family dwelling, detached garage, and driveway. The site takes vehicular access from Gibson Road to the south. The site is bordered by the residential uses to the east and west. The site is bordered on the south by Gibson road. At the north is an existing unnamed tributary to Neshaminy Creek. There is an existing septic system on the site.

Existing Stormwater Management

There are no existing stormwater management facilities located on the site. The existing site sheet flows into an onsite unnamed tributary of Neshaminy Creek and ultimately to the Delaware River. The stormwater runoff was analyzed at one point of analysis. Point of analysis 1 (POA-1) is located at the northwestern corner of the site.

Chapter 93 Classification and TMDL Status

The site drains to an unnamed tributary of the Neshaminy Creek, which ultimately discharges to the Delaware River. The unnamed Tributary has an existing and designated classification under Chapter 93 as “WWF – Warm Water Fishes” and “MF – Migratory Fishes”. The Neshaminy Creek is subject to a TMDL for Siltation caused by Suspended Solids.

Act 167 Plan

The proposed stormwater management design has been prepared to comply with the Neshaminy Creek Act 167 dated April 2011.

PROPOSED CONDITIONS

Proposed Development

The proposed development will consist of 6 new single-family homes which will be arranged along a constructed roadway. The roadway will be 32-feet wide and have curb and sidewalk. The development will also contain open space areas which will primarily be used for stormwater management and natural resource preservation.

Proposed Stormwater Management

A storm sewer system is proposed to collect runoff from the proposed homes and street. All storm sewers will be placed in easements or located in the street. The proposed BMP stormwater control facilities will also be contained within open space/easements. The proposed system is designed to collect the runoff and direct it to the existing discharge points from the site. Prior to discharge from the site the storm sewers will discharge to an infiltration facility.

In order to meet township requirements for peak rate, the proposed discharges will be directed to rain garden, which are proposed as part of the project. These facilities will attenuate the peak rate of runoff from the site. The rain garden has been designed to provide infiltration of stormwater to meet township and state stormwater volume requirements.

DESIGN METHODOLOGY

Stormwater Management Design – Peak Rate Control

A detailed analysis of both the pre-development and post-development stormwater runoff has been performed in order that the facilities proposed to control stormwater be designed to meet the Township's and PADEP's stormwater control criteria.

Hydrographs for the existing and proposed watersheds were developed using the Dekalb Rational Method.

A value for area, runoff coefficient (C), and time of concentration (Tc) was calculated for each watershed. The runoff coefficient is a land sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff. Based on the coverage of soil groups and land use in the area, an average C was determined for each watershed for existing and proposed conditions.

To calculate time of concentration for each watershed, the method outlined in the USDA Soil Conservation Service Publication TR-55 "Urban Hydrology for Small Watersheds." The TR-55 procedure simulates a watershed as a series of overland flows, channel flows, and inflow and outflow structures for its contribution to runoff.

Rainfall intensities were taken from the intensity-duration-frequency curve, which is based on Pennsylvania Department of Transportation (PADOT) standards.

Stormwater Management Design – Volume Control

An analysis of both the pre-development and post-development stormwater runoff volumes has

been performed in order to demonstrate that the facilities proposed control stormwater volumes below the existing rates for storms up to the 2-year storm. The analysis was performed using the direct runoff method which utilizes the method outlined in the USDA Soil Conservation Service Publication TR-55 "Urban Hydrology for Small Watersheds."

The BMP calculations for the proposed volume reductions were computed using a spreadsheet that was prepared in conjunction with the PADEP. These BMP calculations include the volume stored within the BMP along with the volume which is infiltrated during the duration of the storm, using a factor of safety of 2 for the tested infiltration rate. These calculations assume that the stormwater BMP is empty at the start time of 2-year storm.

PROPOSED POST CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

In accordance with the requirements set forth in Chapter 102.8, *the following measures and facilities are utilized to preserve the integrity of existing features and stormwater runoff, as well as maintain and protect the qualities of the receiving streams.*

Limiting Exposed Extent and Duration of Disturbed Areas

The extent of disturbed land has been limited to include only those areas required for the development of the subject site. All sediment and erosion control practices are to be installed prior to any major soil disturbance or in their proper sequence and maintained until permanent protection is established. Upon completion or temporary cessation of the earth disturbance activity, or any stage thereof, the project site shall be immediately stabilized.

Protection of Existing Drainage Features and Vegetation

The limit of disturbance is minimized to reduce the disturbance to the existing features. The existing vegetation is to remain to the maximum extent possible.

Minimize Impervious Areas

The project has limited impervious areas proposed to the maximum extent possible. The site plan has clustered the development to reduce the extent of proposed roadways and the driveways are the minimum acceptable length.

Minimize Land Clearing

The project has limited the soil disturbance area to the maximum extent possible and land clearing is limited to the areas shown on the plan.

Minimize Soil Compaction

The project has limited the soil disturbance area. Additionally, the soil will be minimally compacted in non-structural areas. This will help reduce runoff from these areas and increase the infiltration capacity of the soil.

Features and Measures to Minimize Stormwater Runoff

Temporary Stabilization: Upon completion or temporary cessation of the earth disturbance activity, or any stage thereof, the project site shall be immediately stabilized. The disturbed areas will also be mulched with unrotted straw or salt hay. Temporary stabilization measures are

specified on Soil Erosion and Sediment Pollution Control Detail Plans.

Permanent Stabilization: All slopes and disturbed areas shall be stabilized with permanent seeding and landscaping as soon as possible after the final earthmoving and construction activities have been completed.

Solids Separation: Prior to any site disturbance or construction activities, a gravel buffer will be installed at the edge of the existing driveway to serve as a construction entrance. In addition, filter fabric fencing will be constructed around the project area, down gradient from any disturbance, to prevent sediment from leaving the site. Filter fabric silt fencing will be constructed and will remain operational until permanent control measures are in place. Inlet protection will be installed in the proposed inlets to capture solids closer to the sources.

Features and Measures to Minimize Stormwater Runoff Volume
A Rain Garden is to be installed to infiltrate runoff before it leaves the site. This BMP will reduce the runoff volume from the site below the existing condition.

SPECIFIC PLAN REQUIREMENTS

The post construction stormwater management plan has been designed to minimize any increase in stormwater runoff rate or volume after construction of the project. Factors that contribute to stormwater runoff have been considered and addressed during preparation of the plan.

Past, Present and Proposed Land Uses
The site has historically (for the past 50 years) been used for single-family dwelling. The buildings are still in place and the site is proposed to be used for residential homes.

Topography
All existing topographic features of the project area and immediately surrounding areas have been shown on the plans. Additionally, the project site has been delineated on the USGS Quadrangle and is included as Figure 1 of this report.

Soil Types and Limitations
The site has been delineated using Buck County Soil Survey Map, as shown on drawing C6.4. The following soils are identified within the limits of construction.

SOIL TYPES					
SYM	**NAME**	**Hydric (Y/N)**	**Depth to Bedrock (in.)**	**Depth to Water Table (in.)**	**HSG**
Ha	Hatboro silt loam	Y	60-99	0-6	D
DdA	Doylestown silt loam, 0 to 3 percent slopes	Y	60-72	0-6	C/D
LkB	Lawrenceville silt loam, 3 to 8 percent slopes	N	48-99	18-36	C
UnB	Urban Land-duffield complex, 0 to 8 percent slopes	N	10-100	>80	B

The soils found within the project limits have varying limitations including possible shallow depth to groundwater and possible shallow depth to bedrock. In order to resolve the groundwater limitation, any standing water should be pumped through a sediment filter bag. To resolve the bedrock limitation, the contractor shall determine whether rock is rippable. If rock is not rippable, blasting will be required. All blasting shall meet all local, county, state and federal regulations.

Existing Geologic Formation and Soil Conditions

The existing site is not underlain by any naturally occurring geologic formations or soil conditions which could cause pollution during earth disturbance.

BEST MANAGEMENT PRACTICES (BMPS)

The current NPDES regulations put emphasis on addressing stormwater quality in addition to addressing quantity reductions. A number of Best Management Practices (BMP's) are proposed in the stormwater runoff and conveyance design to meet the NPDES requirements. Below is a list of BMPs used to achieve the requirements of Bensalem Township and PADEP. Please see Appendix B for BMP calculations and the PCSM plan for illustration of BMPs and points of interest.

Non-Structural BMPs

Re-Vegetate Disturbed Areas: All disturbed areas will be permanently seeded or landscaped. Additionally, new trees will be planted through the site to reduce the thermal impacts of impervious surfaces and reduce runoff volume through transpiration.

Rooftop Disconnection: Disconnecting roof leaders from conventional stormwater conveyance systems allows rooftop runoff to be collected and managed on site. Rooftop runoff can be directed to designated areas for on-site storage, treatment and volume control. The proposed roof leaders for each dwelling unit will discharge to vegetated areas.

Structural BMPs

Rain Garden: The BMP is designed to reduce the peak rate of stormwater discharge from the site. The BMP will be constructed with an outlet structure which controls the rate of flow from the basin. The BMP is also equipped with an emergency spillway which is designed to safely convey stormwater downstream without compromising the structural integrity of the BMP. The BMP is also designed to recharge groundwater. The infiltration tests in the location of the BMPs determined that the existing soils had good infiltration rates. The stored volume will be infiltrated to help reduce the runoff volume below the existing levels for the 2-year storm. Plants and soil media are proposed to be installed to filter pollutants from the stormwater prior to recharge/ discharge from the basin.

BMP Maintenance

The proposed stormwater management facility and Best Management Practices will be owned and maintained by the homeowner's association. A Best Management Practices Maintenance Plan can be found on the PCSM Drawing.

CRITICAL STAGES OF PCSM PLAN IMPLEMENTATION

The construction of the rain garden will require the oversight of a licensed professional or their designee.

THERMAL IMPACTS ANALYSIS

Thermal impacts will be minimized through the installation of the rain garden which will capture and infiltrate the initial runoff which has the highest temperature. Additionally, area disturbed will be permanently seeded. Thermal impacts will also be minimized during construction because the run off from disturbed areas will be filtered through a sediment facility prior to discharging off site.

INFILTRATION TESTING

Infiltration testing and soils evaluation was performed on May 10, 2021 by Schetter Environmental. The calculations for volume control reflect the results of that testing.

A total of 4 soil test pits were excavated as part of the stormwater investigation. Test pit locations are shown in report found in Appendix B. Infiltration tests were also performed in each of these areas.

The infiltration tests were performed below the invert elevations of the proposed facilities. The infiltration testing showed infiltration rates of between 0.75 and 2.25 inches per hour. Due to these infiltration rates, the rain garden has been designed with a clean planting soil mix to allow for quick absorption/ infiltration of the stormwater but will require no other modifications to operate properly. Additionally, we recommend that the existing subsoil be scarified prior to construction of the basins.

The results of that testing can be found in Appendix B.

CONCLUSION

The proposed development will reduce the peak rate of runoff below the actual existing flows to each point of discharge from the site in all storm events. Below is a table comparing the actual existing peak flows to the point of discharge with the proposed peak flows.

STORM (YR)	PEAK DISCHARGE TO POA #1		
	EXISTING (CFS)	PROPOSED (CFS)	NET CHANGE (CFS)
2	3.545	2.769	-0.776
5	4.308	3.833	-0.475
10	4.866	4.502	-0.364
25	7.008	6.403	-0.605
50	7.778	7.052	-0.726
100	8.544	7.703	-0.841

Below is a table comparing the actual existing runoff volume to the point of discharge with the proposed runoff volume for the 2-year storm event.

STORM (YR)	RUNOFF VOLUME (UNT Neshaminy Creek)		
	EXISTING (CF)	PROPOSED (CF)	NET CHANGE (CF)
2	10,669	8,389	-2,280

As Shown in the table above, the site complies with the township's requirements for discharges to the Neshaminy Creek. Also, the on-site storm sewer systems have been designed to safely convey the 100-year storm. Additionally, the stormwater management system has been designed to comply with the regulations of Bensalem Township and the PADEP. It is our opinion that the proposed development will have no negative impact to the downstream properties.

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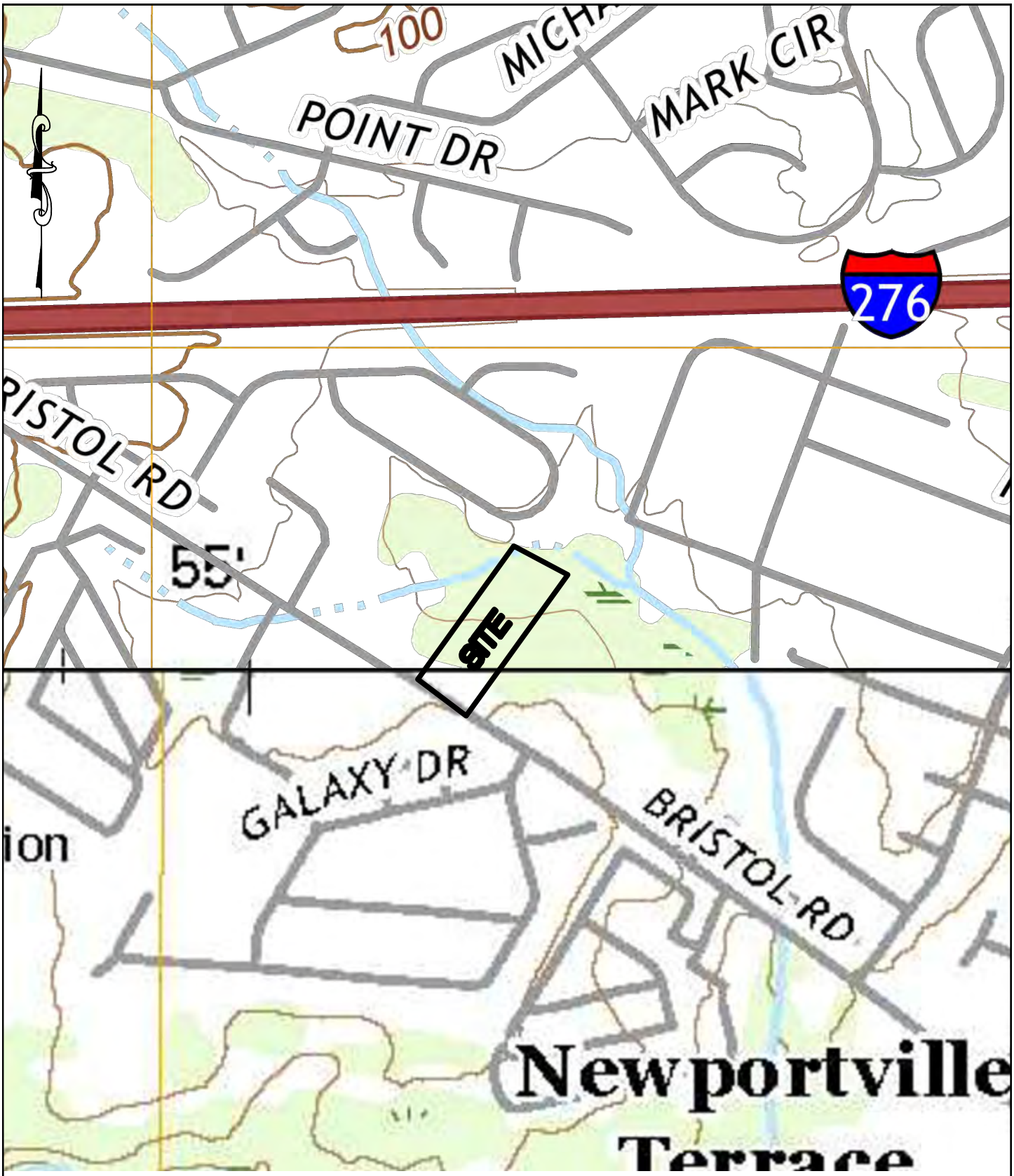
FIGURES



0 500 1000 Feet

REFERENCE: USGS BEVERLY QUADRANGLE

File No. StormwaterFigures.dwg

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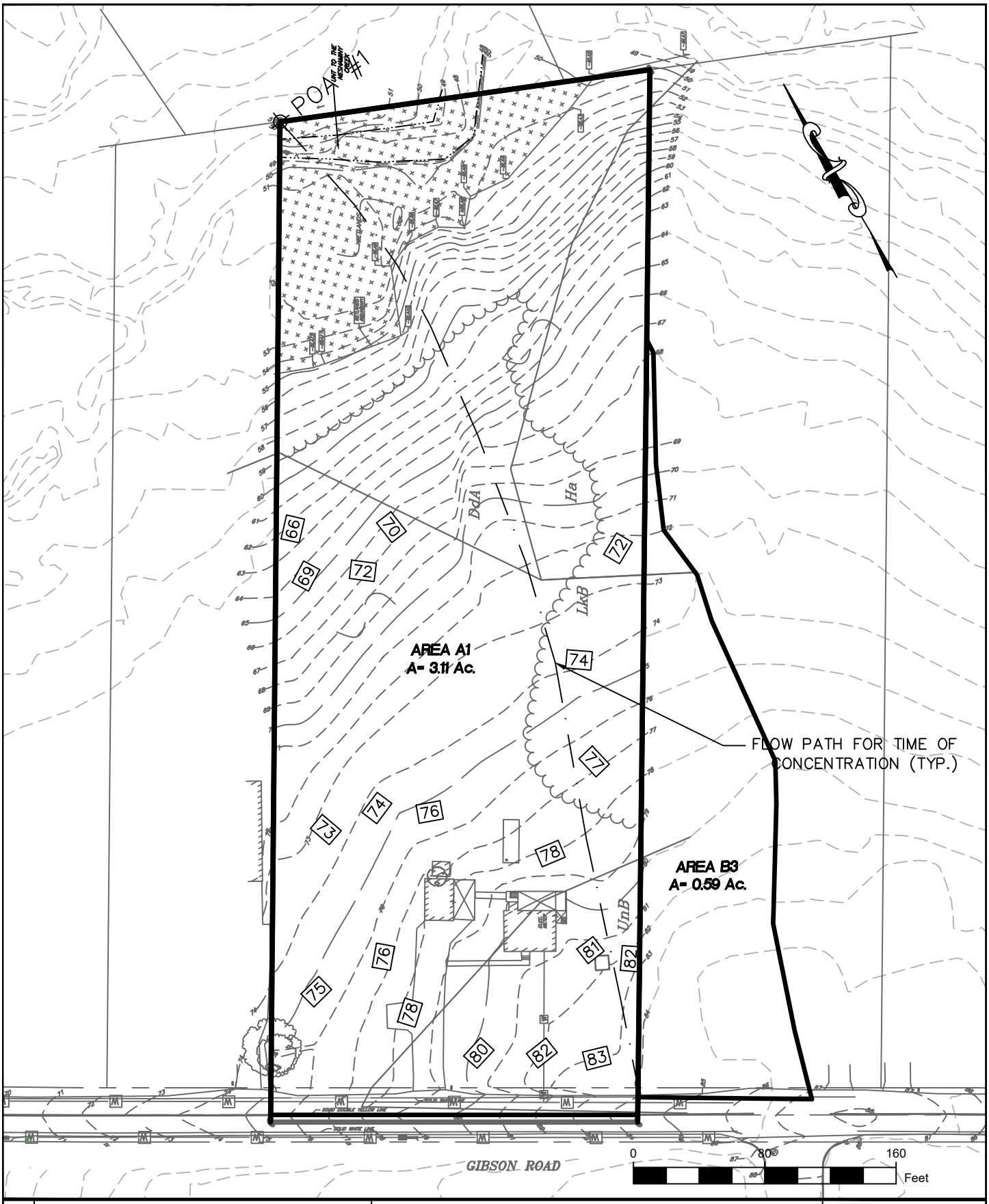
TMP# 02-054-005

Gibson Road

Bensalem Township, Bucks County, PA

Site Location Map

HCE Job No.	1608
Date	12/02/2021
Scale	1" = 500'
Drawing No.	Figure 1



File No. StormwaterFigures.dwg

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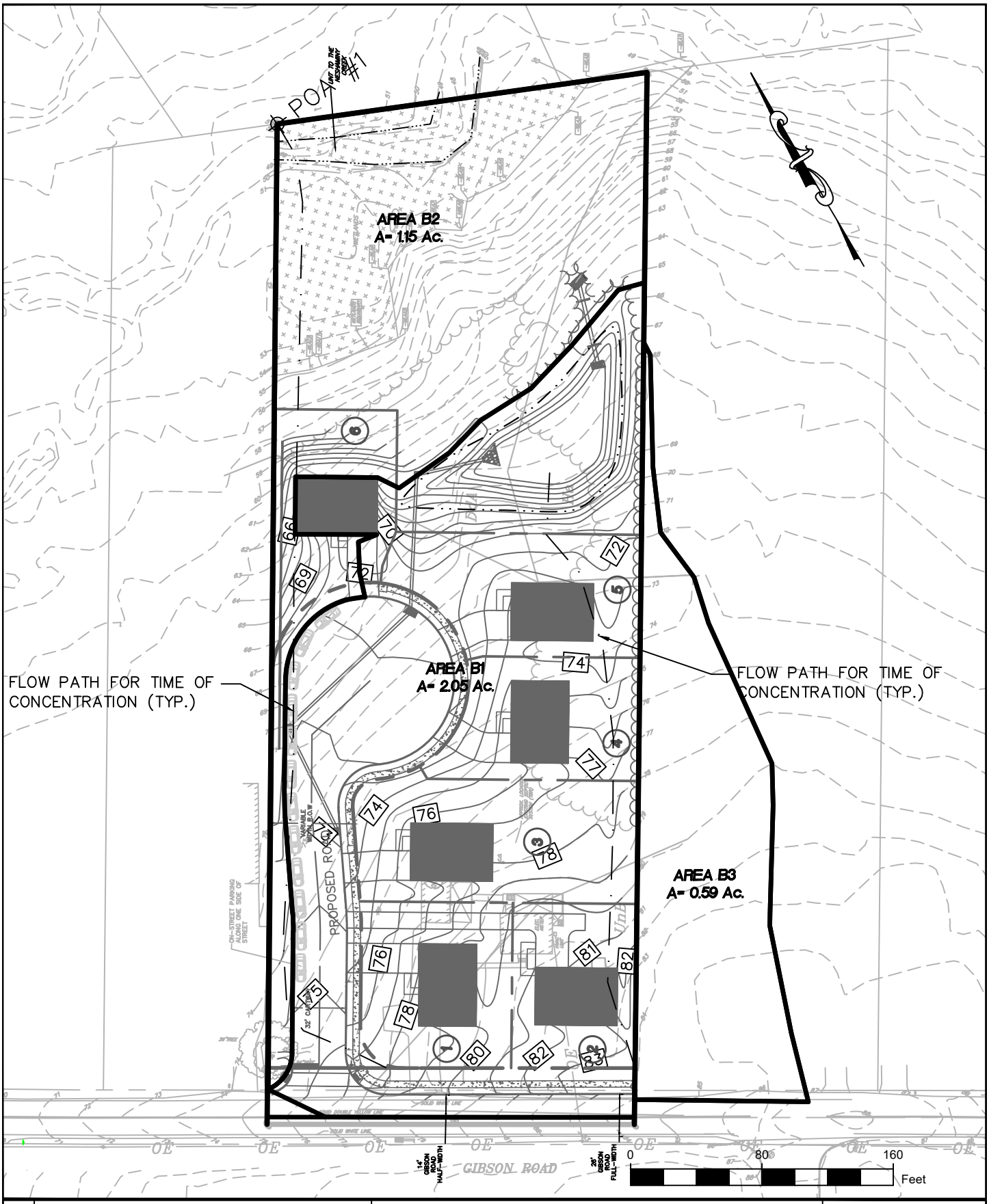
TMP# 02-054-005

Gibson Road
Bensalem Township, Bucks County, PA

Pre-Development Drainage Area Map

HCE Job No.	1608
Date	07/15/2022
Scale	1" = 80'
Drawing No.	Figure 2



File No. StormwaterFigures.dwg

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Gibson Road
Bensalem Township, Bucks County, PA

Post-Development Drainage Area Map

HCE Job No.	1608
Date	07/15/2022
Scale	1" = 80'
Drawing No.	Figure 3

File No. StormwaterFigures.dwg

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Gibson Road
Bensalem Township, Bucks County, PA

Inlet Drainage Area Map

HCE Job No.	1608
Date	07/15/2022
Scale	1" = 80'
Drawing No.	Figure 4

APPENDIX A

Stormwater Peak Rate Calculations

Project	**Gibson Road**	By	**EC**	Date	**7/15/2022**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**7/15/2022**
Circle one:	Present (circled) Developed		**Existing A1 (< 25 year)**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.36	1.71	0.617
B (Slope 6%+)	Meadow	0.30	0.38	0.113
C (Slope 6%+)	Forest	0.16	0.67	0.107
B (Slope 6%+)	Forest	0.14	0.27	0.038
C (Slope 6%+)	Meadow (20% Impervious)	0.36	0.02	0.006
B (Slope 6%+)	Meadow (20% Impervious)	0.30	0.02	0.005
B&C (Slope 6%+)	Impervious	0.87	0.14	0.120
		Totals =	3.20	1.006

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1.01}{3.20} = 0.31$

Use Runoff Coeff. = **0.31**

Project	**Gibson Road**	By	**EC**	Date	**7/15/2022**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**7/15/2022**
Circle one:	Present (Developed)	**Area B1 - Detained (<25 year)**			

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Open Space	0.24	0.61	0.146
B (Slope 6%+)	Open Space	0.19	0.39	0.075
C (Slope 6%+)	Forest	0.16	0.04	0.007
B (Slope 6%+)	Forest	0.14	0.00	0.000
B &C (Slope 6%+)	Impervious (includes 8,000 SF future impervious)	0.87	1.01	0.875
		Totals =	2.05	1.102

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1.10}{2.05} = 0.54$

Use Runoff Coeff. = **0.54**

Project	**Gibson Road**	By	**EC**	Date	**7/15/2022**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**7/15/2022**
Circle one:	Present (Developed)	**Area B2 - Undetained (< 25 year)**			

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.36	0.35	0.127
B (Slope 6%+)	Meadow	0.30	0.00	0.000
C (Slope 6%+)	Open Space	0.24	0.32	0.077
B (Slope 6%+)	Open Space	0.19	0.01	0.001
C (Slope 6%+)	Forest	0.16	0.42	0.068
B (Slope 6%+)	Forest	0.14	0.00	0.000
B/C (Slope 6%+)	Impervious	0.87	0.04	0.036
		Totals =	1.15	0.310

1 Use only one runoff coefficient source per line

$$\text{Runoff Coefficient (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{0.31}{1.15} = 0.27$$

Use Runoff Coeff. = **0.27**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)		**Existing A1 (25 year +)**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.44	1.71	0.754
B (Slope 6%+)	Meadow	0.37	0.38	0.140
C (Slope 6%+)	Forest	0.20	0.67	0.133
B (Slope 6%+)	Forest	0.18	0.27	0.048
C (Slope 6%+)	Meadow (20% Impervious)	0.44	0.02	0.008
B (Slope 6%+)	Meadow (20% Impervious)	0.37	0.02	0.006
B&C (Slope 6%+)	Impervious	0.97	0.14	0.134
		Totals =	3.20	1.223

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1.22}{3.20} = 0.38$

Use Runoff Coeff. = **0.38**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)	**Area B1 - Detained (25 year +)**			

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Open Space	0.32	0.61	0.194
B (Slope 6%+)	Open Space	0.26	0.39	0.102
C (Slope 6%+)	Forest	0.20	0.04	0.009
B (Slope 6%+)	Forest	0.18	0.00	0.000
B &C (Slope 6%+)	Impervious (includes 8,000 SF future impervious)	0.97	1.01	0.976
		Totals =	2.05	1.281

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1.28}{2.05} = 0.62$

Use Runoff Coeff. = **0.62**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)	**Area B2 - Undetained (25 year +)**			

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.44	0.35	0.155
B (Slope 6%+)	Meadow	0.37	0.00	0.000
C (Slope 6%+)	Open Space	0.32	0.32	0.103
B (Slope 6%+)	Open Space	0.26	0.01	0.002
C (Slope 6%+)	Forest	0.20	0.42	0.085
B (Slope 6%+)	Forest	0.18	0.00	0.000
B/C (Slope 6%+)	Impervious	0.97	0.04	0.041
		Totals =	1.15	0.386

1 Use only one runoff coefficient source per line

$$\text{Runoff Coefficient (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{0.39}{1.15} = 0.34$$

Use Runoff Coeff. = **0.34**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)		**Area B3 (25yr+) Offsite**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.44	0.00	0.000
B (Slope 6%+)	Meadow	0.37	0.00	0.000
C (Slope 6%+)	Open Space	0.32	0.22	0.071
B (Slope 6%+)	Open Space	0.26	0.30	0.078
C (Slope 6%+)	Forest	0.20	0.00	0.000
B (Slope 6%+)	Forest	0.18	0.00	0.000
B/C (Slope 6%+)	Impervious	0.97	0.06	0.062
		Totals =	0.59	0.212

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{0.21}{0.59} = 0.36$

Use Runoff Coeff. = **0.36**

Project	**Gibson Road**	By	**EC**	Date	**7/15/2022**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**7/15/2022**
Circle one:	Present (Developed)		**Area B3 (<25yr) Offsite**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Meadow	0.36	0.00	0.000
B (Slope 6%+)	Meadow	0.30	0.00	0.000
C (Slope 6%+)	Open Space	0.24	0.22	0.053
B (Slope 6%+)	Open Space	0.19	0.30	0.057
C (Slope 6%+)	Forest	0.16	0.00	0.000
B (Slope 6%+)	Forest	0.14	0.00	0.000
B/C (Slope 6%+)	Impervious	0.87	0.06	0.056
		Totals =	0.59	0.166

1 Use only one runoff coefficient source per line

$$\text{Runoff Coefficient (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{0.17}{0.59} = 0.28$$

Use Runoff Coeff. = **0.28**

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Dekalb	------	-------	3.039	-------	3.693	4.171	4.867	5.402	5.934	Existing A1 (<25yr)
2	Dekalb	------	-------	0.506	-------	0.615	0.695	0.810	0.900	0.988	B3 Offsite (<25yr)
3	Combine	1, 2	-------	3.545	-------	4.308	4.866	5.677	6.302	6.922	Total Existing (<25yr)
5	Dekalb	------	-------	4.927	-------	5.814	6.482	7.461	8.229	8.984	Proposed B1 (<25yr)
6	Dekalb	------	-------	0.735	-------	0.868	0.967	1.113	1.228	1.341	B3 Offsite (<25yr)
7	Combine	5, 6	-------	5.663	-------	6.682	7.449	8.574	9.457	10.33	Proposed to Basin (<25yr)
8	Reservoir	7	-------	2.087	-------	2.923	3.369	3.943	4.354	4.715	BMP Routing (<25yr)
9	Dekalb	------	-------	1.382	-------	1.631	1.818	2.093	2.308	2.520	Proposed B2 (<25yr)
10	Combine	8, 9	-------	2.769	-------	3.833	4.502	5.311	5.893	6.435	Proposed Total (<25yr)
12	Dekalb	------	-------	3.725	-------	4.527	5.113	5.966	6.622	7.274	Existing A1 (25yr+)
13	Dekalb	------	-------	0.651	-------	0.791	0.893	1.042	1.157	1.270	B3 Offsite (25Yr+)
14	Combine	12, 13	-------	4.376	-------	5.318	6.006	7.008	7.778	8.544	Total Existing (25yr+)
16	Dekalb	------	-------	5.657	-------	6.675	7.442	8.566	9.448	10.32	Proposed B1 (25yr+)
17	Dekalb	------	-------	0.945	-------	1.116	1.244	1.431	1.579	1.724	B3 Offsite (25Yr+)
18	Combine	16, 17	-------	6.603	-------	7.791	8.686	9.997	11.03	12.04	Proposed to Basin (25yr+)
19	Reservoir	18	-------	2.860	-------	3.551	3.996	4.593	4.974	5.983	BMP Routing (25yr+)
20	Dekalb	------	-------	1.740	-------	2.054	2.289	2.635	2.907	3.173	Proposed B2 (25yr+)
21	Combine	19, 20	-------	3.836	-------	4.874	5.525	6.403	7.052	7.703	Proposed Total (25yr+)

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	3.039	1	120	9,146	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.506	1	120	1,523	------	------	------	B3 Offsite (<25yr)
3	Combine	3.545	1	120	10,669	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	4.927	1	55	9,724	------	------	------	Proposed B1 (<25yr)
6	Dekalb	0.735	1	55	1,451	------	------	------	B3 Offsite (<25yr)
7	Combine	5.663	1	55	11,175	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	2.087	1	65	5,662	7	63.21	6,956	BMP Routing (<25yr)
9	Dekalb	1.382	1	55	2,727	------	------	------	Proposed B2 (<25yr)
10	Combine	2.769	1	62	8,389	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	3.725	1	120	11,212	------	------	------	Existing A1 (25yr+)
13	Dekalb	0.651	1	120	1,958	------	------	------	B3 Offsite (25Yr+)
14	Combine	4.376	1	120	13,170	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	5.657	1	55	11,164	------	------	------	Proposed B1 (25yr+)
17	Dekalb	0.945	1	55	1,866	------	------	------	B3 Offsite (25Yr+)
18	Combine	6.603	1	55	13,030	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	2.860	1	64	7,470	18	63.37	7,642	BMP Routing (25yr+)
20	Dekalb	1.740	1	55	3,434	------	------	------	Proposed B2 (25yr+)
21	Combine	3.836	1	61	10,904	19, 20	------	------	Proposed Total (25yr+)

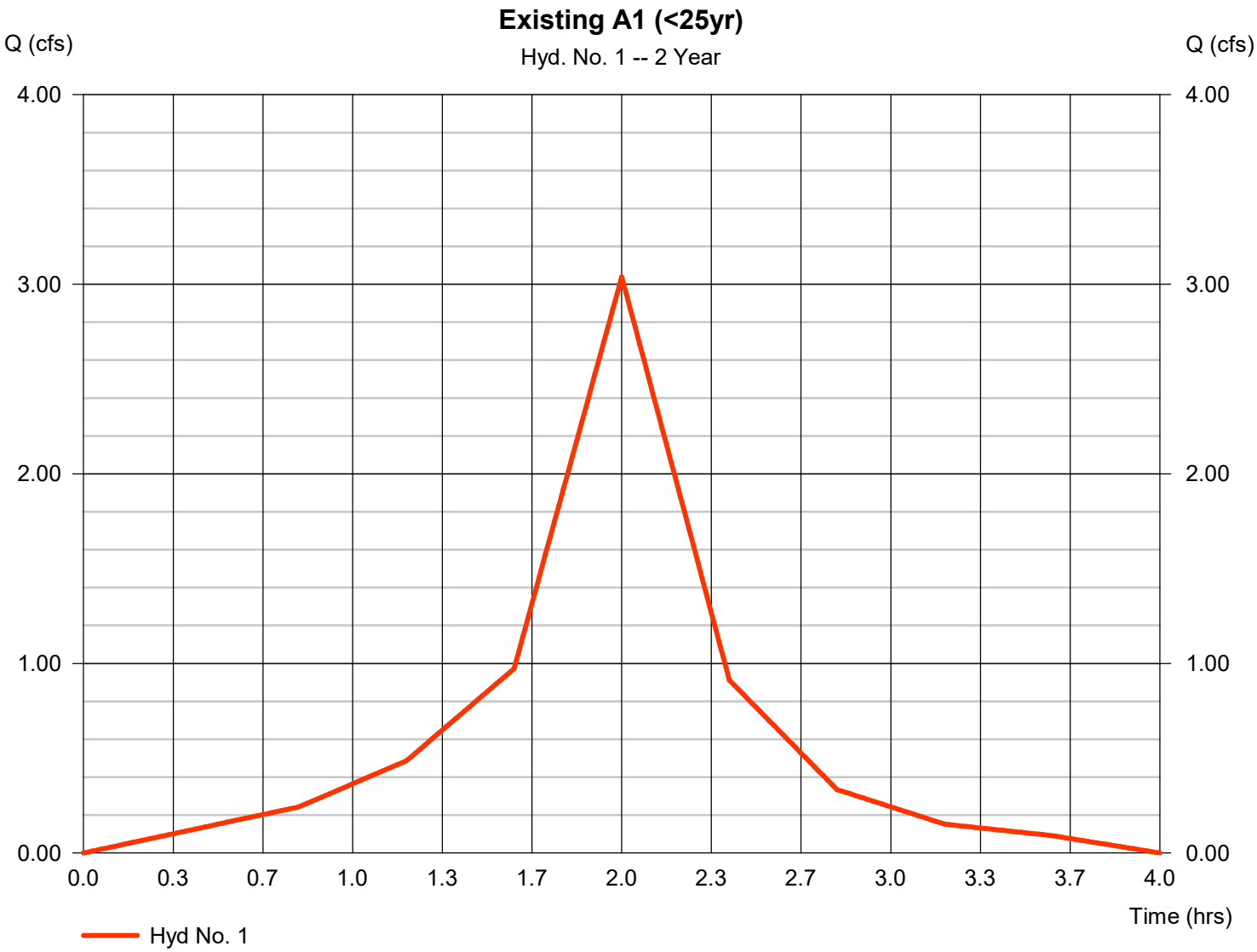
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 1

Existing A1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 3.039 cfs
Storm frequency	= 2 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 9,146 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.31
Intensity	= 3.064 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



TR55 Tc Worksheet

Hyd. No. 1

Existing A1 (<25yr)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.26		0.00		0.00		
Land slope (%)	= 1.50		0.00		0.00		
Travel Time (min)	**= 21.94**	**+**	**0.00**	**+**	**0.00**	**=**	**21.94**
Shallow Concentrated Flow							
Flow length (ft)	= 488.00		0.00		0.00		
Watercourse slope (%)	= 5.16		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.67		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 24.00 min

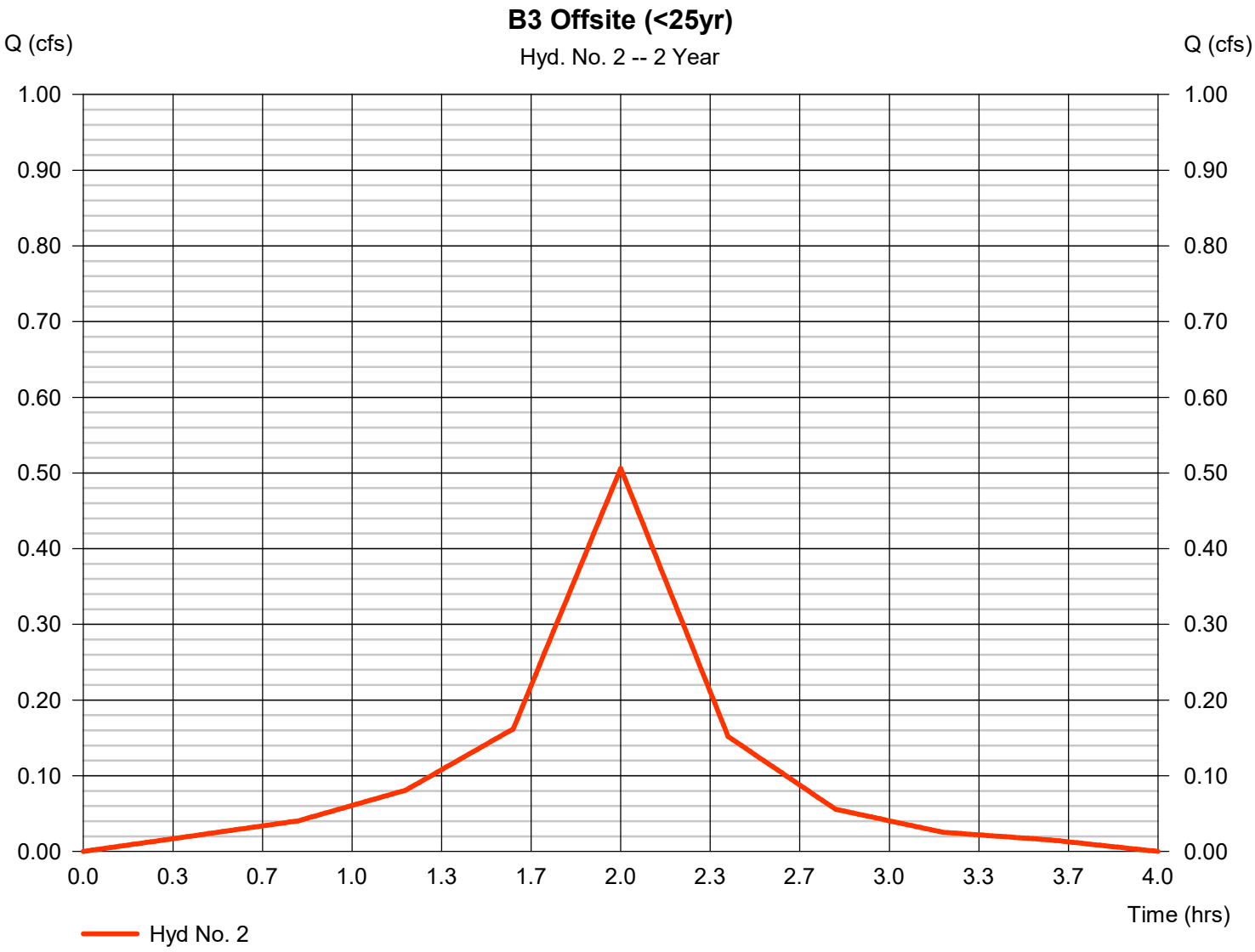
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 2

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.506 cfs
Storm frequency	= 2 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 1,523 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 3.064 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



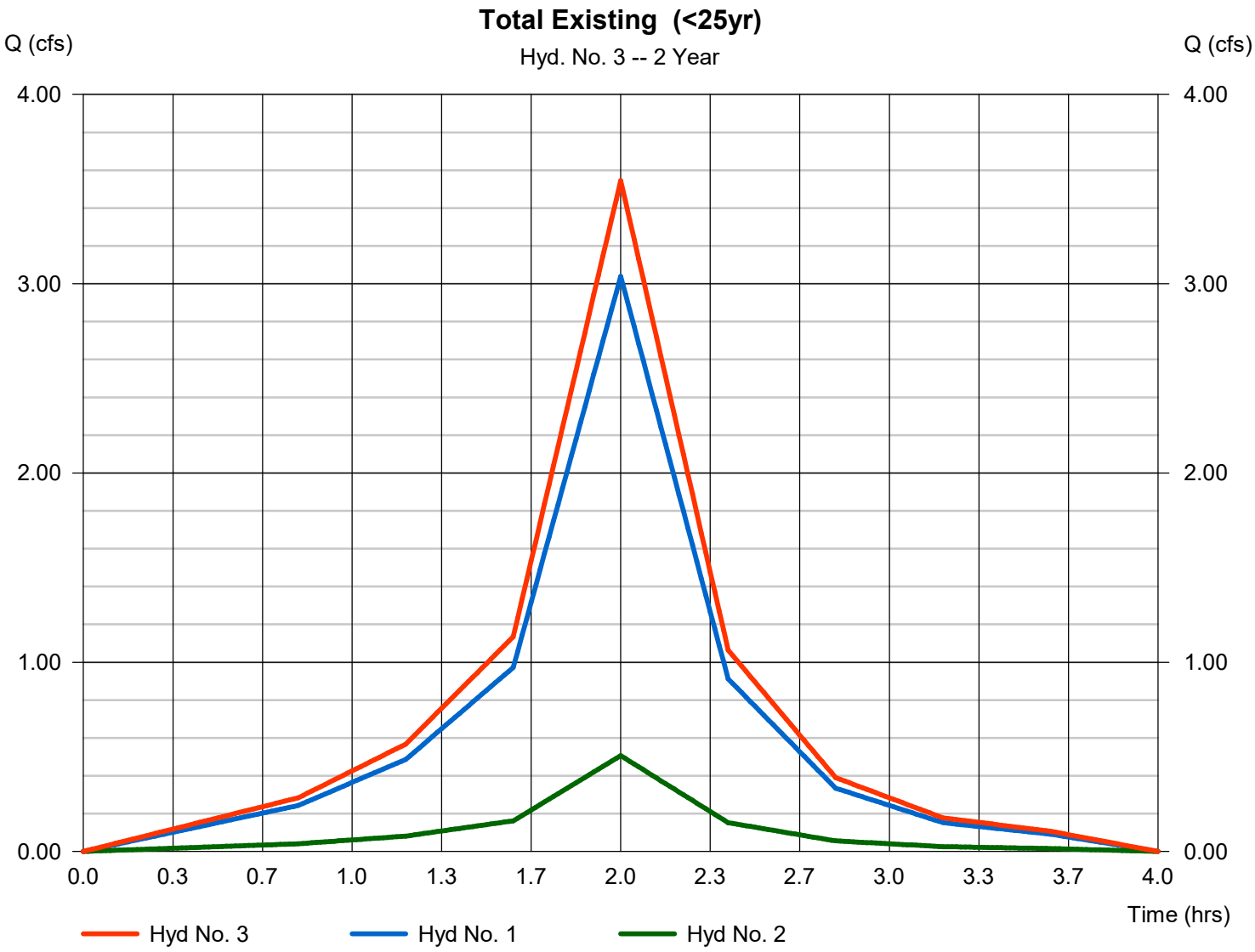
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 3

Total Existing (<25yr)

Hydrograph type	= Combine	Peak discharge	= 3.545 cfs
Storm frequency	= 2 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 10,669 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac



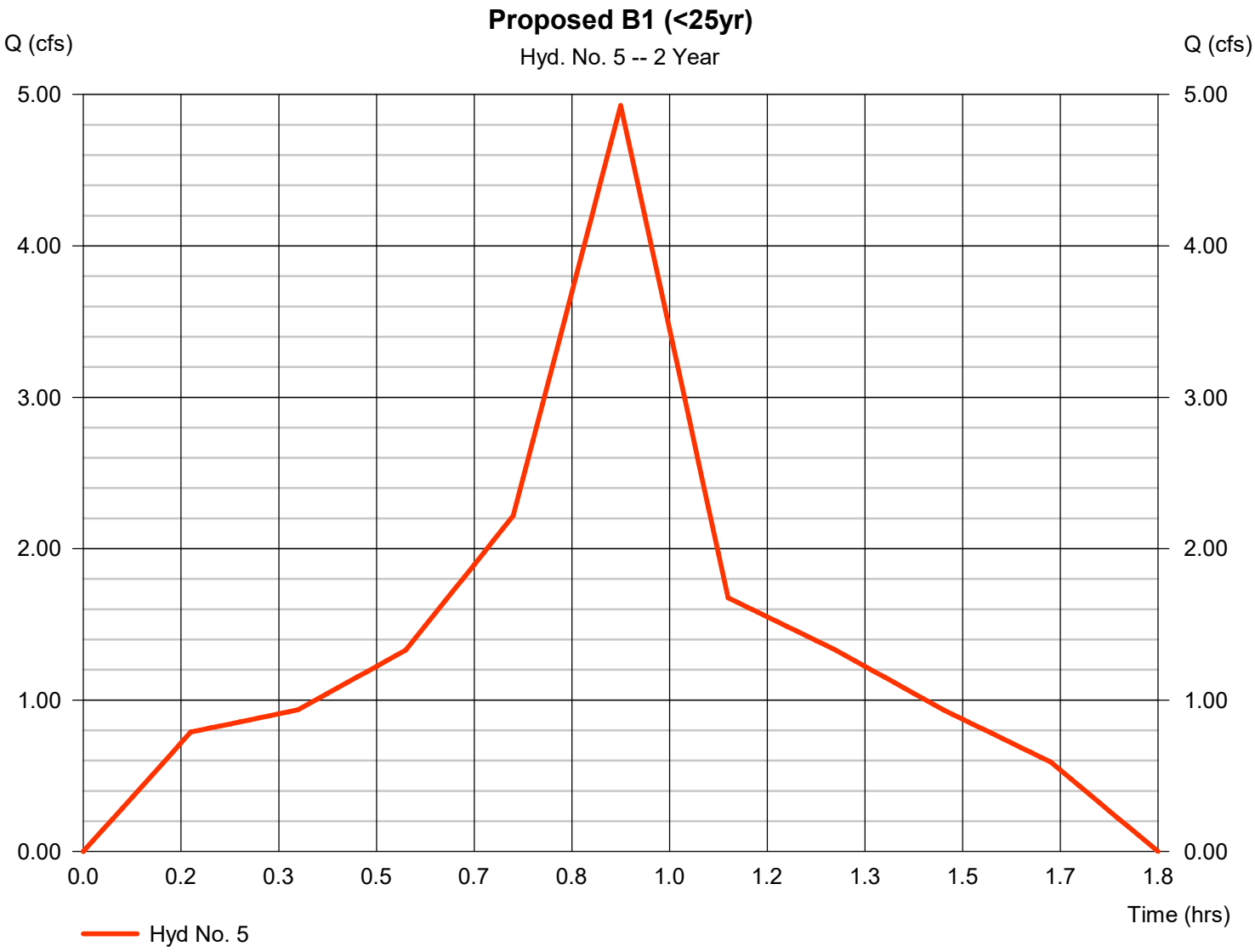
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 5

Proposed B1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 4.927 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 9,724 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.54
Intensity	= 4.451 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



TR55 Tc Worksheet

Hyd. No. 5

Proposed B1 (<25yr)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 55.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.26		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 8.76**	**+**	**0.00**	**+**	**0.00**	**=**	**8.76**
Shallow Concentrated Flow							
Flow length (ft)	= 320.00		101.00		18.00		
Watercourse slope (%)	= 6.50		2.50		30.50		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=4.11		3.21		8.91		
Travel Time (min)	**= 1.30**	**+**	**0.52**	**+**	**0.03**	**=**	**1.85**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.012		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 11.00 min

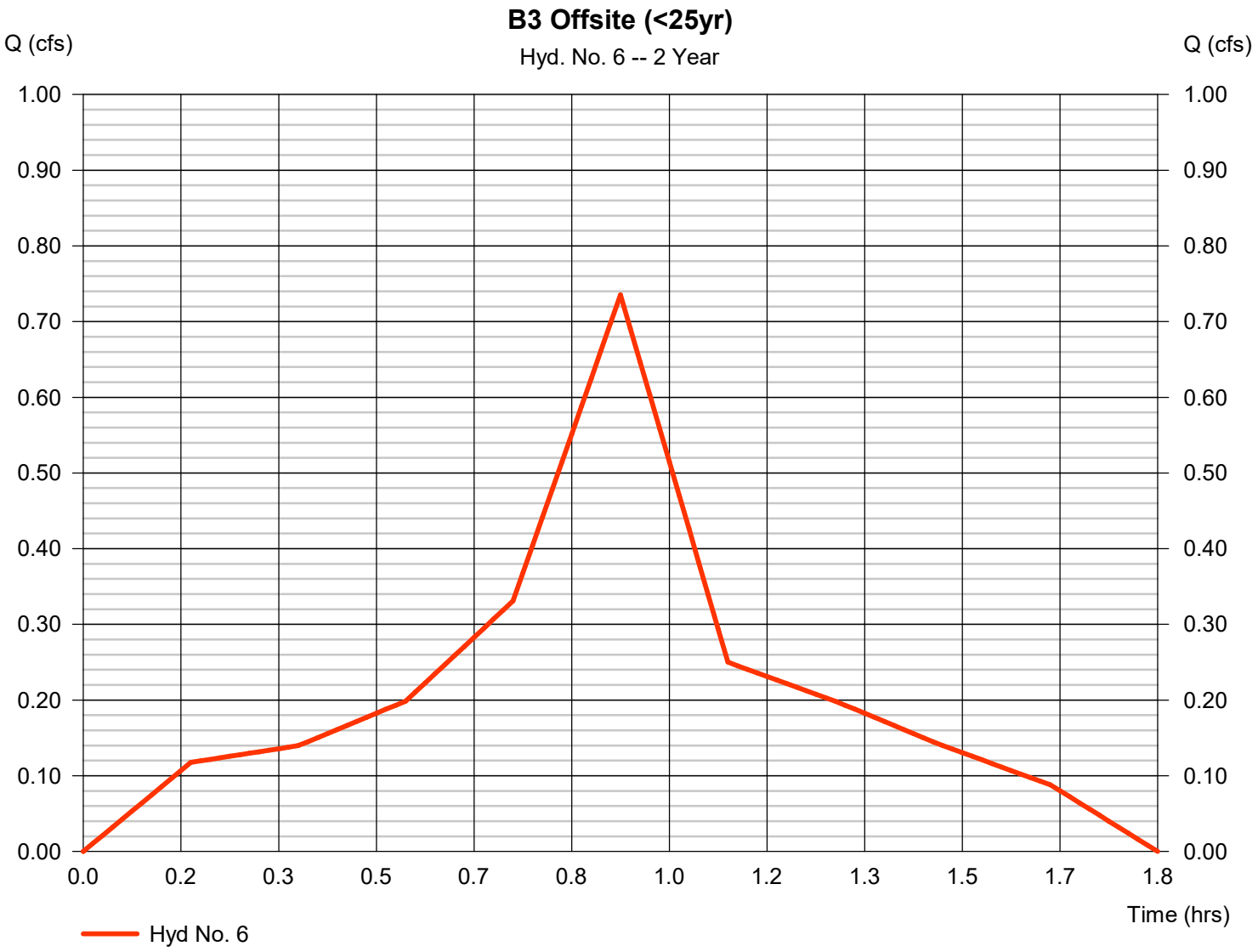
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 6

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.735 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 1,451 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 4.451 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



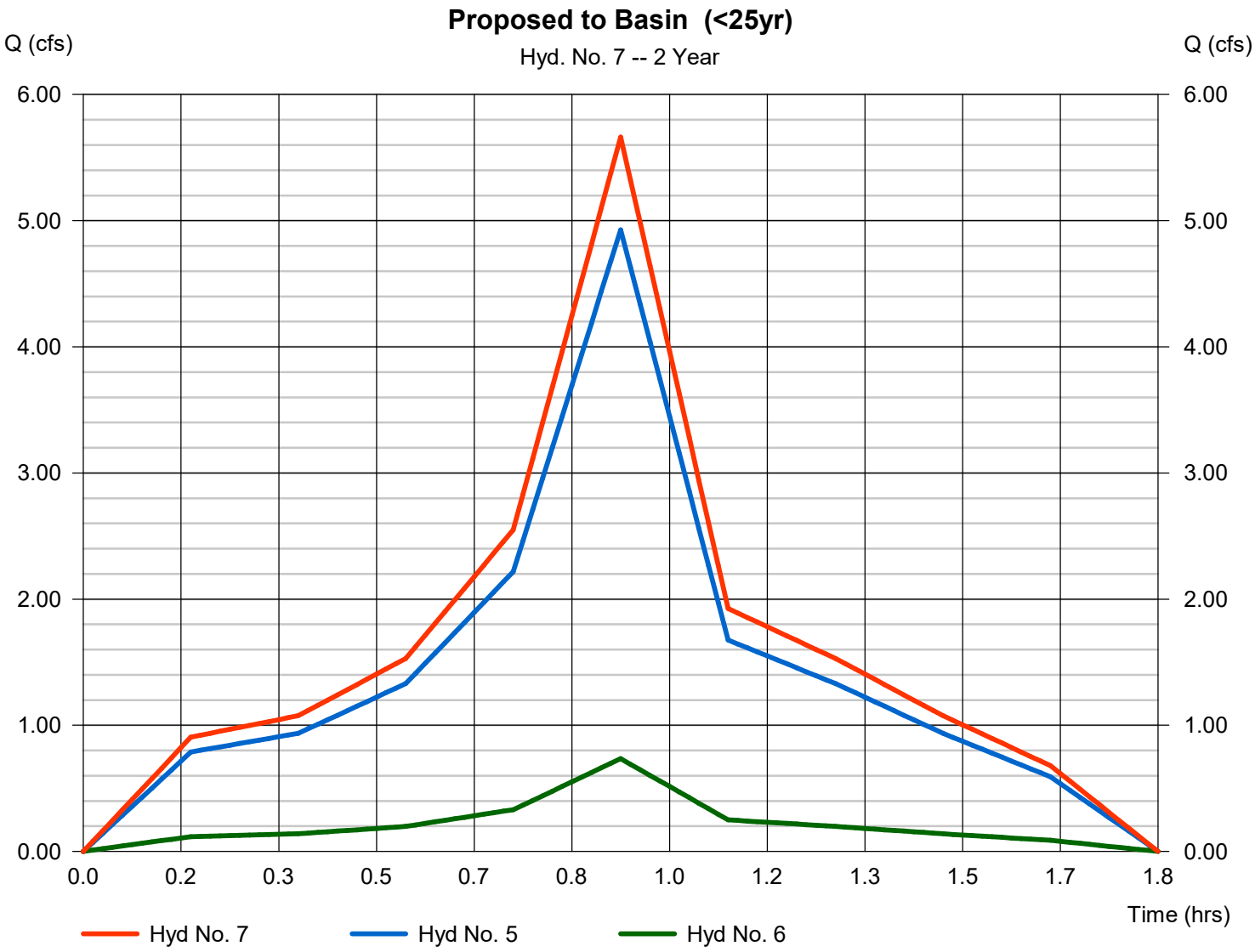
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 7

Proposed to Basin (<25yr)

Hydrograph type	= Combine	Peak discharge	= 5.663 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 11,175 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 2.640 ac



Hydrograph Report

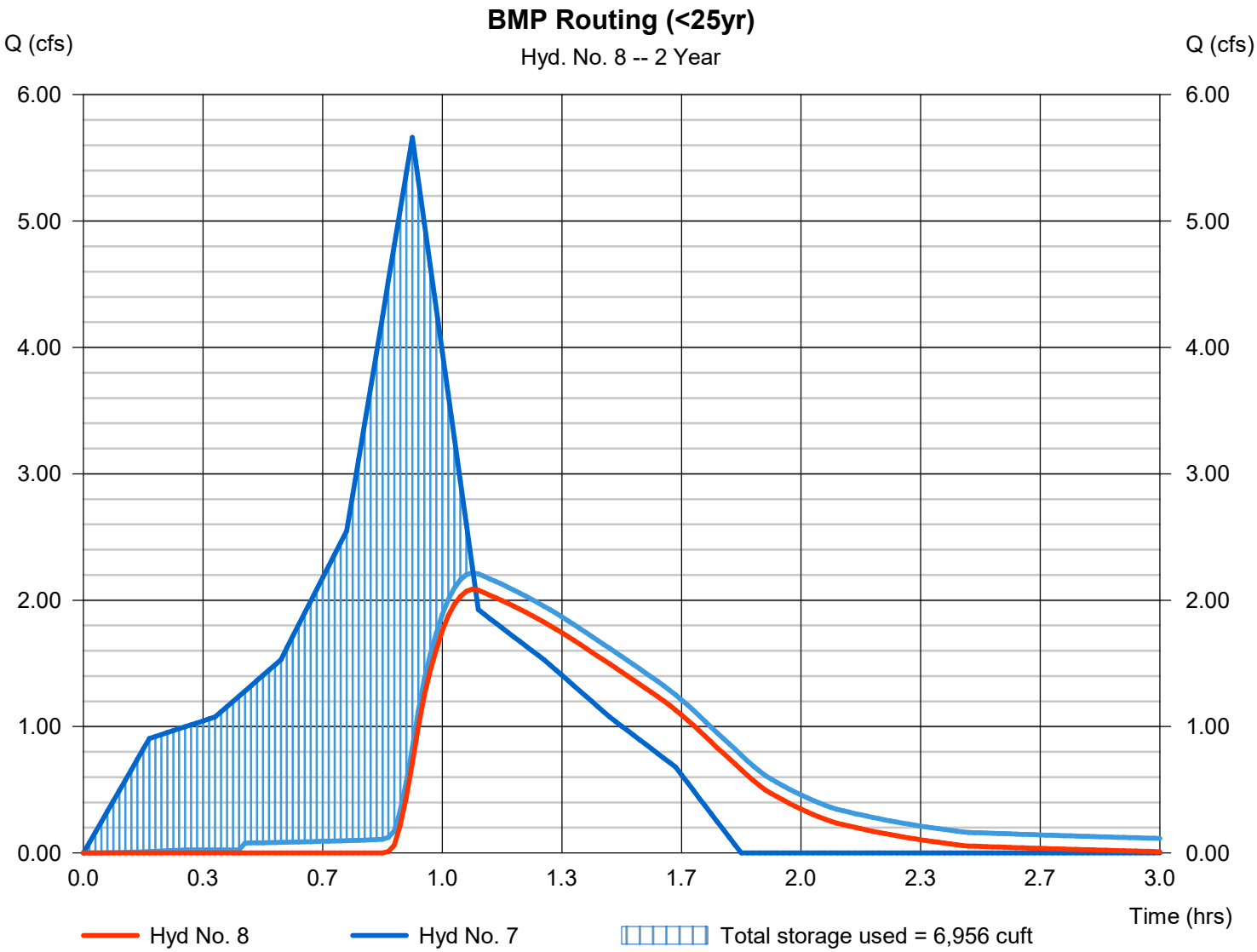
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 8

BMP Routing (<25yr)

Hydrograph type	= Reservoir	Peak discharge	= 2.087 cfs
Storm frequency	= 2 yrs	Time to peak	= 1.08 hrs
Time interval	= 1 min	Hyd. volume	= 5,662 cuft
Inflow hyd. No.	= 7 - Proposed to Basin (<25yr)	Max. Elevation	= 63.21 ft
Reservoir name	= Rain Garden	Max. Storage	= 6,956 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Pond No. 1 - Rain Garden

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 59.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	59.50	734	0	0
1.00	60.50	734	734	734
1.99	61.49	734	727	1,461
2.00	61.50	2,447	16	1,477
2.50	62.00	2,848	1,324	2,800
3.50	63.00	3,701	3,275	6,075
4.50	64.00	4,690	4,195	10,270
5.00	64.50	5,212	2,476	12,746

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	10.00	Inactive
Span (in)	= 18.00	3.00	13.40	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 59.50	62.54	62.54	0.00
Length (ft)	= 52.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	Inactive	0.00	Inactive
Crest El. (ft)	= 64.25	0.00	63.47	0.00
Weir Coeff.	= 3.33	3.33	0.11	3.33
Weir Type	= 1	Rect	5 degV	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 1.380 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	59.50	0.00	0.00	0.00	---	0.00	---	---	---	0.000	---	0.000
0.10	73	59.60	0.00	0.00	0.00	---	0.00	---	---	---	0.002	---	0.002
0.20	147	59.70	0.00	0.00	0.00	---	0.00	---	---	---	0.005	---	0.005
0.30	220	59.80	0.00	0.00	0.00	---	0.00	---	---	---	0.007	---	0.007
0.40	294	59.90	0.00	0.00	0.00	---	0.00	---	---	---	0.009	---	0.009
0.50	367	60.00	0.00	0.00	0.00	---	0.00	---	---	---	0.012	---	0.012
0.60	440	60.10	0.00	0.00	0.00	---	0.00	---	---	---	0.014	---	0.014
0.70	514	60.20	0.00	0.00	0.00	---	0.00	---	---	---	0.016	---	0.016
0.80	587	60.30	0.00	0.00	0.00	---	0.00	---	---	---	0.019	---	0.019
0.90	661	60.40	0.00	0.00	0.00	---	0.00	---	---	---	0.021	---	0.021
1.00	734	60.50	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.10	807	60.60	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.20	879	60.70	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.30	952	60.80	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.40	1,025	60.90	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.49	1,097	60.99	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.59	1,170	61.09	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.69	1,243	61.19	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.79	1,315	61.29	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.89	1,388	61.39	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.99	1,461	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.99	1,462	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.029	---	0.029
1.99	1,464	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.034	---	0.034
1.99	1,465	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.040	---	0.040
1.99	1,467	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.045	---	0.045
2.00	1,469	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.051	---	0.051
2.00	1,470	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.056	---	0.056
2.00	1,472	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.062	---	0.062
2.00	1,473	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.067	---	0.067
2.00	1,475	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.073	---	0.073
2.00	1,477	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.078	---	0.078
2.05	1,609	61.55	0.00	0.00	0.00	---	0.00	---	---	---	0.079	---	0.079
2.10	1,741	61.60	0.00	0.00	0.00	---	0.00	---	---	---	0.081	---	0.081
2.15	1,874	61.65	0.00	0.00	0.00	---	0.00	---	---	---	0.082	---	0.082
2.20	2,006	61.70	0.00	0.00	0.00	---	0.00	---	---	---	0.083	---	0.083

Continues on next page...

Rain Garden

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.25	2,138	61.75	0.00	0.00	0.00	---	0.00	---	---	---	0.085	---	0.085
2.30	2,271	61.80	0.00	0.00	0.00	---	0.00	---	---	---	0.086	---	0.086
2.35	2,403	61.85	0.00	0.00	0.00	---	0.00	---	---	---	0.087	---	0.087
2.40	2,536	61.90	0.00	0.00	0.00	---	0.00	---	---	---	0.088	---	0.088
2.45	2,668	61.95	0.00	0.00	0.00	---	0.00	---	---	---	0.090	---	0.090
2.50	2,800	62.00	0.00	0.00	0.00	---	0.00	---	---	---	0.091	---	0.091
2.60	3,128	62.10	0.00	0.00	0.00	---	0.00	---	---	---	0.094	---	0.094
2.70	3,455	62.20	0.00	0.00	0.00	---	0.00	---	---	---	0.096	---	0.096
2.80	3,783	62.30	0.00	0.00	0.00	---	0.00	---	---	---	0.099	---	0.099
2.90	4,110	62.40	0.00	0.00	0.00	---	0.00	---	---	---	0.102	---	0.102
3.00	4,438	62.50	0.00	0.00	0.00	---	0.00	---	---	---	0.105	---	0.105
3.10	4,765	62.60	0.06 ic	0.00	0.06 ic	---	0.00	---	---	---	0.107	---	0.163
3.20	5,092	62.70	0.25 ic	0.00	0.24 ic	---	0.00	---	---	---	0.110	---	0.353
3.30	5,420	62.80	0.52 ic	0.00	0.50 ic	---	0.00	---	---	---	0.113	---	0.617
3.40	5,747	62.90	0.84 ic	0.00	0.82 ic	---	0.00	---	---	---	0.116	---	0.937
3.50	6,075	63.00	1.21 ic	0.00	1.19 ic	---	0.00	---	---	---	0.118	---	1.304
3.60	6,494	63.10	1.59 ic	0.00	1.59 ic	---	0.00	---	---	---	0.121	---	1.715
3.70	6,914	63.20	2.07 oc	0.00	2.04 ic	---	0.00	---	---	---	0.125	---	2.163
3.80	7,333	63.30	2.54 oc	0.00	2.52 ic	---	0.00	---	---	---	0.128	---	2.647
3.90	7,753	63.40	3.01 oc	0.00	2.98 ic	---	0.00	---	---	---	0.131	---	3.114
4.00	8,173	63.50	3.32 oc	0.00	3.30 ic	---	0.00	---	0.00	---	0.134	---	3.437
4.10	8,592	63.60	3.60 oc	0.00	3.59 ic	---	0.00	---	0.00	---	0.137	---	3.732
4.20	9,012	63.70	3.90 oc	0.00	3.86 ic	---	0.00	---	0.00	---	0.140	---	4.006
4.30	9,431	63.80	4.13 oc	0.00	4.11 ic	---	0.00	---	0.01	---	0.143	---	4.265
4.40	9,851	63.90	4.38 oc	0.00	4.35 ic	---	0.00	---	0.01	---	0.147	---	4.512
4.50	10,270	64.00	4.60 oc	0.00	4.58 ic	---	0.00	---	0.02	---	0.150	---	4.749
4.55	10,518	64.05	4.72 oc	0.00	4.69 ic	---	0.00	---	0.03	---	0.151	---	4.865
4.60	10,765	64.10	4.83 oc	0.00	4.79 ic	---	0.00	---	0.03	---	0.153	---	4.979
4.65	11,013	64.15	4.94 oc	0.00	4.89 ic	---	0.00	---	0.04	---	0.155	---	5.092
4.70	11,261	64.20	5.05 oc	0.00	5.00 ic	---	0.00	---	0.05	---	0.156	---	5.203
4.75	11,508	64.25	5.16 oc	0.00	5.10 ic	---	0.00	---	0.06	---	0.158	---	5.313
4.80	11,756	64.30	5.71 oc	0.00	5.19 ic	---	0.45	---	0.07	---	0.160	---	5.870
4.85	12,003	64.35	6.63 oc	0.00	5.29 ic	---	1.26	---	0.08	---	0.161	---	6.795
4.90	12,251	64.40	7.80 oc	0.00	5.38 ic	---	2.32	---	0.09	---	0.163	---	7.961
4.95	12,498	64.45	9.16 oc	0.00	5.48 ic	---	3.57	---	0.11	---	0.165	---	9.321
5.00	12,746	64.50	10.68 oc	0.00	5.57 ic	---	4.99	---	0.12	---	0.166	---	10.85

...End

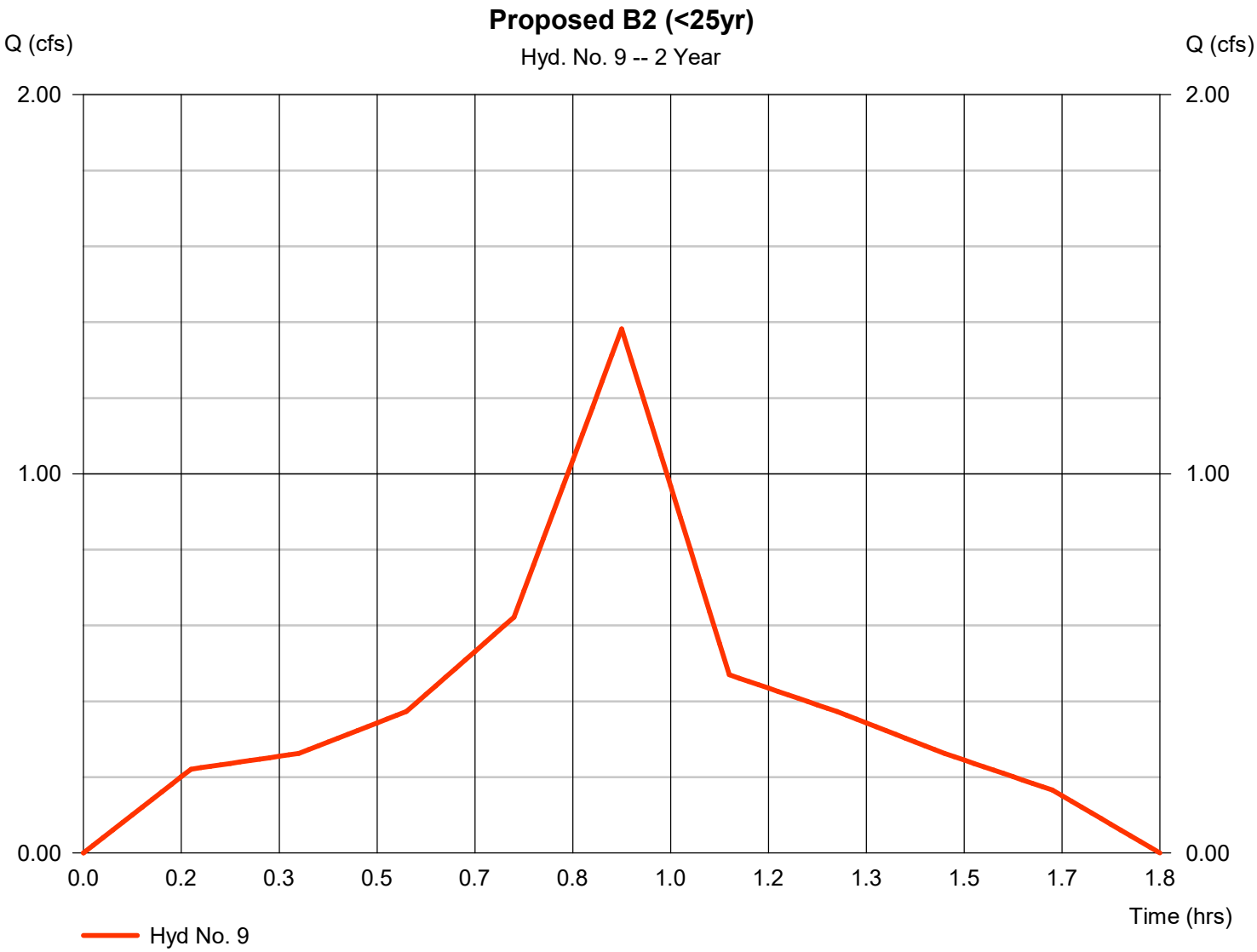
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 9

Proposed B2 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 1.382 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 2,727 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.27
Intensity	= 4.451 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



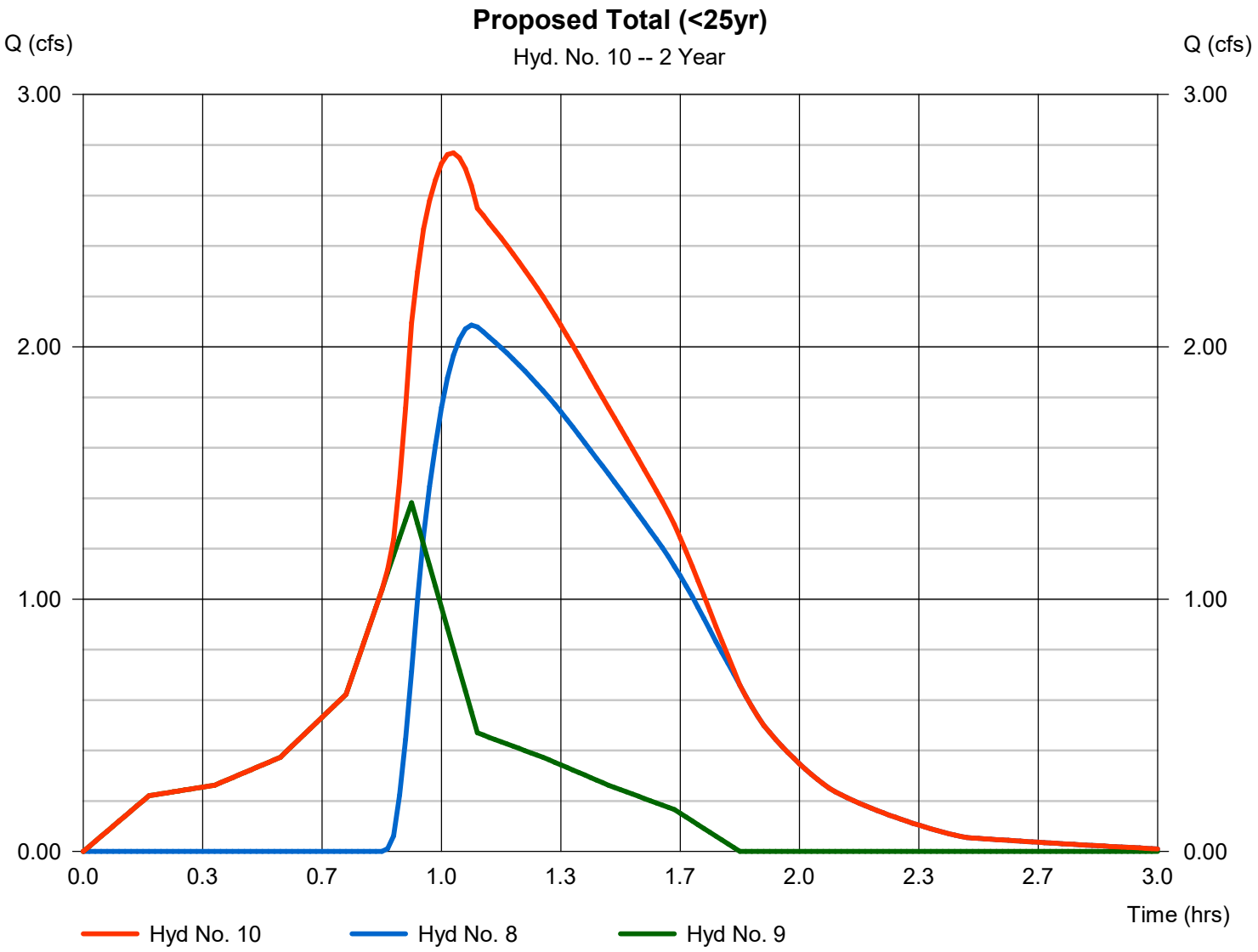
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 10

Proposed Total (<25yr)

Hydrograph type	= Combine	Peak discharge	= 2.769 cfs
Storm frequency	= 2 yrs	Time to peak	= 1.03 hrs
Time interval	= 1 min	Hyd. volume	= 8,389 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 1.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	3.693	1	120	11,116	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.615	1	120	1,851	------	------	------	B3 Offsite (<25yr)
3	Combine	4.308	1	120	12,967	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	5.814	1	55	11,474	------	------	------	Proposed B1 (<25yr)
6	Dekalb	0.868	1	55	1,712	------	------	------	B3 Offsite (<25yr)
7	Combine	6.682	1	55	13,186	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	2.923	1	64	7,623	7	63.39	7,698	BMP Routing (<25yr)
9	Dekalb	1.631	1	55	3,218	------	------	------	Proposed B2 (<25yr)
10	Combine	3.833	1	61	10,841	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	4.527	1	120	13,626	------	------	------	Existing A1 (25yr+)
13	Dekalb	0.791	1	120	2,380	------	------	------	B3 Offsite (25Yr+)
14	Combine	5.318	1	120	16,006	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	6.675	1	55	13,173	------	------	------	Proposed B1 (25yr+)
17	Dekalb	1.116	1	55	2,201	------	------	------	B3 Offsite (25Yr+)
18	Combine	7.791	1	55	15,375	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	3.551	1	64	9,761	18	63.59	8,530	BMP Routing (25yr+)
20	Dekalb	2.054	1	55	4,053	------	------	------	Proposed B2 (25yr+)
21	Combine	4.874	1	59	13,813	19, 20	------	------	Proposed Total (25yr+)

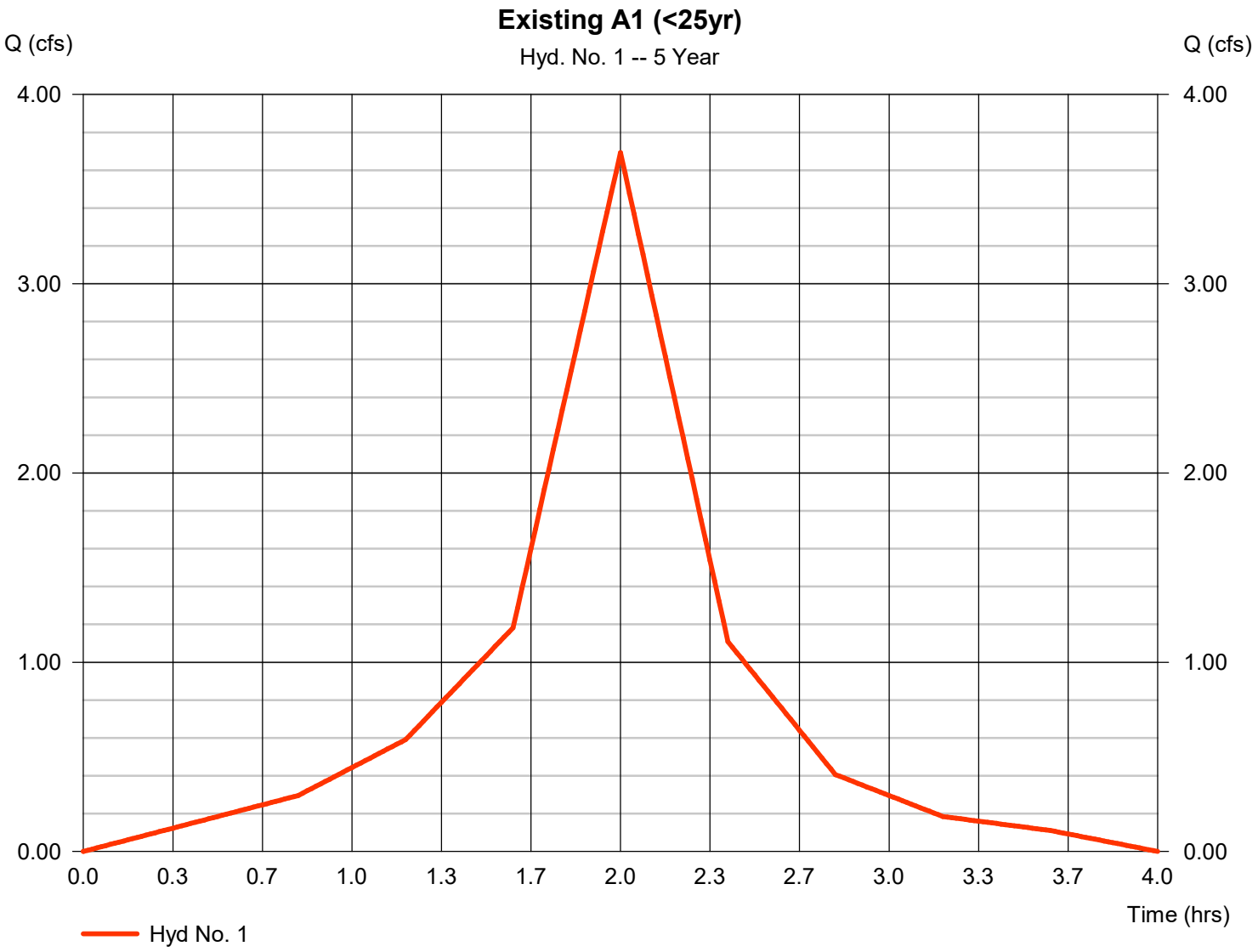
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 1

Existing A1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 3.693 cfs
Storm frequency	= 5 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 11,116 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.31
Intensity	= 3.723 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



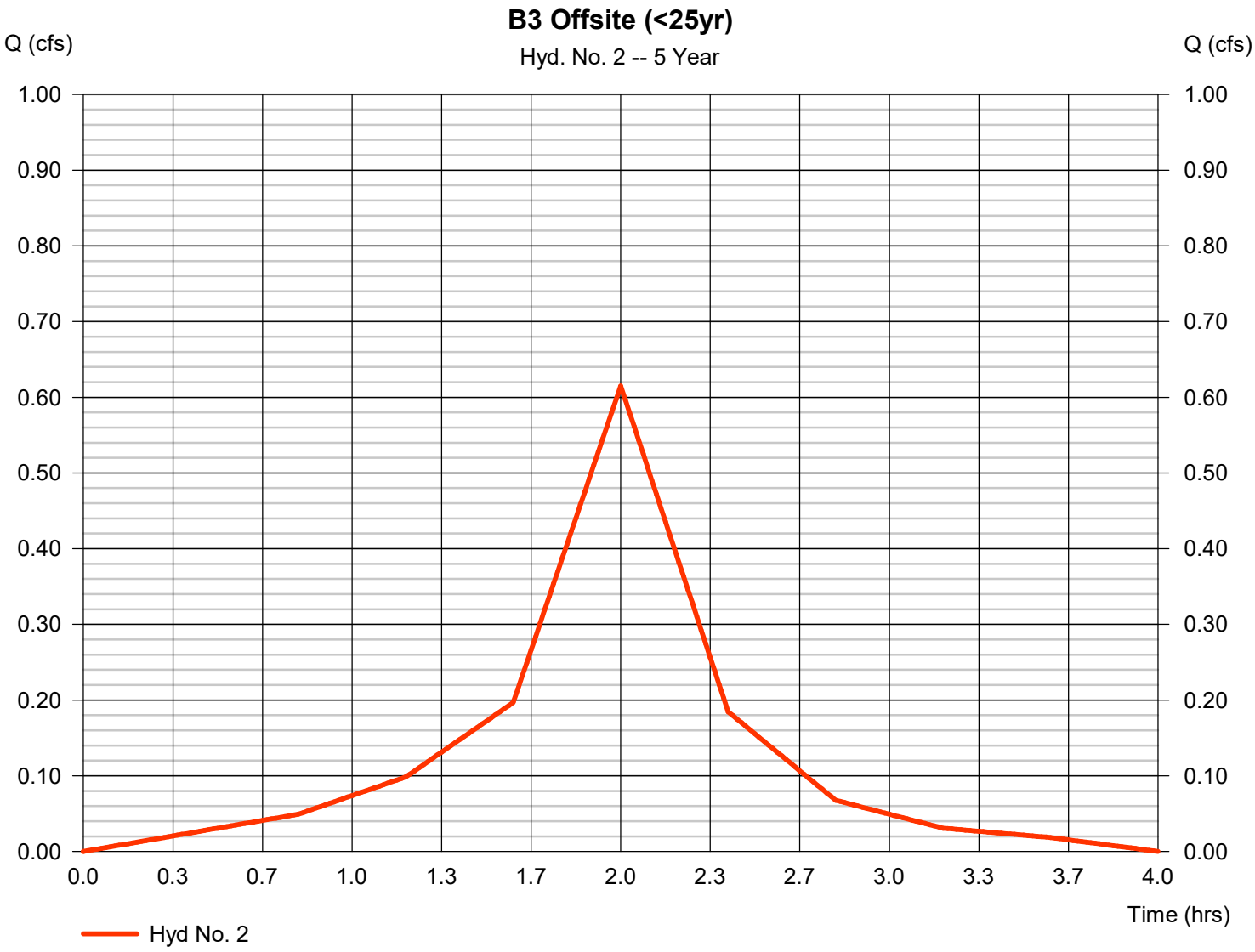
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 2

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.615 cfs
Storm frequency	= 5 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 1,851 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 3.723 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



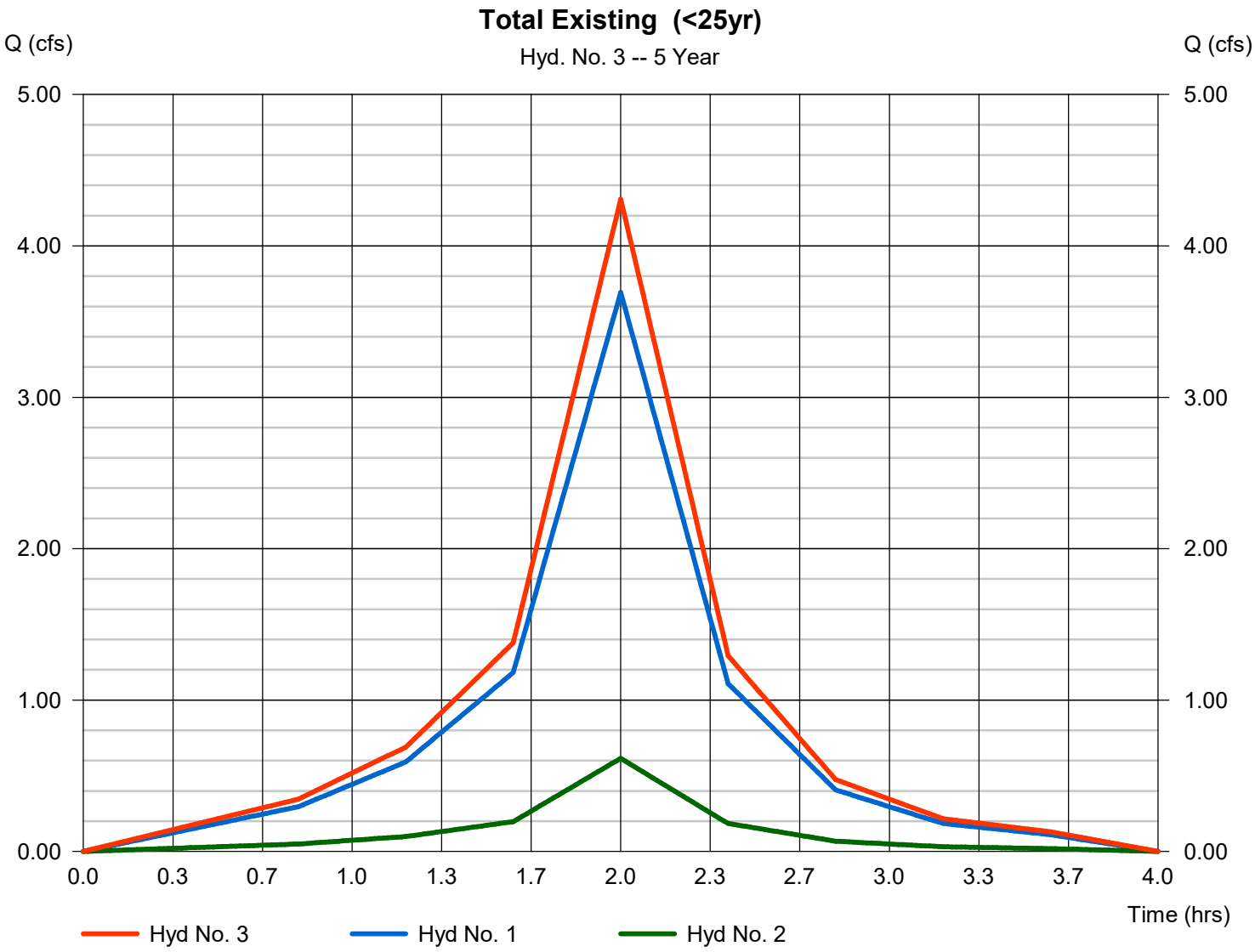
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 3

Total Existing (<25yr)

Hydrograph type	= Combine	Peak discharge	= 4.308 cfs
Storm frequency	= 5 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 12,967 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac



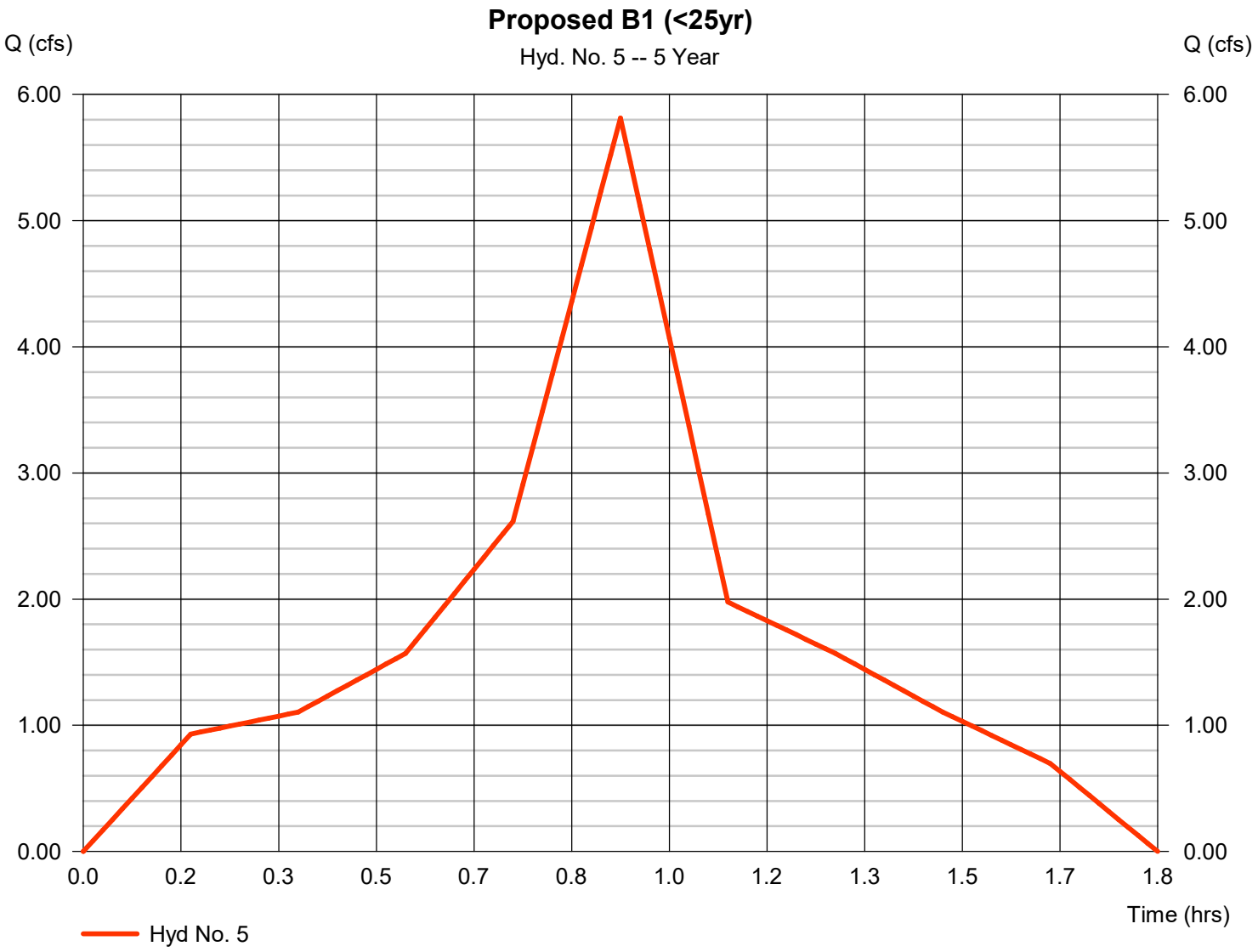
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 5

Proposed B1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 5.814 cfs
Storm frequency	= 5 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 11,474 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.54
Intensity	= 5.252 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



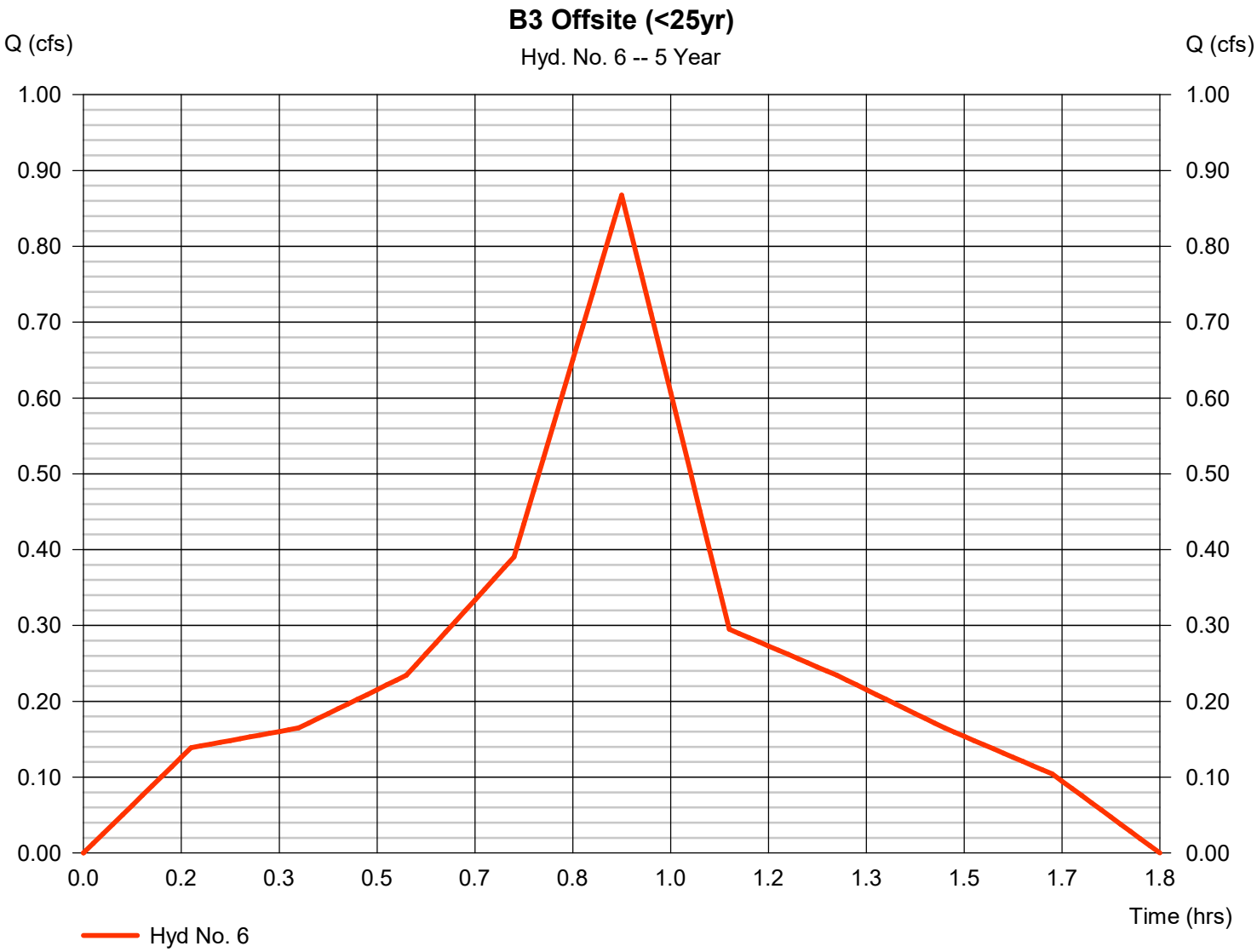
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 6

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.868 cfs
Storm frequency	= 5 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 1,712 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 5.252 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



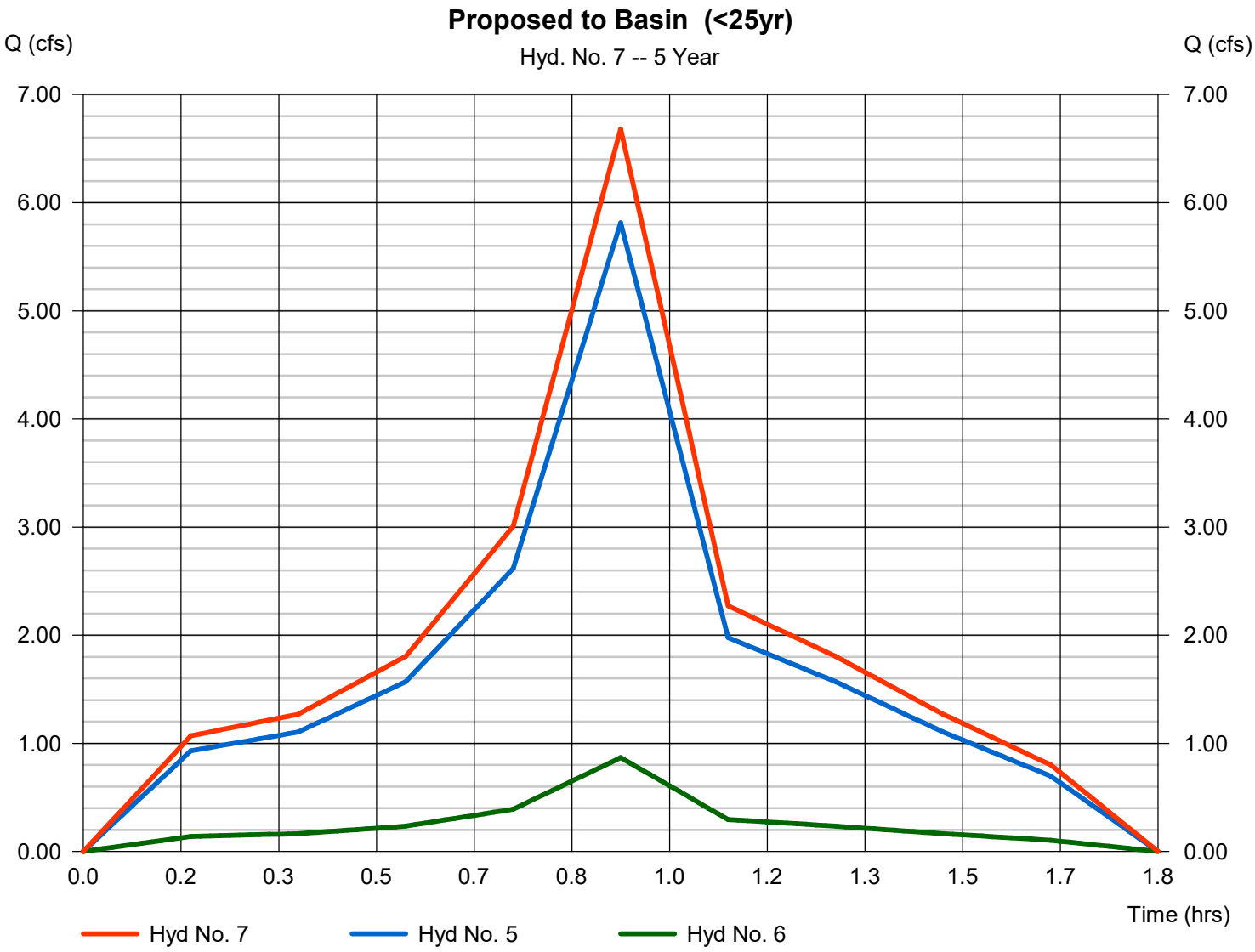
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 7

Proposed to Basin (<25yr)

Hydrograph type	= Combine	Peak discharge	= 6.682 cfs
Storm frequency	= 5 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 13,186 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 2.640 ac



Hydrograph Report

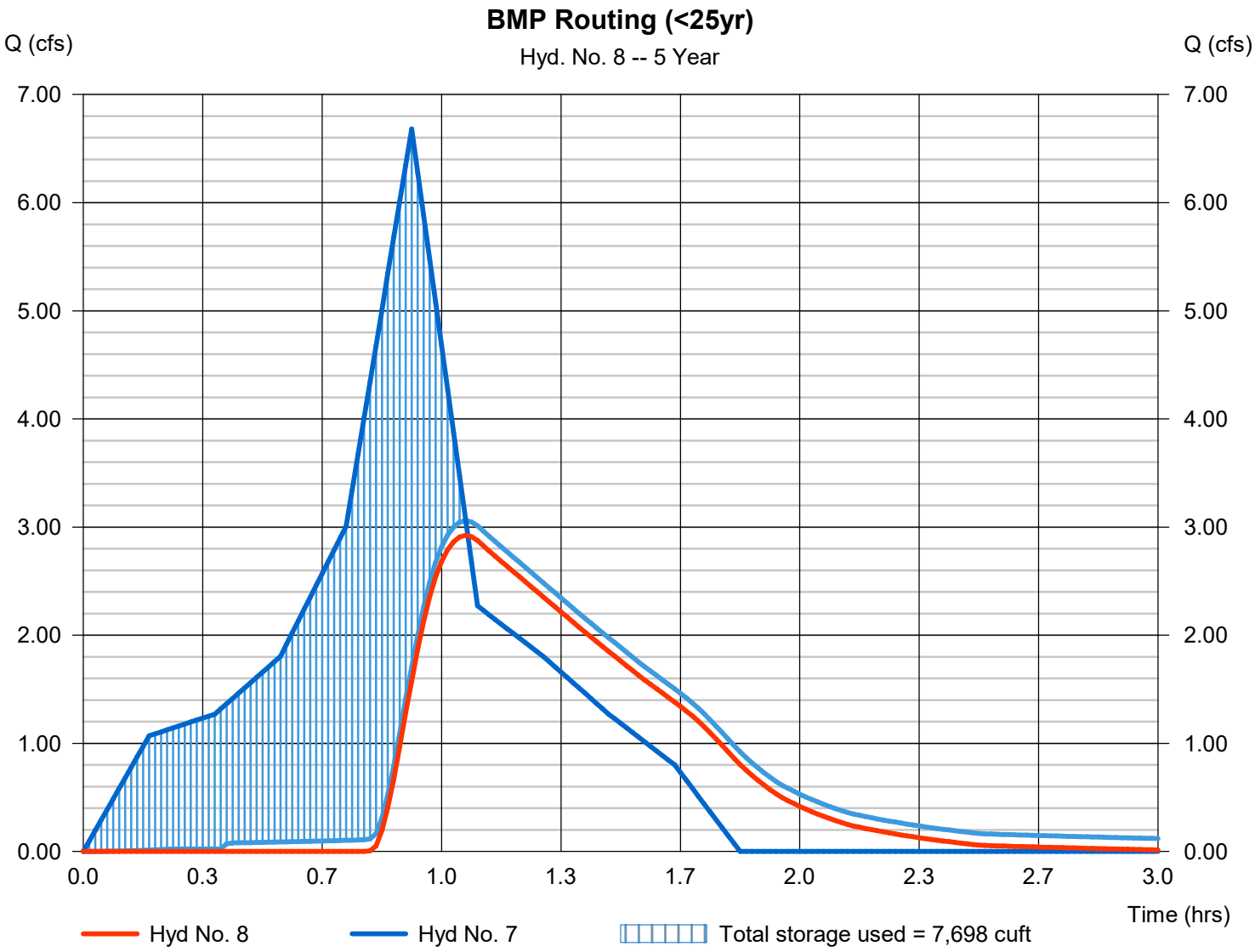
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 8

BMP Routing (<25yr)

Hydrograph type	= Reservoir	Peak discharge	= 2.923 cfs
Storm frequency	= 5 yrs	Time to peak	= 1.07 hrs
Time interval	= 1 min	Hyd. volume	= 7,623 cuft
Inflow hyd. No.	= 7 - Proposed to Basin (<25yr)	Max. Elevation	= 63.39 ft
Reservoir name	= Rain Garden	Max. Storage	= 7,698 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



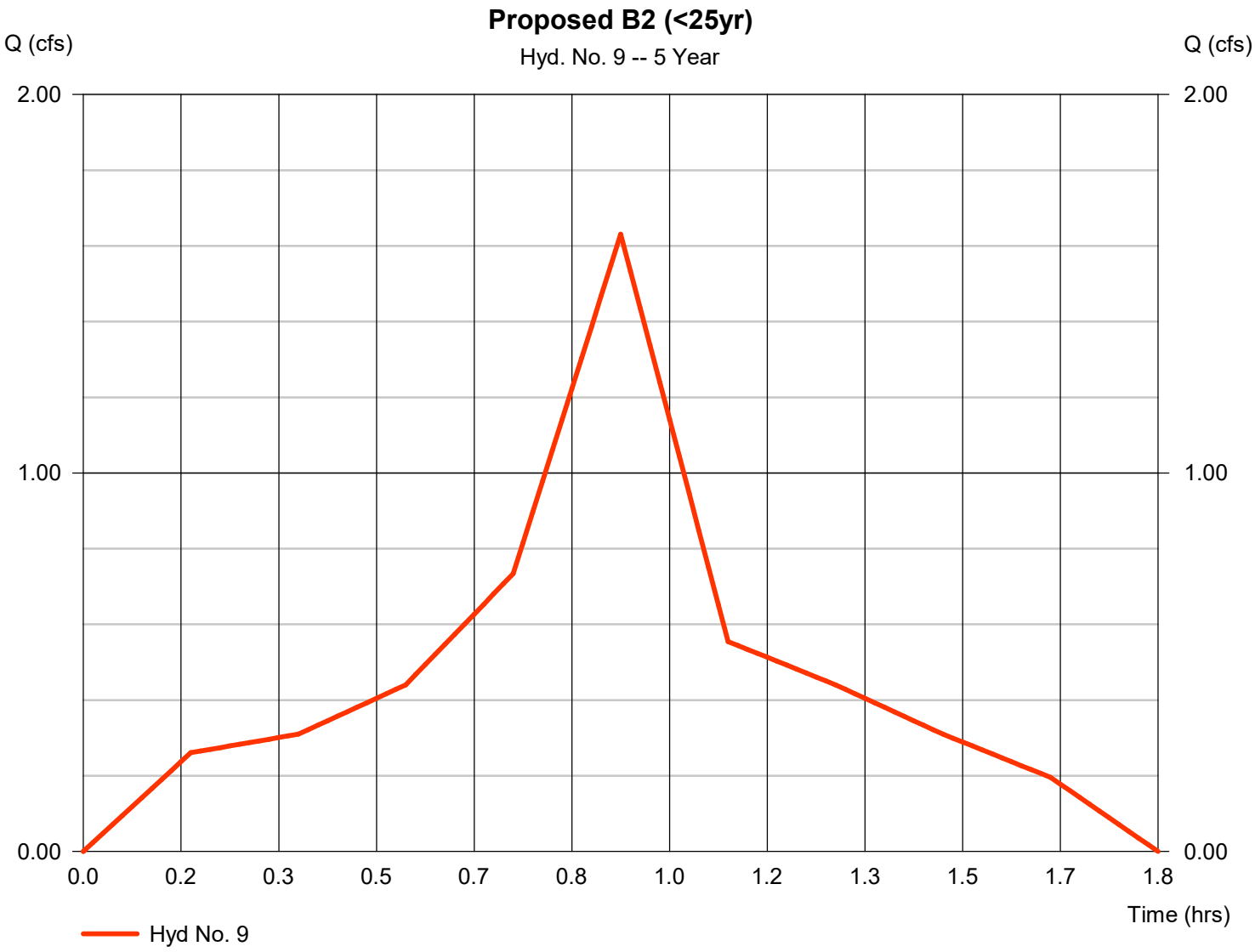
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 9

Proposed B2 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 1.631 cfs
Storm frequency	= 5 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 3,218 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.27
Intensity	= 5.252 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



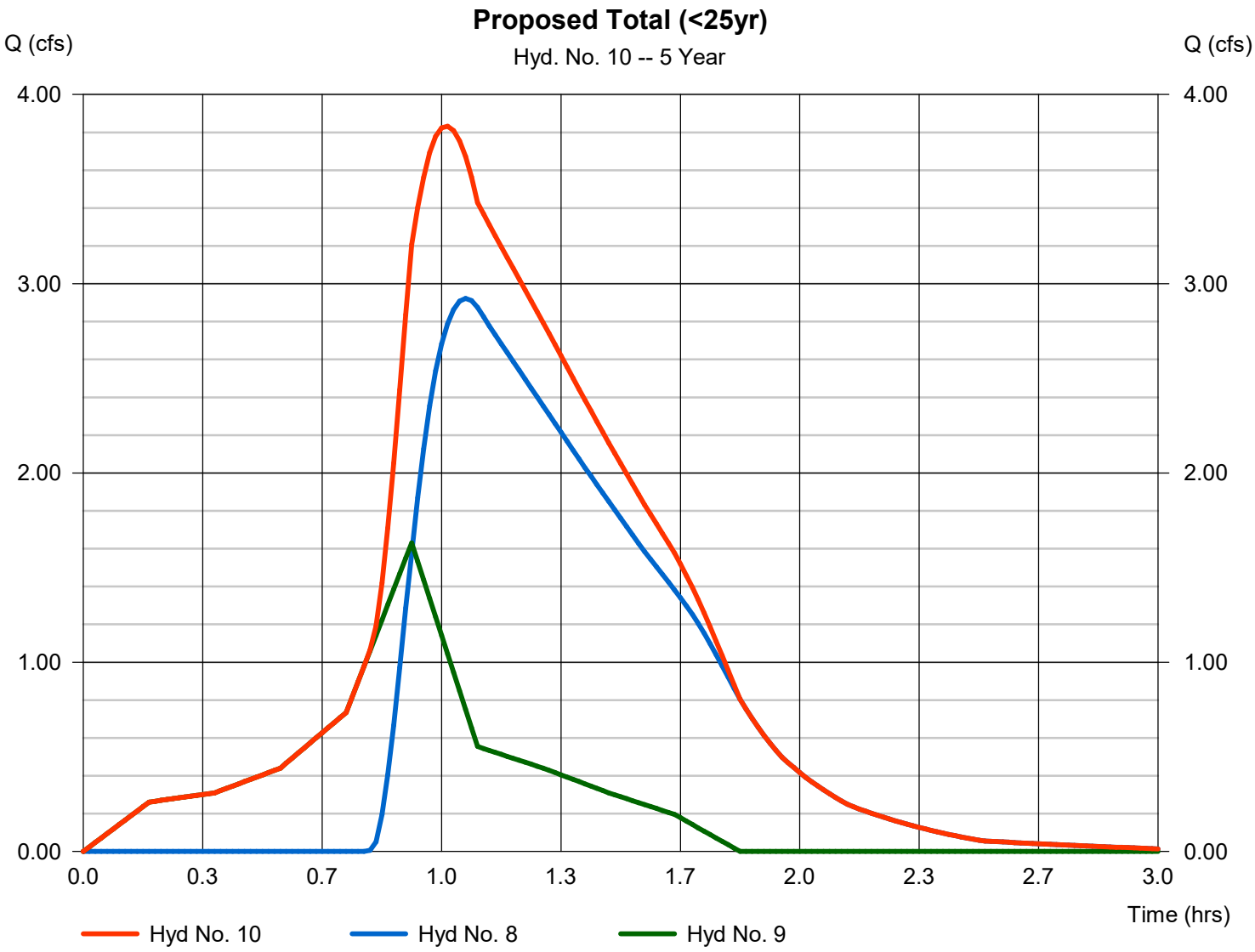
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 10

Proposed Total (<25yr)

Hydrograph type	= Combine	Peak discharge	= 3.833 cfs
Storm frequency	= 5 yrs	Time to peak	= 1.02 hrs
Time interval	= 1 min	Hyd. volume	= 10,841 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 1.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	4.171	1	120	12,553	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.695	1	120	2,091	------	------	------	B3 Offsite (<25yr)
3	Combine	4.866	1	120	14,644	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	6.482	1	55	12,791	------	------	------	Proposed B1 (<25yr)
6	Dekalb	0.967	1	55	1,909	------	------	------	B3 Offsite (<25yr)
7	Combine	7.449	1	55	14,700	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	3.369	1	64	9,101	7	63.52	8,268	BMP Routing (<25yr)
9	Dekalb	1.818	1	55	3,588	------	------	------	Proposed B2 (<25yr)
10	Combine	4.502	1	59	12,689	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	5.113	1	120	15,388	------	------	------	Existing A1 (25yr+)
13	Dekalb	0.893	1	120	2,688	------	------	------	B3 Offsite (25Yr+)
14	Combine	6.006	1	120	18,076	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	7.442	1	55	14,686	------	------	------	Proposed B1 (25yr+)
17	Dekalb	1.244	1	55	2,454	------	------	------	B3 Offsite (25Yr+)
18	Combine	8.686	1	55	17,140	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	3.996	1	64	11,489	18	63.75	9,226	BMP Routing (25yr+)
20	Dekalb	2.289	1	55	4,518	------	------	------	Proposed B2 (25yr+)
21	Combine	5.525	1	58	16,007	19, 20	------	------	Proposed Total (25yr+)

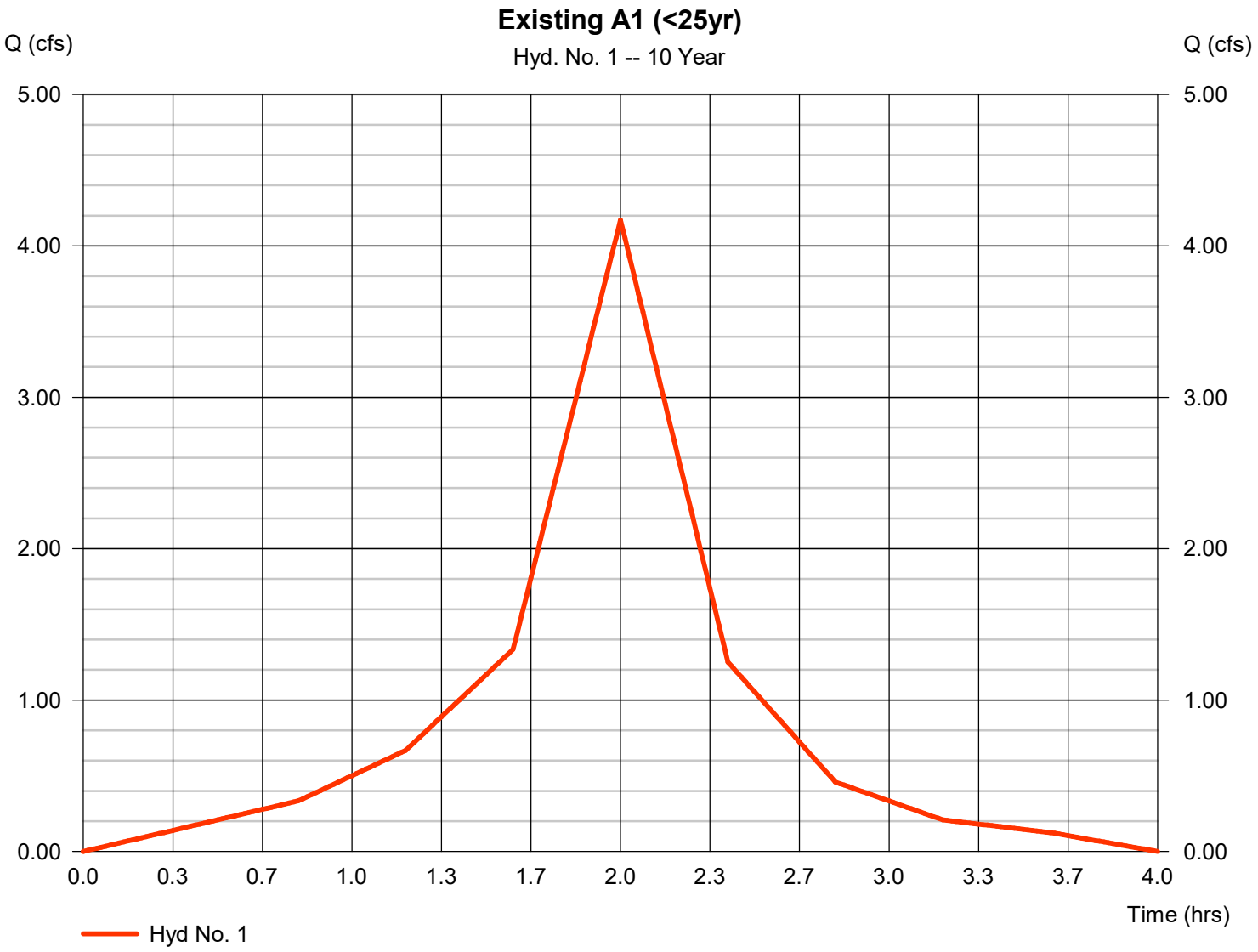
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 1

Existing A1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 4.171 cfs
Storm frequency	= 10 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 12,553 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.31
Intensity	= 4.205 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



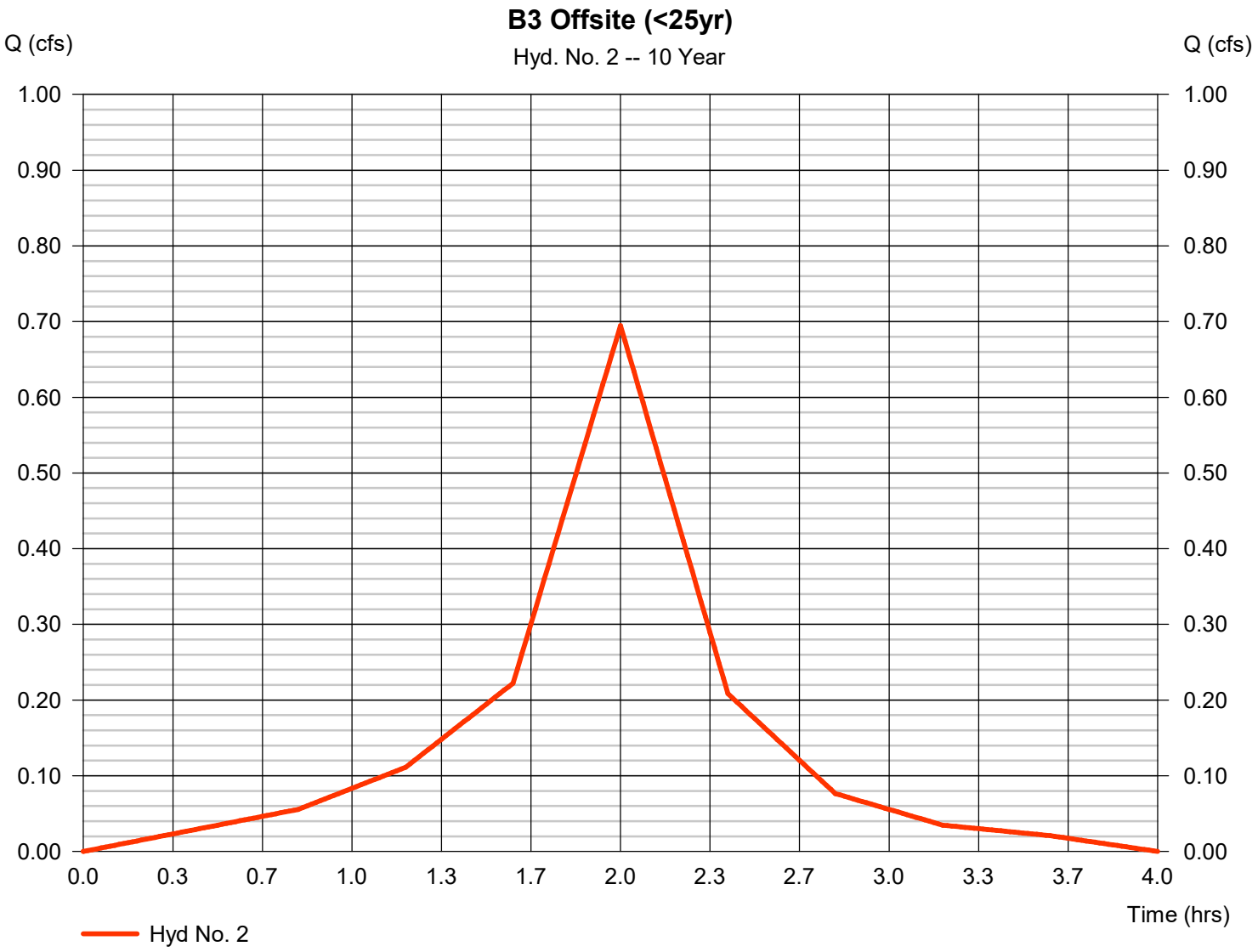
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 2

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.695 cfs
Storm frequency	= 10 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 2,091 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 4.205 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



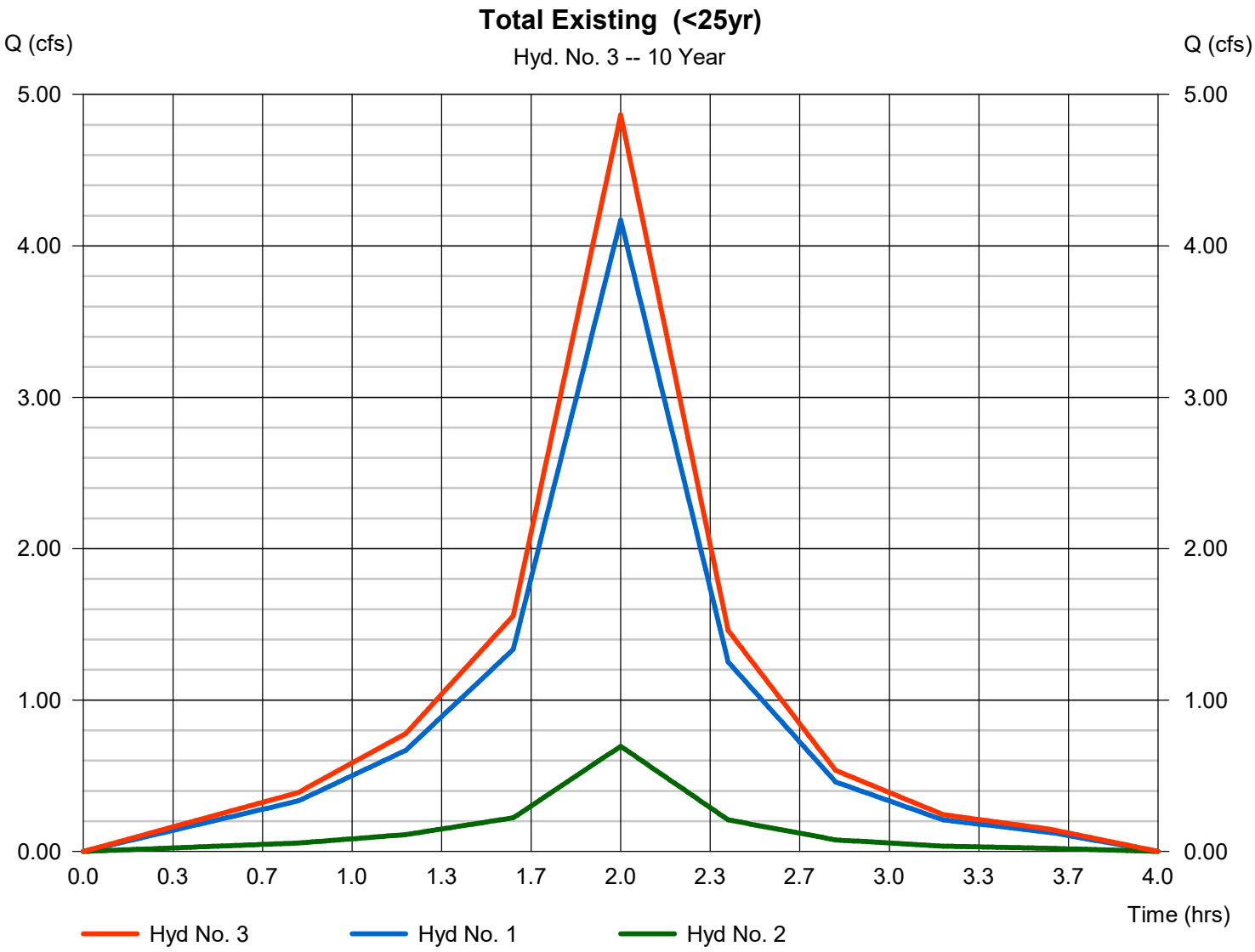
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 3

Total Existing (<25yr)

Hydrograph type	= Combine	Peak discharge	= 4.866 cfs
Storm frequency	= 10 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 14,644 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac



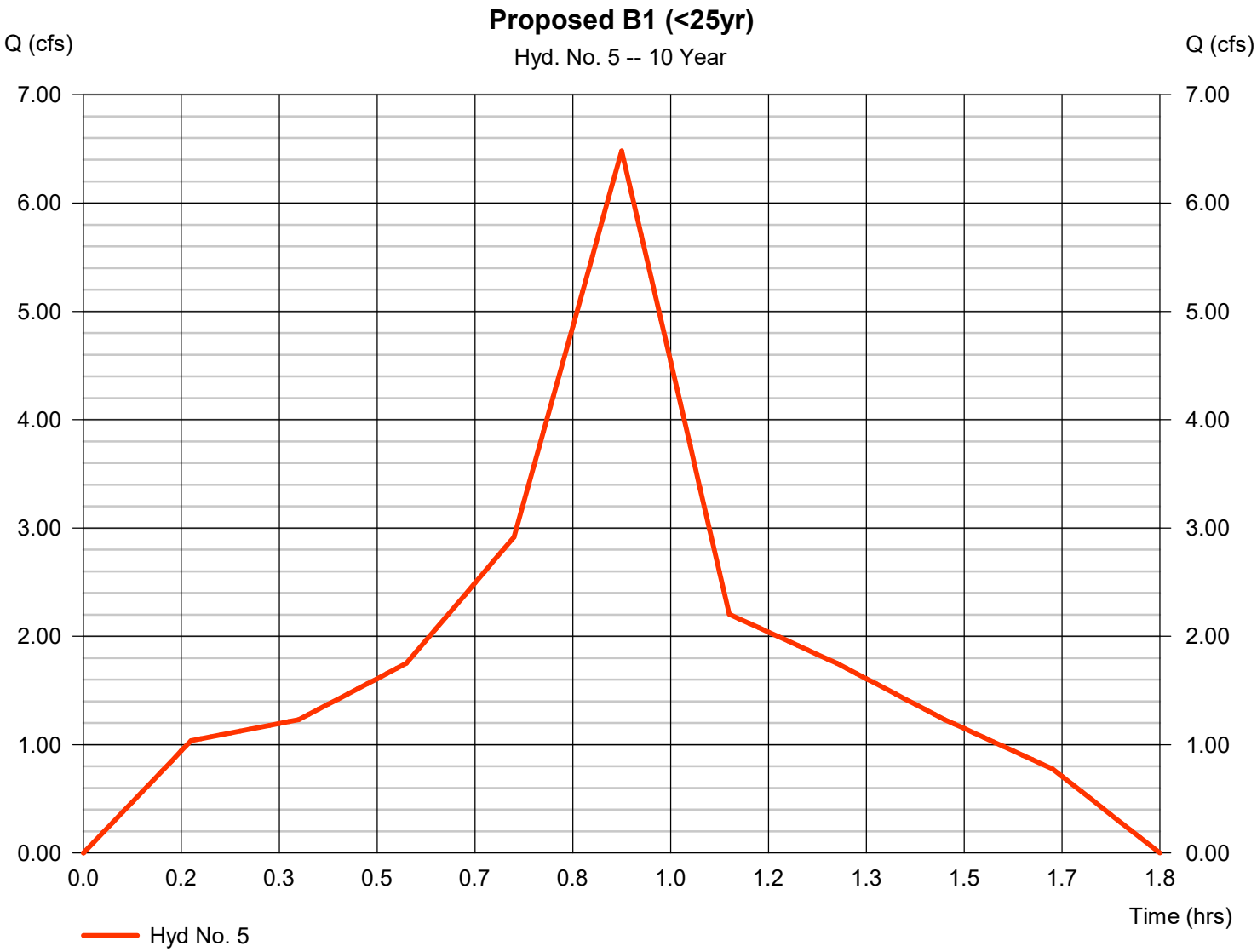
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 5

Proposed B1 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 6.482 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 12,791 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.54
Intensity	= 5.855 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



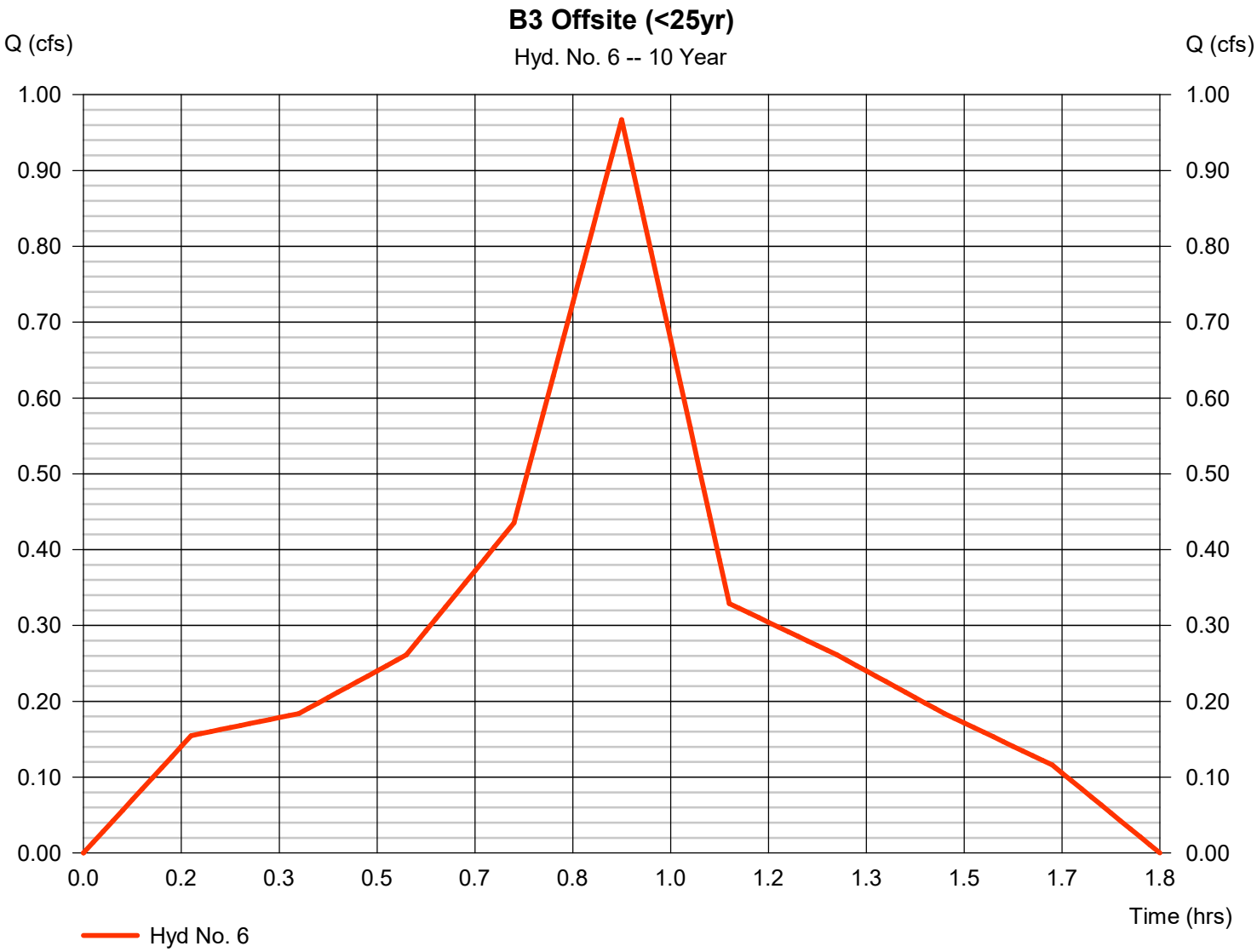
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 6

B3 Offsite (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 0.967 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 1,909 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.28
Intensity	= 5.855 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



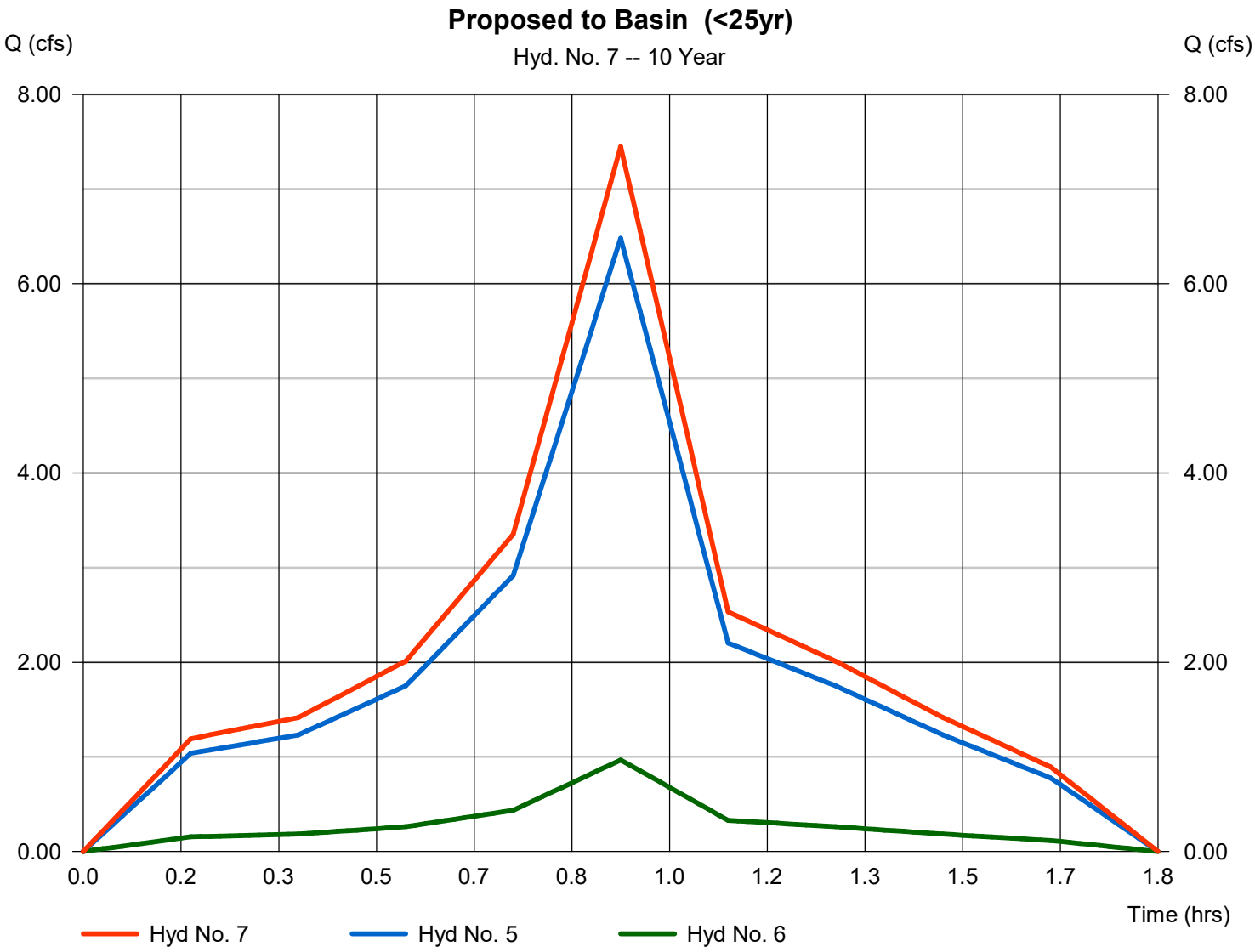
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 7

Proposed to Basin (<25yr)

Hydrograph type	= Combine	Peak discharge	= 7.449 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 14,700 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 2.640 ac



Hydrograph Report

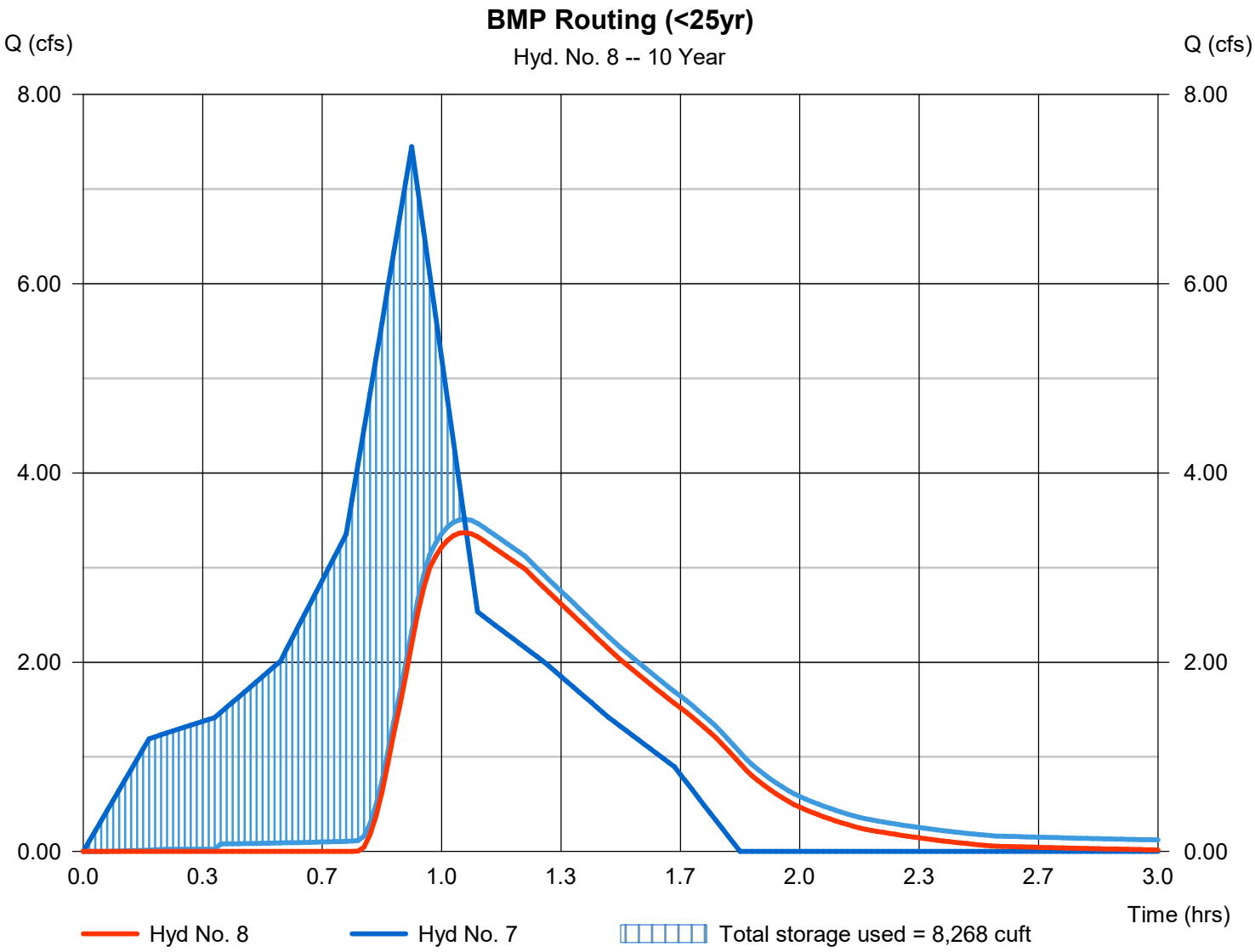
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 8

BMP Routing (<25yr)

Hydrograph type	= Reservoir	Peak discharge	= 3.369 cfs
Storm frequency	= 10 yrs	Time to peak	= 1.07 hrs
Time interval	= 1 min	Hyd. volume	= 9,101 cuft
Inflow hyd. No.	= 7 - Proposed to Basin (<25yr)	Max. Elevation	= 63.52 ft
Reservoir name	= Rain Garden	Max. Storage	= 8,268 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



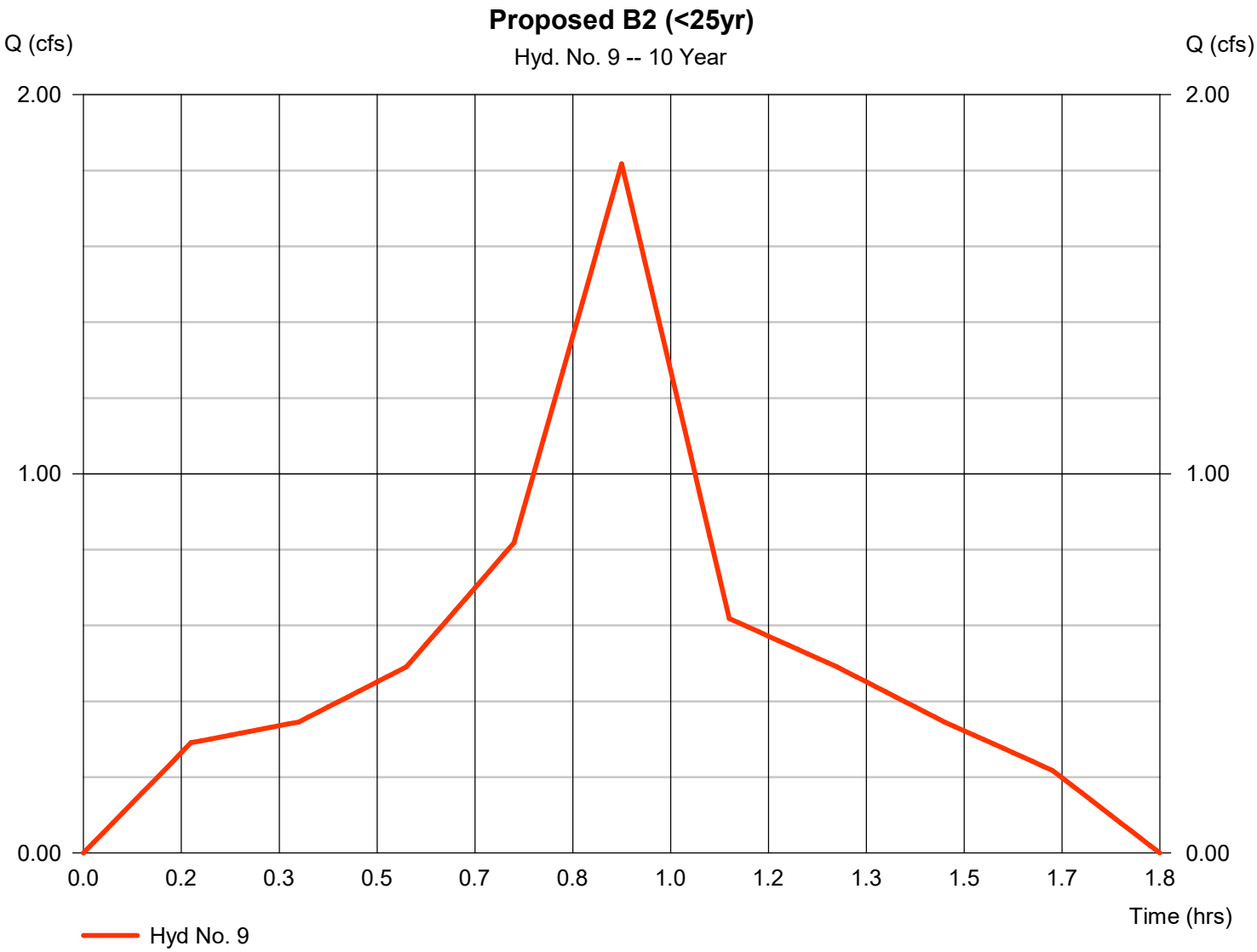
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 9

Proposed B2 (<25yr)

Hydrograph type	= Dekalb	Peak discharge	= 1.818 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 3,588 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.27
Intensity	= 5.855 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



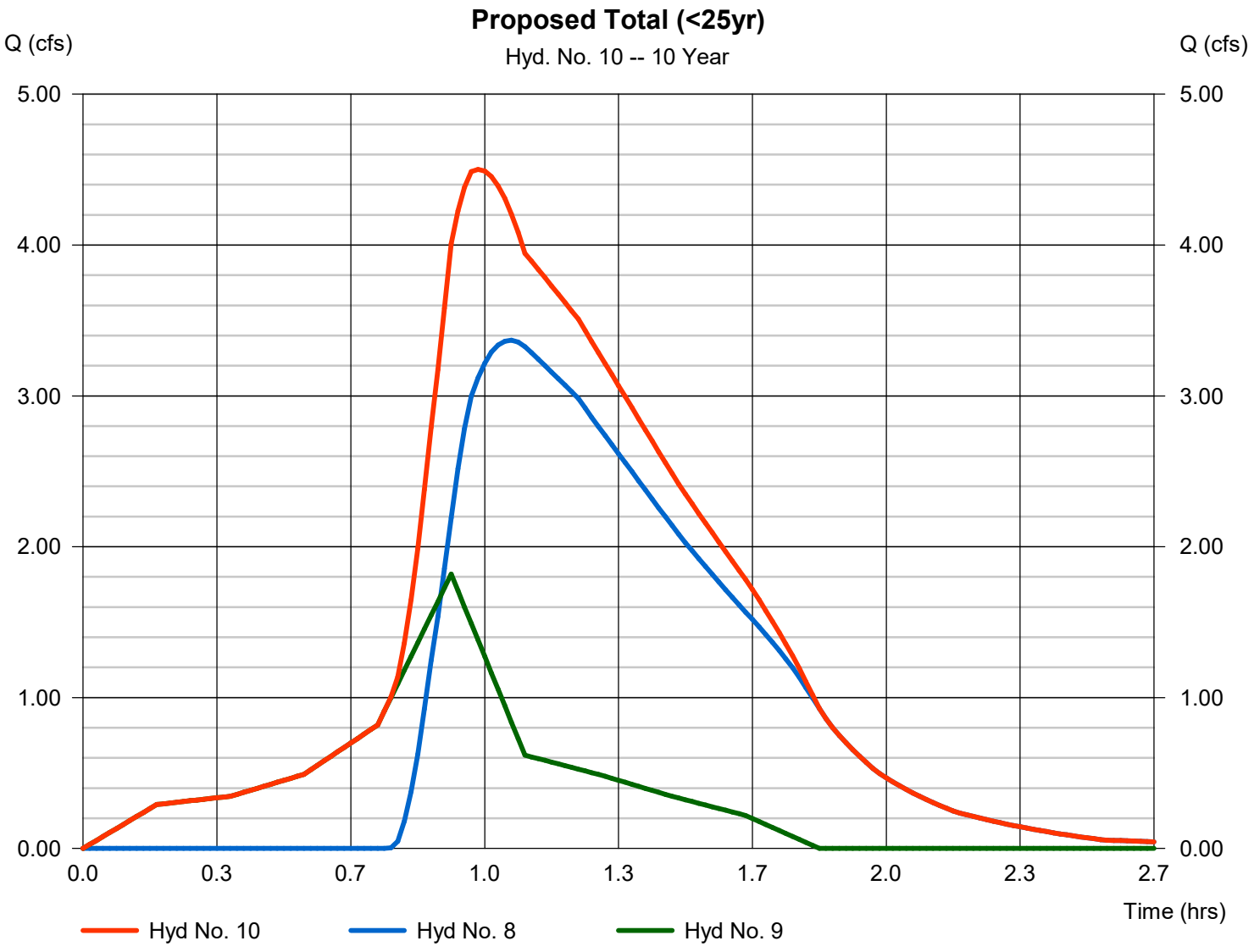
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 10

Proposed Total (<25yr)

Hydrograph type	= Combine	Peak discharge	= 4.502 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.98 hrs
Time interval	= 1 min	Hyd. volume	= 12,689 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 1.150 ac



Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Dekalb	------	-------	3.039	-------	3.693	4.171	4.867	5.402	5.934	Existing A1 (<25yr)
2	Dekalb	------	-------	0.506	-------	0.615	0.695	0.810	0.900	0.988	B3 Offsite (<25yr)
3	Combine	1, 2	-------	3.545	-------	4.308	4.866	5.677	6.302	6.922	Total Existing (<25yr)
5	Dekalb	------	-------	4.927	-------	5.814	6.482	7.461	8.229	8.984	Proposed B1 (<25yr)
6	Dekalb	------	-------	0.735	-------	0.868	0.967	1.113	1.228	1.341	B3 Offsite (<25yr)
7	Combine	5, 6	-------	5.663	-------	6.682	7.449	8.574	9.457	10.33	Proposed to Basin (<25yr)
8	Reservoir	7	-------	2.087	-------	2.923	3.369	3.943	4.354	4.715	BMP Routing (<25yr)
9	Dekalb	------	-------	1.382	-------	1.631	1.818	2.093	2.308	2.520	Proposed B2 (<25yr)
10	Combine	8, 9	-------	2.769	-------	3.833	4.502	5.311	5.893	6.435	Proposed Total (<25yr)
12	Dekalb	------	-------	3.725	-------	4.527	5.113	5.966	6.622	7.274	Existing A1 (25yr+)
13	Dekalb	------	-------	0.651	-------	0.791	0.893	1.042	1.157	1.270	B3 Offsite (25Yr+)
14	Combine	12, 13	-------	4.376	-------	5.318	6.006	7.008	7.778	8.544	Total Existing (25yr+)
16	Dekalb	------	-------	5.657	-------	6.675	7.442	8.566	9.448	10.32	Proposed B1 (25yr+)
17	Dekalb	------	-------	0.945	-------	1.116	1.244	1.431	1.579	1.724	B3 Offsite (25Yr+)
18	Combine	16, 17	-------	6.603	-------	7.791	8.686	9.997	11.03	12.04	Proposed to Basin (25yr+)
19	Reservoir	18	-------	2.860	-------	3.551	3.996	4.593	4.974	5.983	BMP Routing (25yr+)
20	Dekalb	------	-------	1.740	-------	2.054	2.289	2.635	2.907	3.173	Proposed B2 (25yr+)
21	Combine	19, 20	-------	3.836	-------	4.874	5.525	6.403	7.052	7.703	Proposed Total (25yr+)

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	4.867	1	120	14,647	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.810	1	120	2,439	------	------	------	B3 Offsite (<25yr)
3	Combine	5.677	1	120	17,086	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	7.461	1	55	14,723	------	------	------	Proposed B1 (<25yr)
6	Dekalb	1.113	1	55	2,197	------	------	------	B3 Offsite (<25yr)
7	Combine	8.574	1	55	16,920	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	3.943	1	64	11,273	7	63.73	9,138	BMP Routing (<25yr)
9	Dekalb	2.093	1	55	4,130	------	------	------	Proposed B2 (<25yr)
10	Combine	5.311	1	58	15,402	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	5.966	1	120	17,954	------	------	------	Existing A1 (25yr+)
13	Dekalb	1.042	1	120	3,136	------	------	------	B3 Offsite (25Yr+)
14	Combine	7.008	1	120	21,090	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	8.566	1	55	16,904	------	------	------	Proposed B1 (25yr+)
17	Dekalb	1.431	1	55	2,825	------	------	------	B3 Offsite (25Yr+)
18	Combine	9.997	1	55	19,729	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	4.593	1	64	14,021	18	64.00	10,259	BMP Routing (25yr+)
20	Dekalb	2.635	1	55	5,200	------	------	------	Proposed B2 (25yr+)
21	Combine	6.403	1	57	19,222	19, 20	------	------	Proposed Total (25yr+)

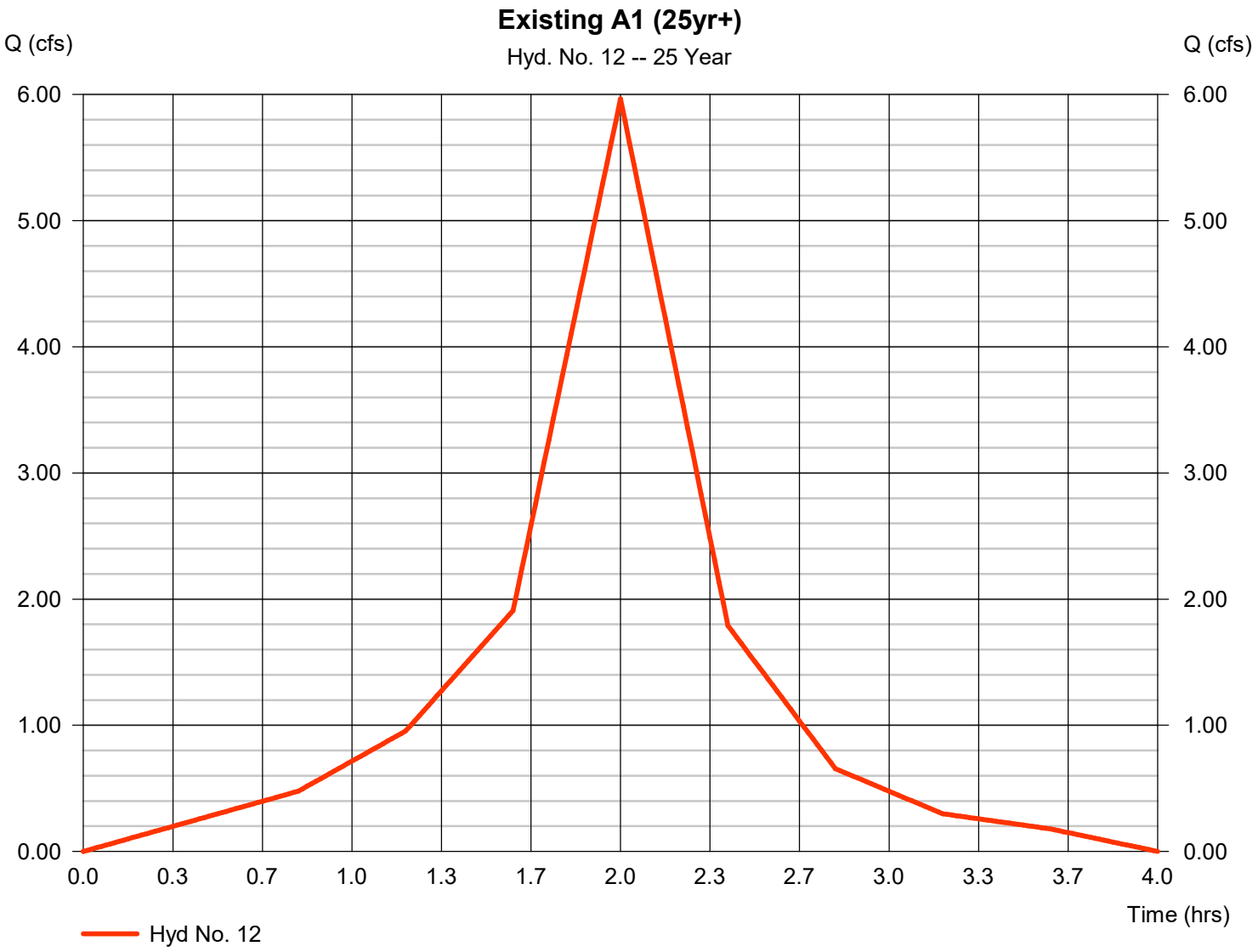
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 12

Existing A1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 5.966 cfs
Storm frequency	= 25 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 17,954 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.38
Intensity	= 4.906 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No. 12

Existing A1 (25yr+)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 150.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.26		0.00		0.00		
Land slope (%)	= 1.50		0.00		0.00		
Travel Time (min)	**= 21.94**	**+**	**0.00**	**+**	**0.00**	**=**	**21.94**
Shallow Concentrated Flow							
Flow length (ft)	= 488.00		0.00		0.00		
Watercourse slope (%)	= 5.16		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.67		0.00		0.00		
Travel Time (min)	**= 2.22**	**+**	**0.00**	**+**	**0.00**	**=**	**2.22**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 24.00 min

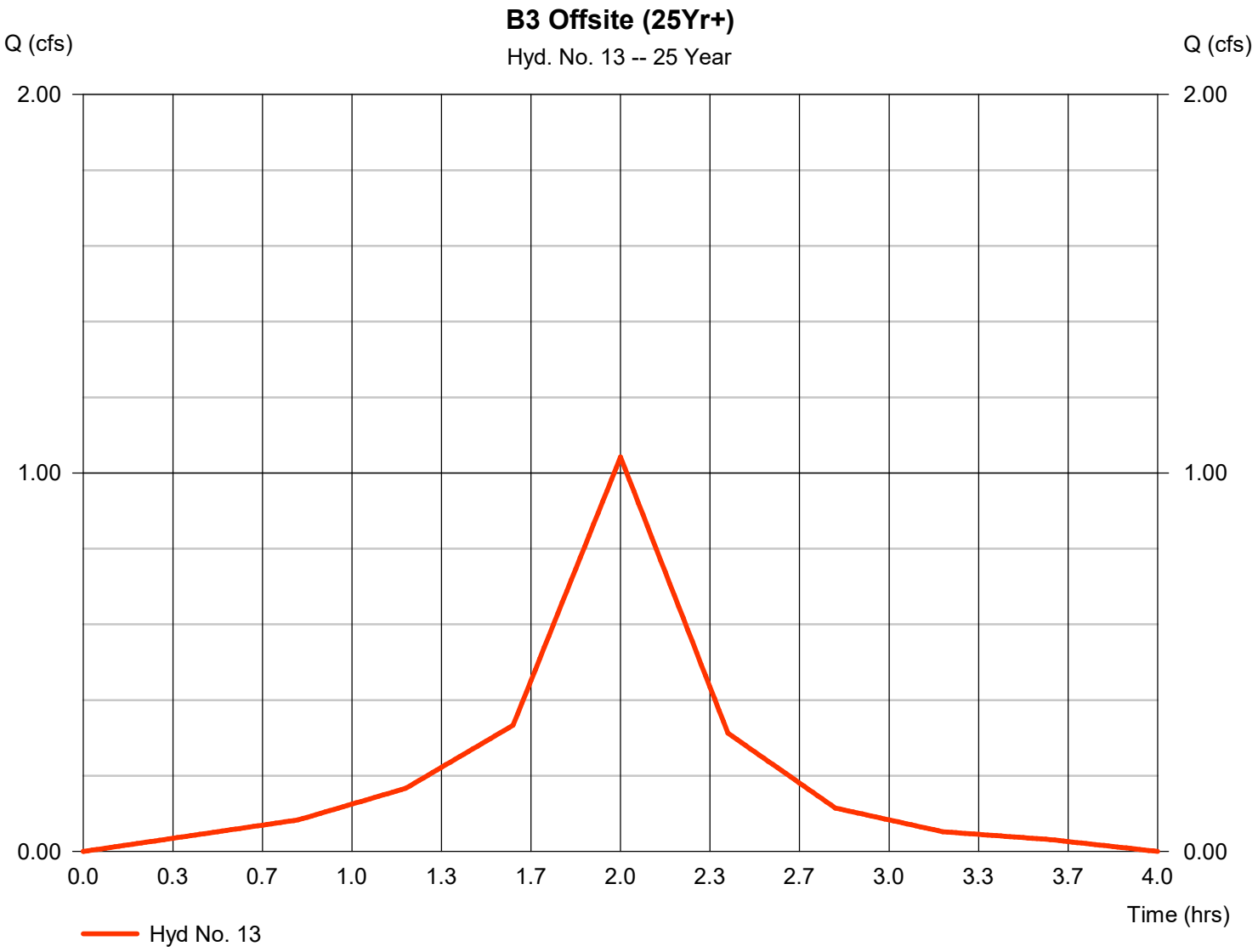
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 13

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.042 cfs
Storm frequency	= 25 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 3,136 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 4.906 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



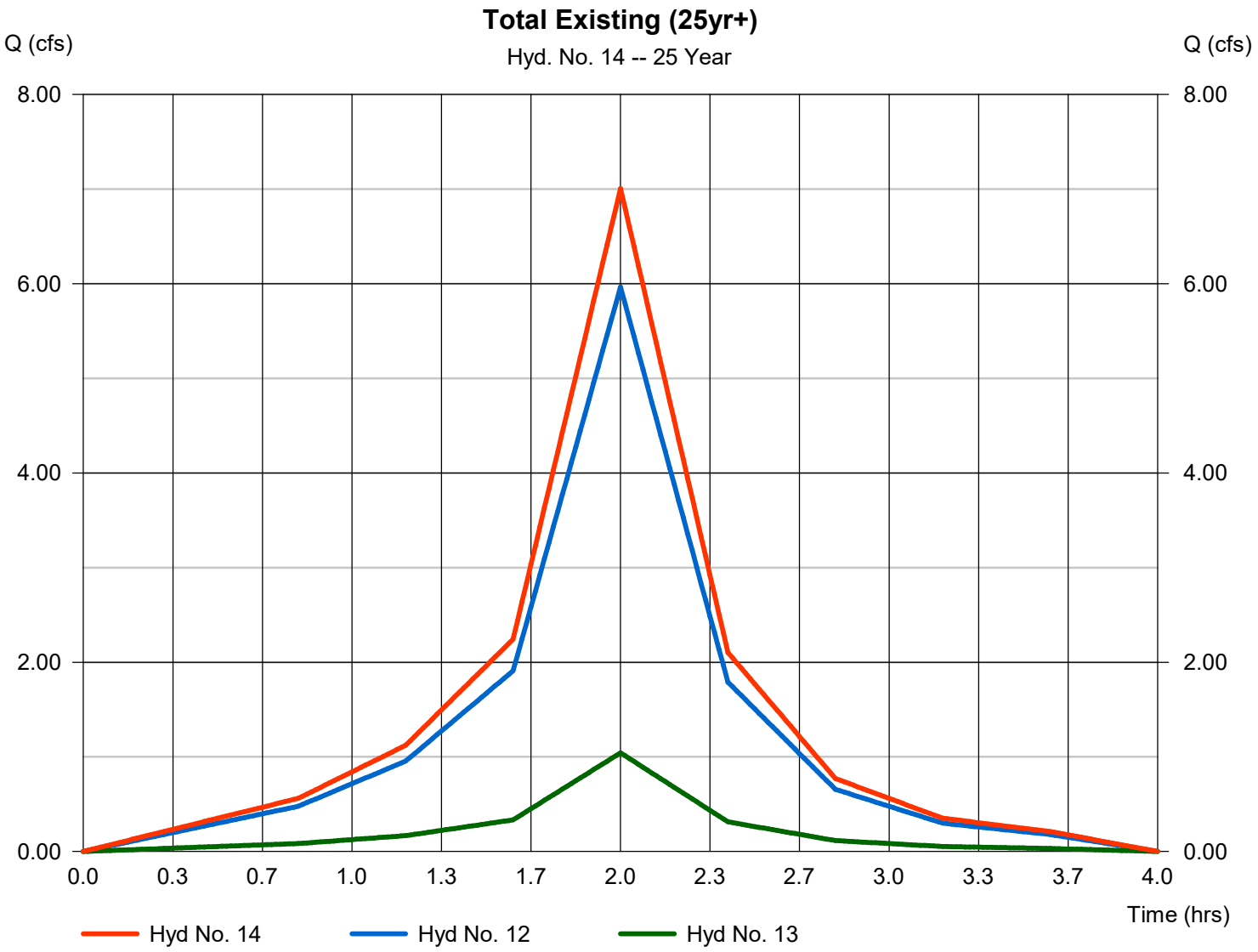
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 14

Total Existing (25yr+)

Hydrograph type	= Combine	Peak discharge	= 7.008 cfs
Storm frequency	= 25 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 21,090 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 3.790 ac



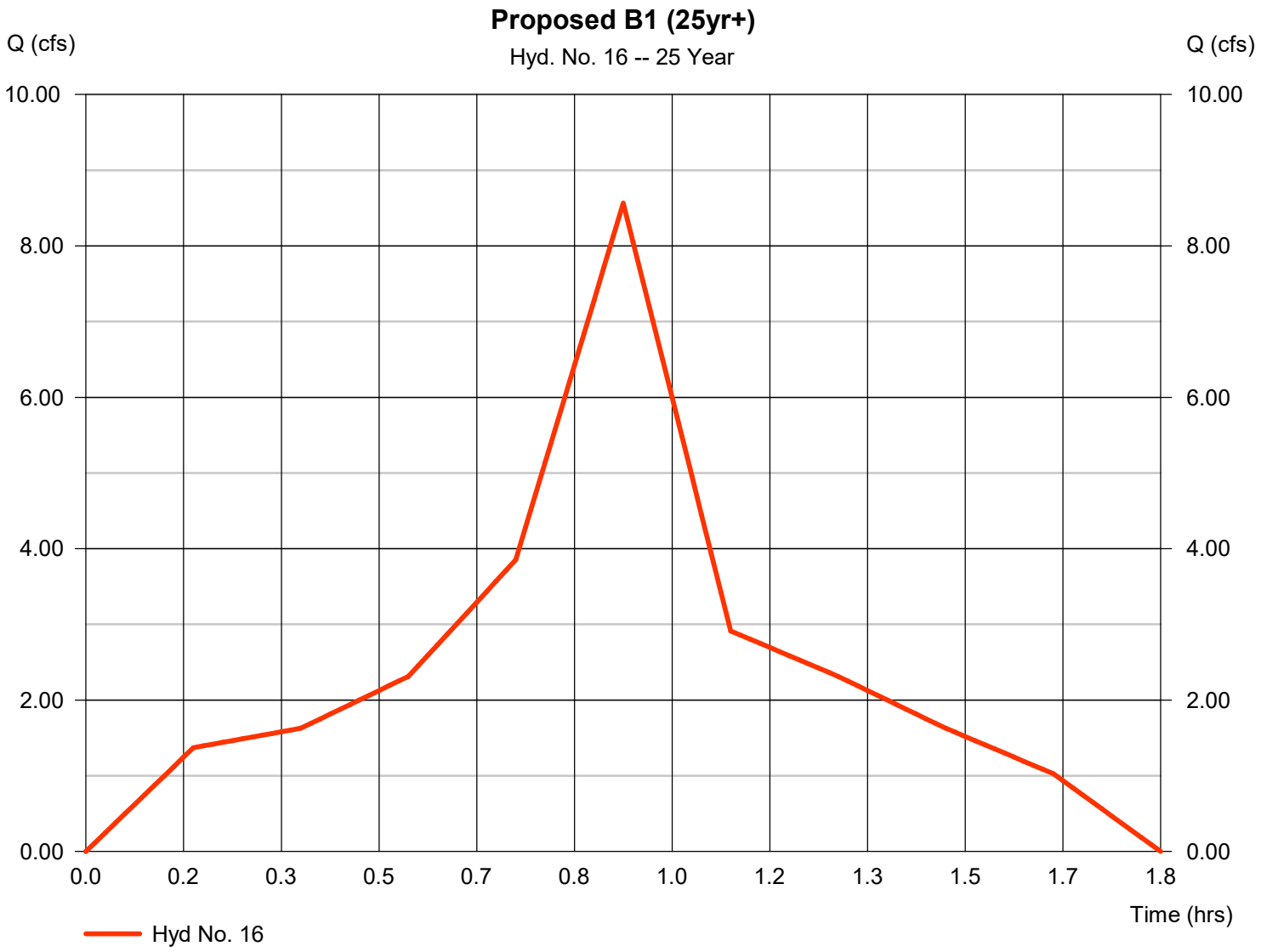
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 16

Proposed B1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 8.566 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 16,904 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.62
Intensity	= 6.739 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



TR55 Tc Worksheet

Hyd. No. 16

Proposed B1 (25yr+)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 55.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.26		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 8.76**	**+**	**0.00**	**+**	**0.00**	**=**	**8.76**
Shallow Concentrated Flow							
Flow length (ft)	= 320.00		101.00		18.00		
Watercourse slope (%)	= 6.50		2.50		30.50		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=4.11		3.21		8.91		
Travel Time (min)	**= 1.30**	**+**	**0.52**	**+**	**0.03**	**=**	**1.85**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.012		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 11.00 min

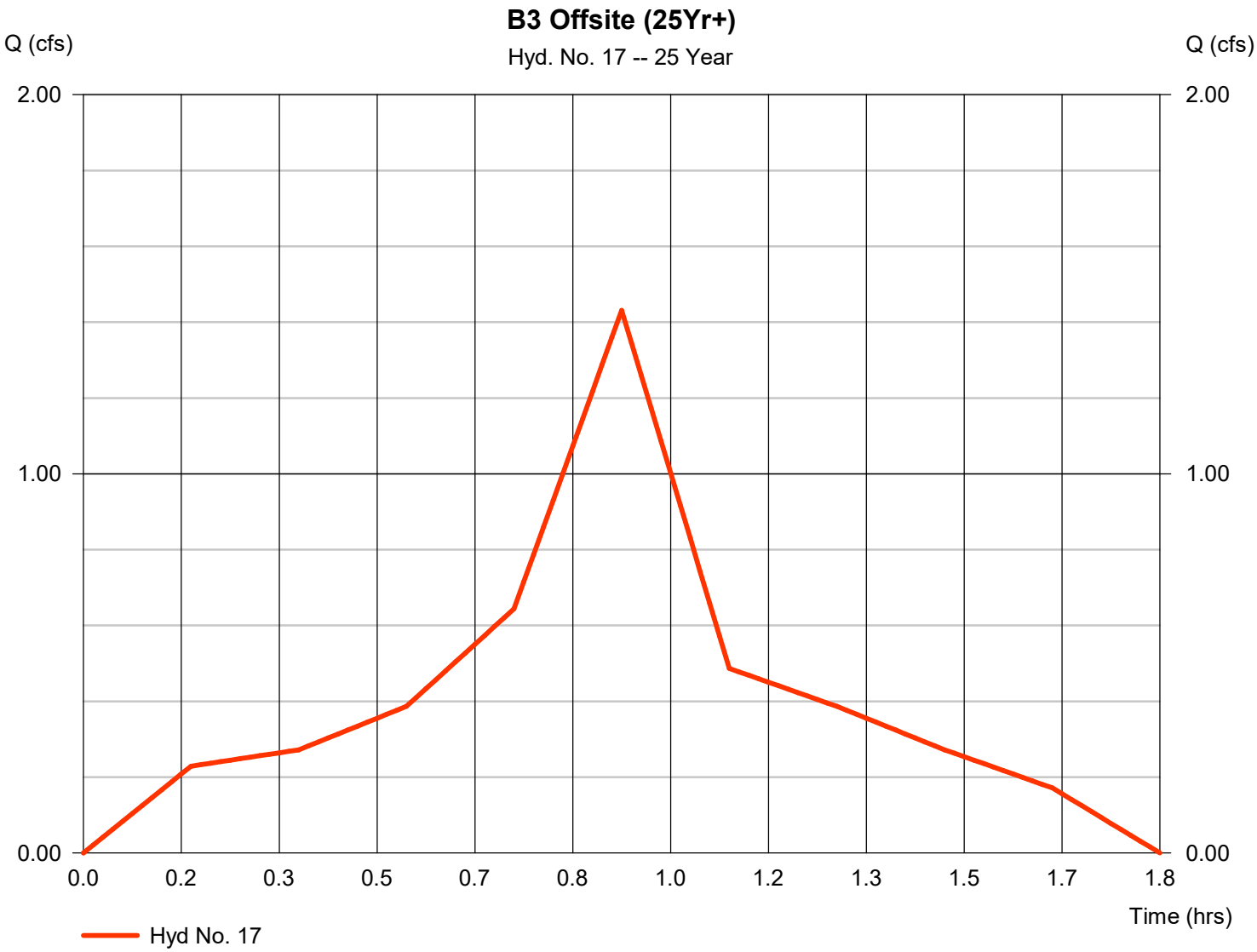
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 17

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.431 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 2,825 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 6.739 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



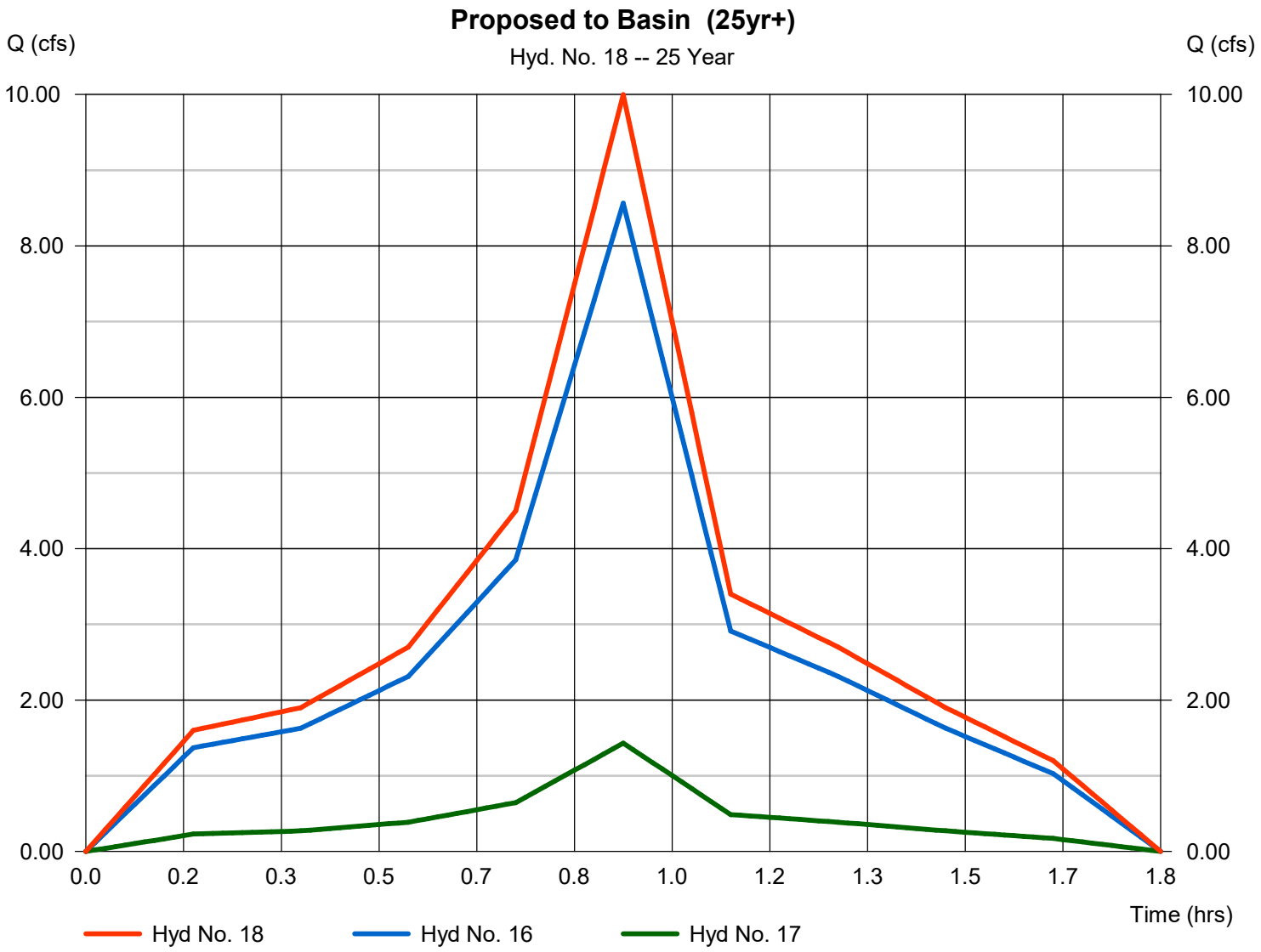
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 18

Proposed to Basin (25yr+)

Hydrograph type	= Combine	Peak discharge	= 9.997 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 19,729 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.640 ac



Hydrograph Report

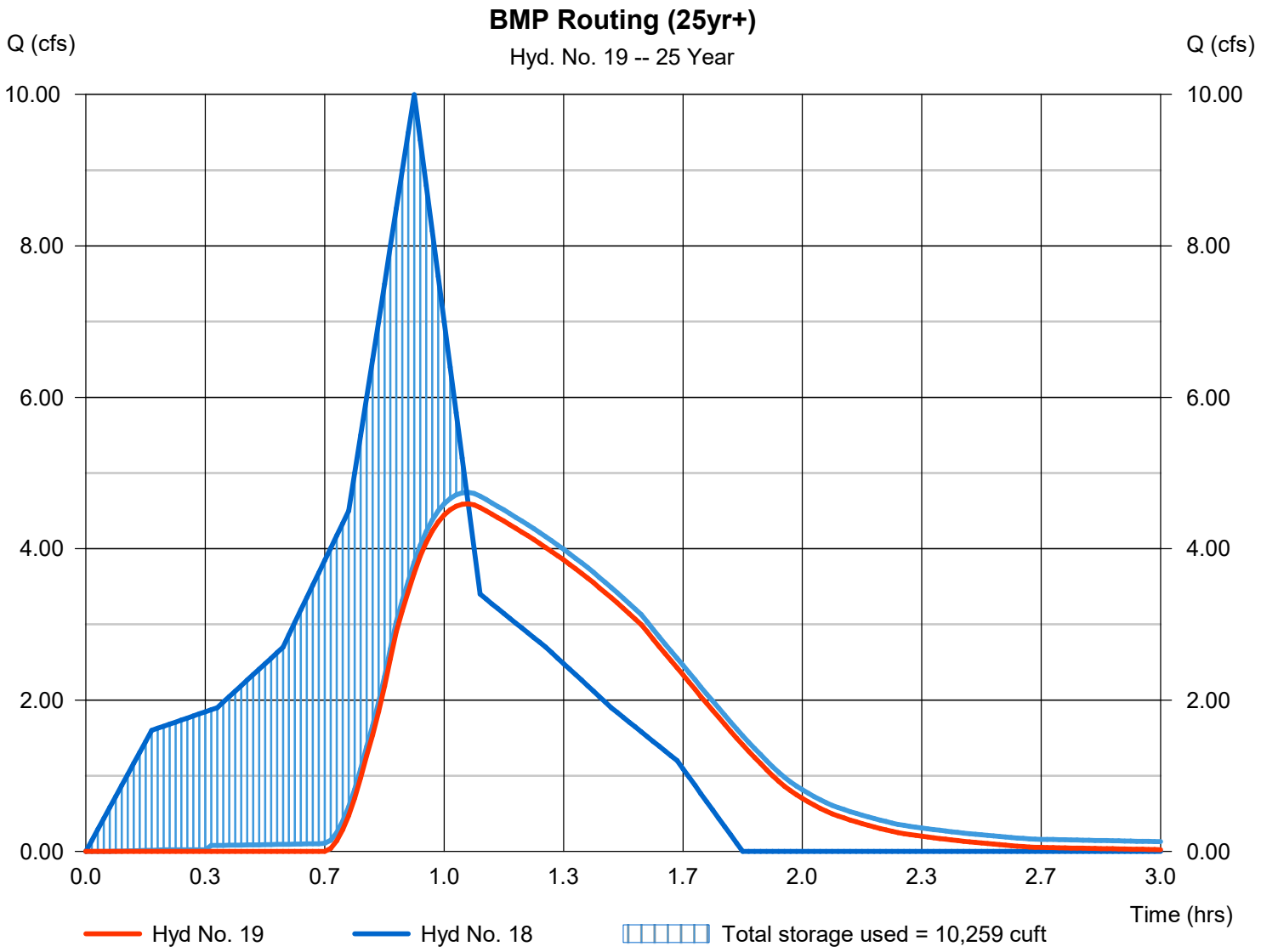
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 19

BMP Routing (25yr+)

Hydrograph type	= Reservoir	Peak discharge	= 4.593 cfs
Storm frequency	= 25 yrs	Time to peak	= 1.07 hrs
Time interval	= 1 min	Hyd. volume	= 14,021 cuft
Inflow hyd. No.	= 18 - Proposed to Basin (25yr+)	Max. Elevation	= 64.00 ft
Reservoir name	= Rain Garden	Max. Storage	= 10,259 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Pond No. 1 - Rain Garden

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 59.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	59.50	734	0	0
1.00	60.50	734	734	734
1.99	61.49	734	727	1,461
2.00	61.50	2,447	16	1,477
2.50	62.00	2,848	1,324	2,800
3.50	63.00	3,701	3,275	6,075
4.50	64.00	4,690	4,195	10,270
5.00	64.50	5,212	2,476	12,746

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	10.00	Inactive
Span (in)	= 18.00	3.00	13.40	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 59.50	62.54	62.54	0.00
Length (ft)	= 52.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	Inactive	0.00	Inactive
Crest El. (ft)	= 64.25	0.00	63.47	0.00
Weir Coeff.	= 3.33	3.33	0.11	3.33
Weir Type	= 1	Rect	5 degV	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 1.380 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	59.50	0.00	0.00	0.00	---	0.00	---	---	---	0.000	---	0.000
0.10	73	59.60	0.00	0.00	0.00	---	0.00	---	---	---	0.002	---	0.002
0.20	147	59.70	0.00	0.00	0.00	---	0.00	---	---	---	0.005	---	0.005
0.30	220	59.80	0.00	0.00	0.00	---	0.00	---	---	---	0.007	---	0.007
0.40	294	59.90	0.00	0.00	0.00	---	0.00	---	---	---	0.009	---	0.009
0.50	367	60.00	0.00	0.00	0.00	---	0.00	---	---	---	0.012	---	0.012
0.60	440	60.10	0.00	0.00	0.00	---	0.00	---	---	---	0.014	---	0.014
0.70	514	60.20	0.00	0.00	0.00	---	0.00	---	---	---	0.016	---	0.016
0.80	587	60.30	0.00	0.00	0.00	---	0.00	---	---	---	0.019	---	0.019
0.90	661	60.40	0.00	0.00	0.00	---	0.00	---	---	---	0.021	---	0.021
1.00	734	60.50	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.10	807	60.60	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.20	879	60.70	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.30	952	60.80	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.40	1,025	60.90	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.49	1,097	60.99	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.59	1,170	61.09	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.69	1,243	61.19	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.79	1,315	61.29	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.89	1,388	61.39	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.99	1,461	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.023	---	0.023
1.99	1,462	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.029	---	0.029
1.99	1,464	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.034	---	0.034
1.99	1,465	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.040	---	0.040
1.99	1,467	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.045	---	0.045
2.00	1,469	61.49	0.00	0.00	0.00	---	0.00	---	---	---	0.051	---	0.051
2.00	1,470	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.056	---	0.056
2.00	1,472	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.062	---	0.062
2.00	1,473	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.067	---	0.067
2.00	1,475	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.073	---	0.073
2.00	1,477	61.50	0.00	0.00	0.00	---	0.00	---	---	---	0.078	---	0.078
2.05	1,609	61.55	0.00	0.00	0.00	---	0.00	---	---	---	0.079	---	0.079
2.10	1,741	61.60	0.00	0.00	0.00	---	0.00	---	---	---	0.081	---	0.081
2.15	1,874	61.65	0.00	0.00	0.00	---	0.00	---	---	---	0.082	---	0.082
2.20	2,006	61.70	0.00	0.00	0.00	---	0.00	---	---	---	0.083	---	0.083

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Rain Garden

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.25	2,138	61.75	0.00	0.00	0.00	---	0.00	---	---	---	0.085	---	0.085
2.30	2,271	61.80	0.00	0.00	0.00	---	0.00	---	---	---	0.086	---	0.086
2.35	2,403	61.85	0.00	0.00	0.00	---	0.00	---	---	---	0.087	---	0.087
2.40	2,536	61.90	0.00	0.00	0.00	---	0.00	---	---	---	0.088	---	0.088
2.45	2,668	61.95	0.00	0.00	0.00	---	0.00	---	---	---	0.090	---	0.090
2.50	2,800	62.00	0.00	0.00	0.00	---	0.00	---	---	---	0.091	---	0.091
2.60	3,128	62.10	0.00	0.00	0.00	---	0.00	---	---	---	0.094	---	0.094
2.70	3,455	62.20	0.00	0.00	0.00	---	0.00	---	---	---	0.096	---	0.096
2.80	3,783	62.30	0.00	0.00	0.00	---	0.00	---	---	---	0.099	---	0.099
2.90	4,110	62.40	0.00	0.00	0.00	---	0.00	---	---	---	0.102	---	0.102
3.00	4,438	62.50	0.00	0.00	0.00	---	0.00	---	---	---	0.105	---	0.105
3.10	4,765	62.60	0.06 ic	0.00	0.06 ic	---	0.00	---	---	---	0.107	---	0.163
3.20	5,092	62.70	0.25 ic	0.00	0.24 ic	---	0.00	---	---	---	0.110	---	0.353
3.30	5,420	62.80	0.52 ic	0.00	0.50 ic	---	0.00	---	---	---	0.113	---	0.617
3.40	5,747	62.90	0.84 ic	0.00	0.82 ic	---	0.00	---	---	---	0.116	---	0.937
3.50	6,075	63.00	1.21 ic	0.00	1.19 ic	---	0.00	---	---	---	0.118	---	1.304
3.60	6,494	63.10	1.59 ic	0.00	1.59 ic	---	0.00	---	---	---	0.121	---	1.715
3.70	6,914	63.20	2.07 oc	0.00	2.04 ic	---	0.00	---	---	---	0.125	---	2.163
3.80	7,333	63.30	2.54 oc	0.00	2.52 ic	---	0.00	---	---	---	0.128	---	2.647
3.90	7,753	63.40	3.01 oc	0.00	2.98 ic	---	0.00	---	---	---	0.131	---	3.114
4.00	8,173	63.50	3.32 oc	0.00	3.30 ic	---	0.00	---	0.00	---	0.134	---	3.437
4.10	8,592	63.60	3.60 oc	0.00	3.59 ic	---	0.00	---	0.00	---	0.137	---	3.732
4.20	9,012	63.70	3.90 oc	0.00	3.86 ic	---	0.00	---	0.00	---	0.140	---	4.006
4.30	9,431	63.80	4.13 oc	0.00	4.11 ic	---	0.00	---	0.01	---	0.143	---	4.265
4.40	9,851	63.90	4.38 oc	0.00	4.35 ic	---	0.00	---	0.01	---	0.147	---	4.512
4.50	10,270	64.00	4.60 oc	0.00	4.58 ic	---	0.00	---	0.02	---	0.150	---	4.749
4.55	10,518	64.05	4.72 oc	0.00	4.69 ic	---	0.00	---	0.03	---	0.151	---	4.865
4.60	10,765	64.10	4.83 oc	0.00	4.79 ic	---	0.00	---	0.03	---	0.153	---	4.979
4.65	11,013	64.15	4.94 oc	0.00	4.89 ic	---	0.00	---	0.04	---	0.155	---	5.092
4.70	11,261	64.20	5.05 oc	0.00	5.00 ic	---	0.00	---	0.05	---	0.156	---	5.203
4.75	11,508	64.25	5.16 oc	0.00	5.10 ic	---	0.00	---	0.06	---	0.158	---	5.313
4.80	11,756	64.30	5.71 oc	0.00	5.19 ic	---	0.45	---	0.07	---	0.160	---	5.870
4.85	12,003	64.35	6.63 oc	0.00	5.29 ic	---	1.26	---	0.08	---	0.161	---	6.795
4.90	12,251	64.40	7.80 oc	0.00	5.38 ic	---	2.32	---	0.09	---	0.163	---	7.961
4.95	12,498	64.45	9.16 oc	0.00	5.48 ic	---	3.57	---	0.11	---	0.165	---	9.321
5.00	12,746	64.50	10.68 oc	0.00	5.57 ic	---	4.99	---	0.12	---	0.166	---	10.85

...End

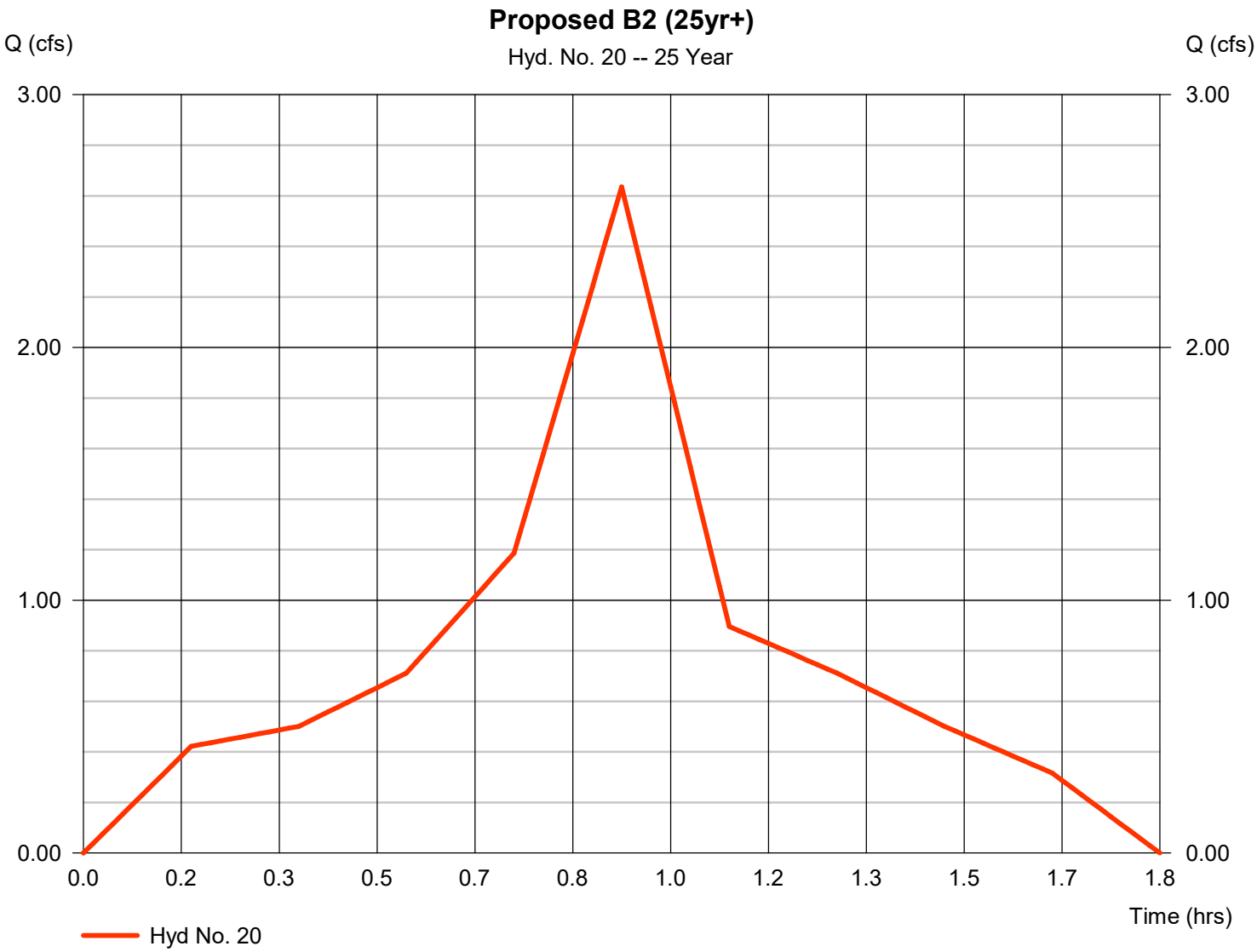
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 20

Proposed B2 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 2.635 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 5,200 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.34
Intensity	= 6.739 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



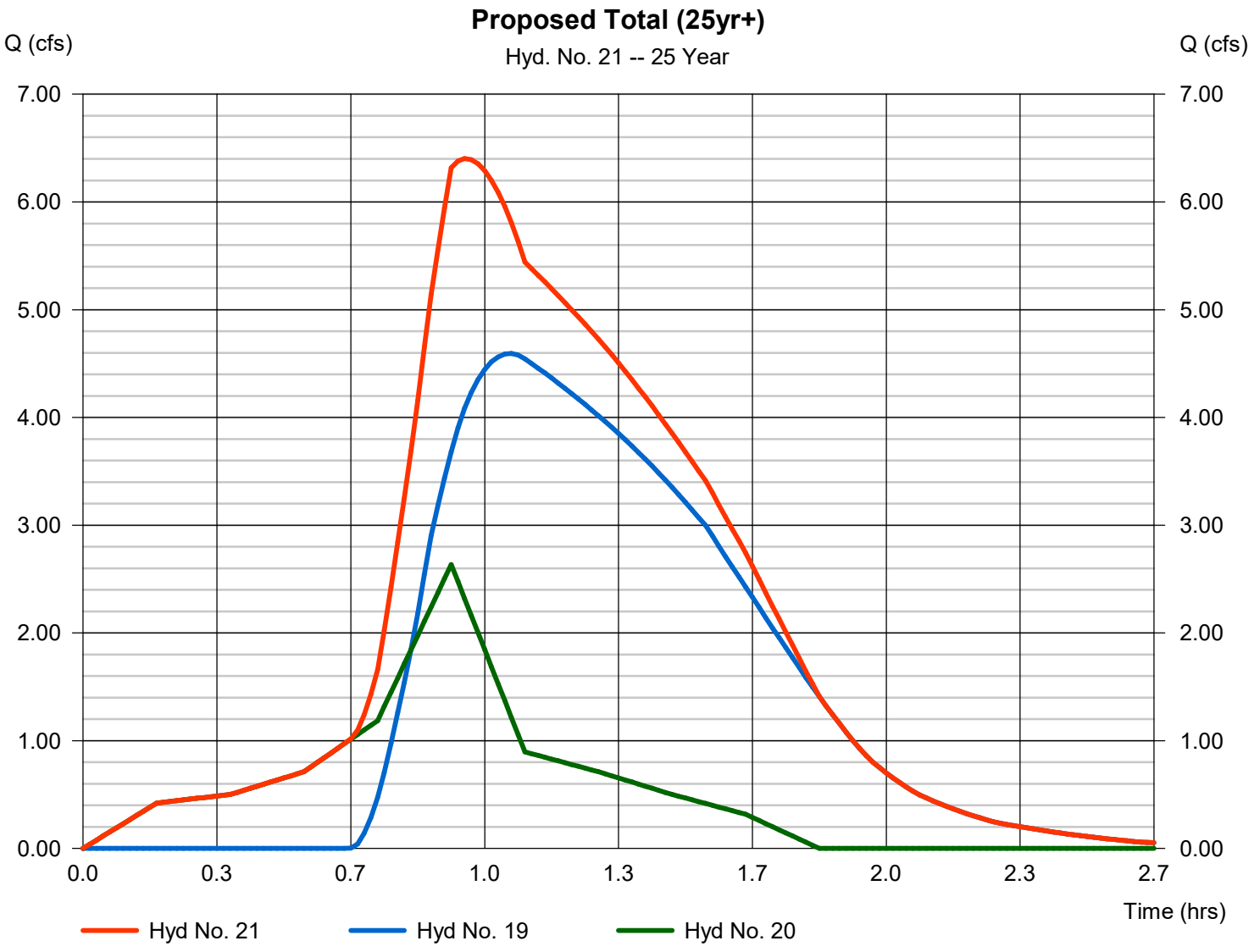
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 21

Proposed Total (25yr+)

Hydrograph type	= Combine	Peak discharge	= 6.403 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.95 hrs
Time interval	= 1 min	Hyd. volume	= 19,222 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 1.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	5.402	1	120	16,258	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.900	1	120	2,707	------	------	------	B3 Offsite (<25yr)
3	Combine	6.302	1	120	18,965	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	8.229	1	55	16,239	------	------	------	Proposed B1 (<25yr)
6	Dekalb	1.228	1	55	2,423	------	------	------	B3 Offsite (<25yr)
7	Combine	9.457	1	55	18,663	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	4.354	1	64	12,978	7	63.90	9,832	BMP Routing (<25yr)
9	Dekalb	2.308	1	55	4,555	------	------	------	Proposed B2 (<25yr)
10	Combine	5.893	1	58	17,533	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	6.622	1	120	19,929	------	------	------	Existing A1 (25yr+)
13	Dekalb	1.157	1	120	3,481	------	------	------	B3 Offsite (25Yr+)
14	Combine	7.778	1	120	23,410	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	9.448	1	55	18,645	------	------	------	Proposed B1 (25yr+)
17	Dekalb	1.579	1	55	3,116	------	------	------	B3 Offsite (25Yr+)
18	Combine	11.03	1	55	21,761	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	4.974	1	64	16,008	18	64.17	11,096	BMP Routing (25yr+)
20	Dekalb	2.907	1	55	5,736	------	------	------	Proposed B2 (25yr+)
21	Combine	7.052	1	57	21,744	19, 20	------	------	Proposed Total (25yr+)

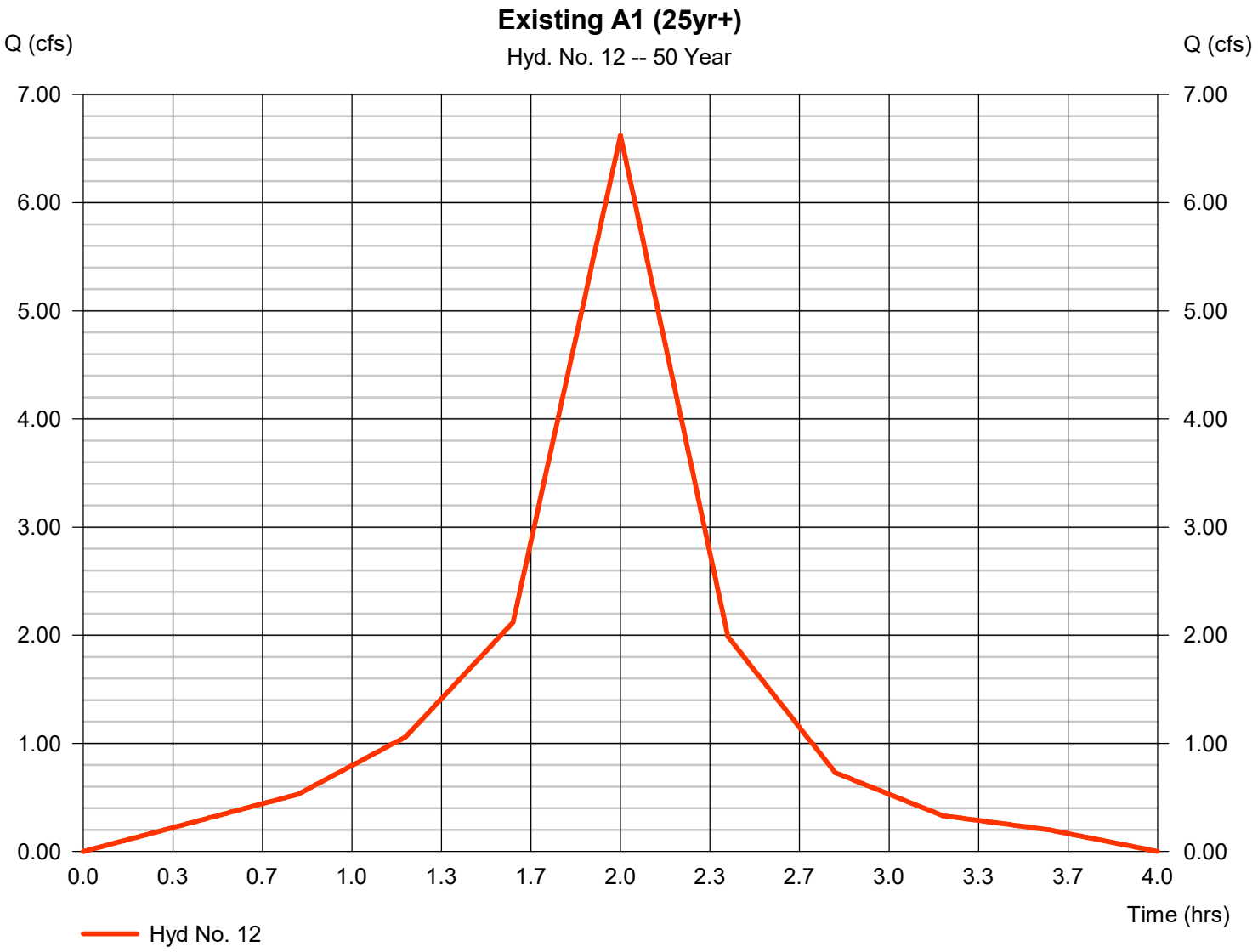
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 12

Existing A1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 6.622 cfs
Storm frequency	= 50 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 19,929 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.38
Intensity	= 5.445 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



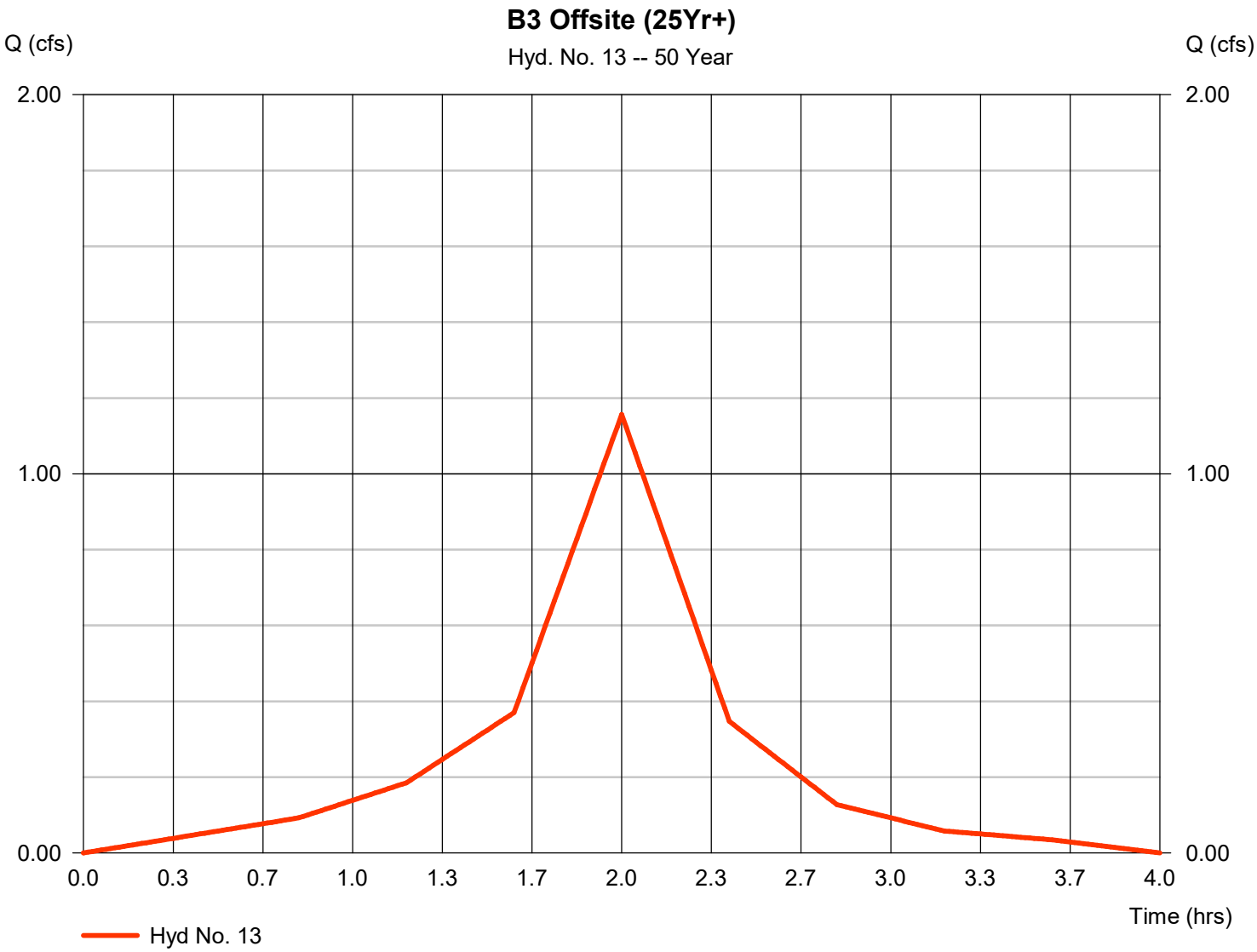
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 13

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.157 cfs
Storm frequency	= 50 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 3,481 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 5.445 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



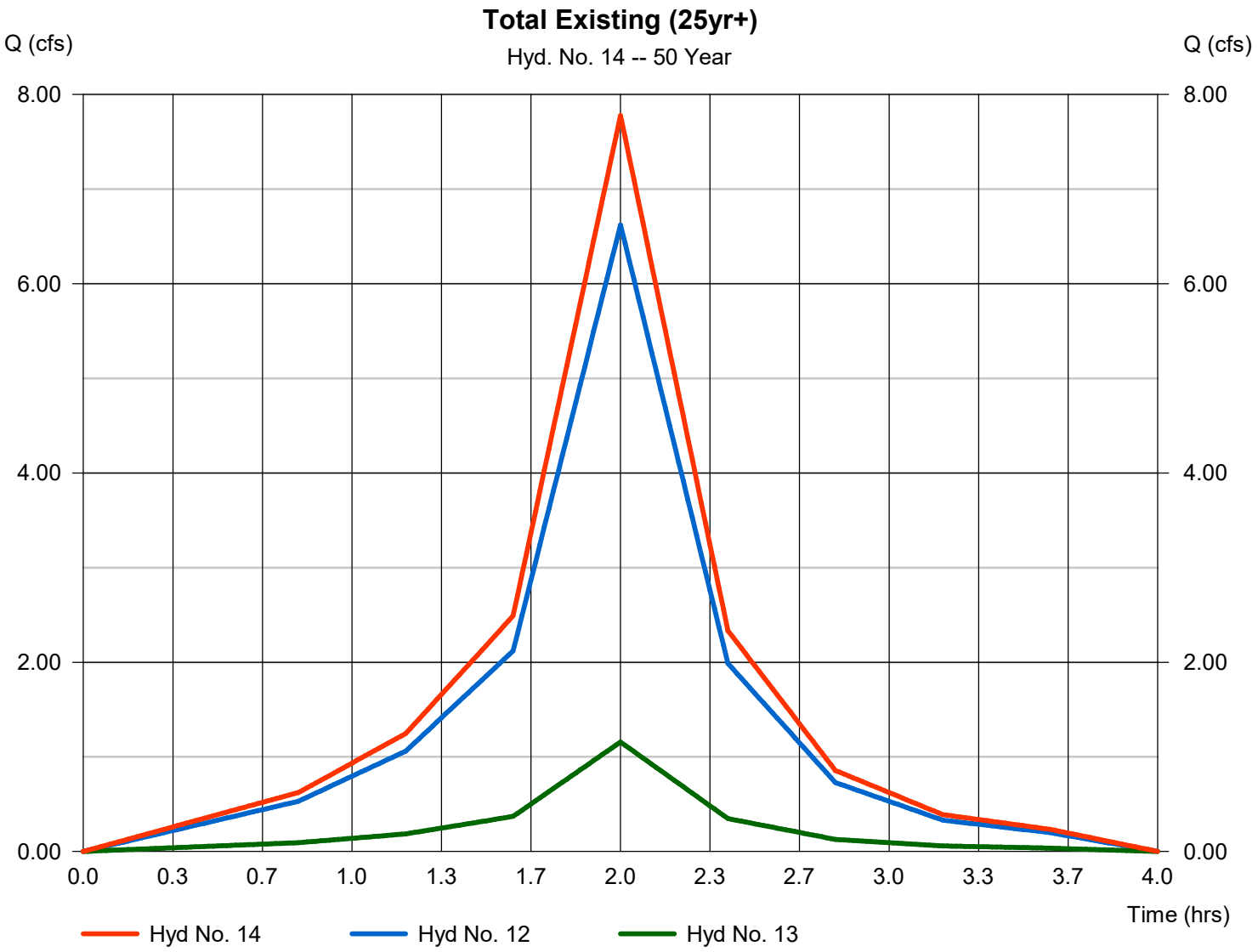
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 14

Total Existing (25yr+)

Hydrograph type	= Combine	Peak discharge	= 7.778 cfs
Storm frequency	= 50 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 23,410 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 3.790 ac



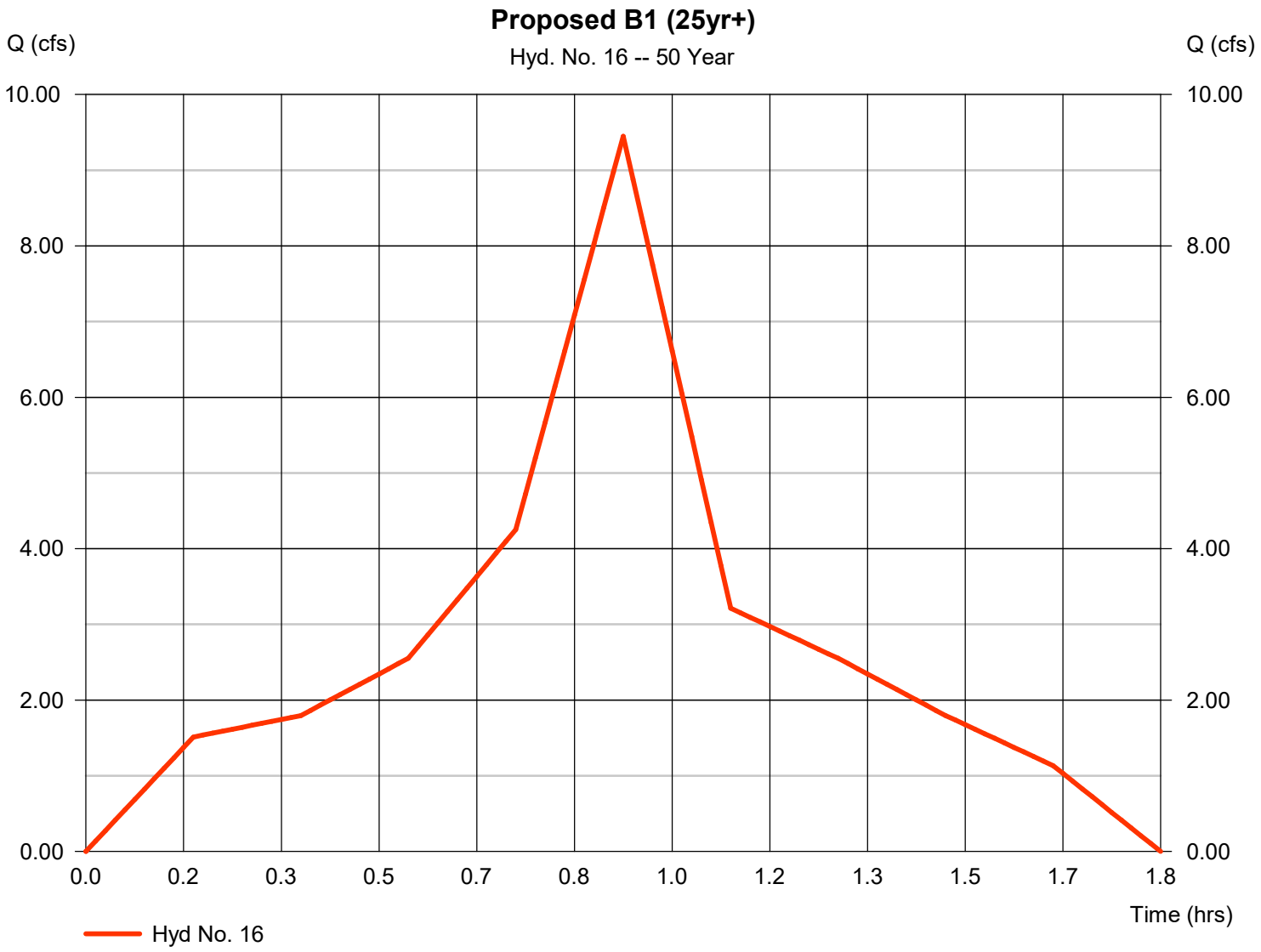
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 16

Proposed B1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 9.448 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 18,645 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.62
Intensity	= 7.434 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



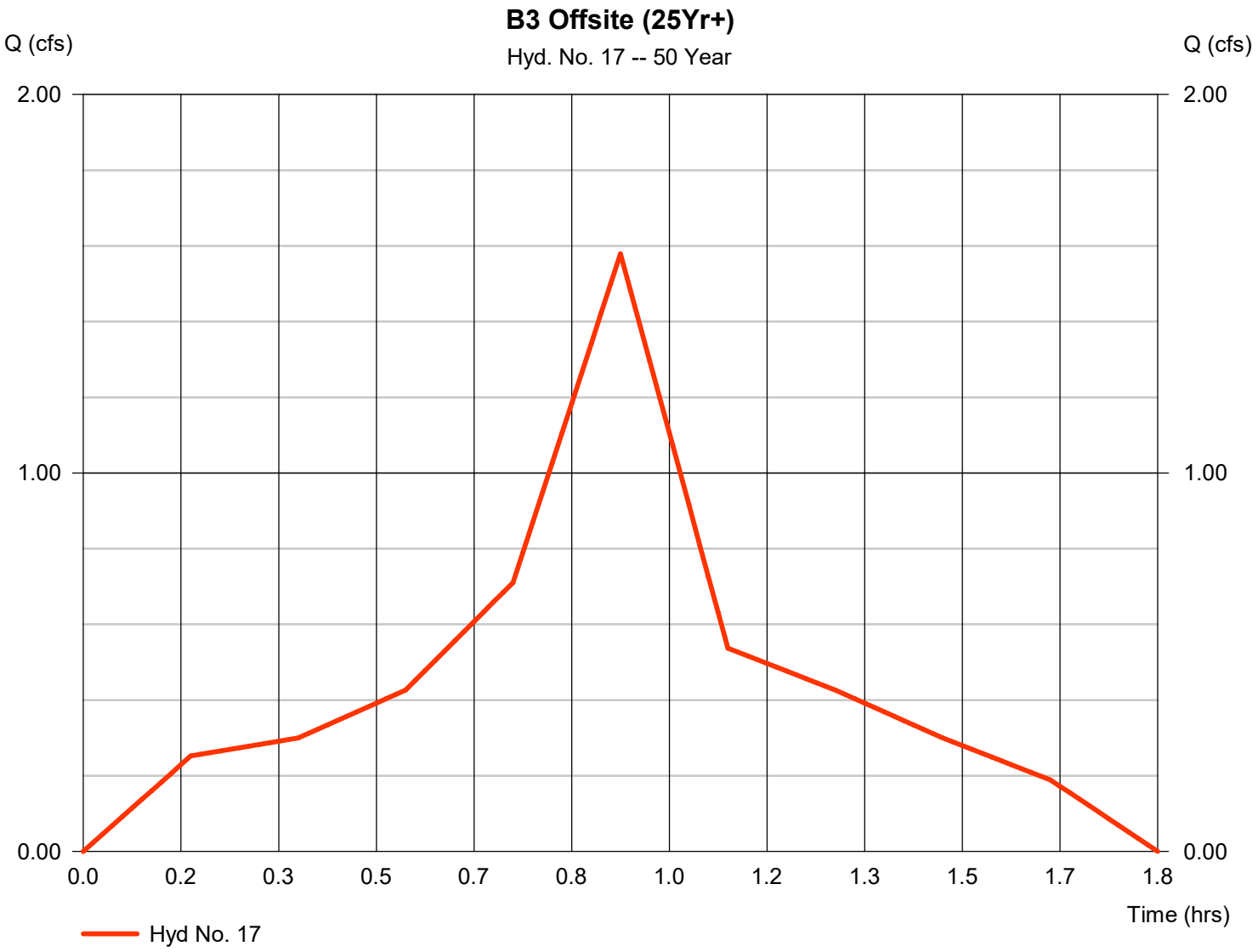
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 17

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.579 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 3,116 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 7.434 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



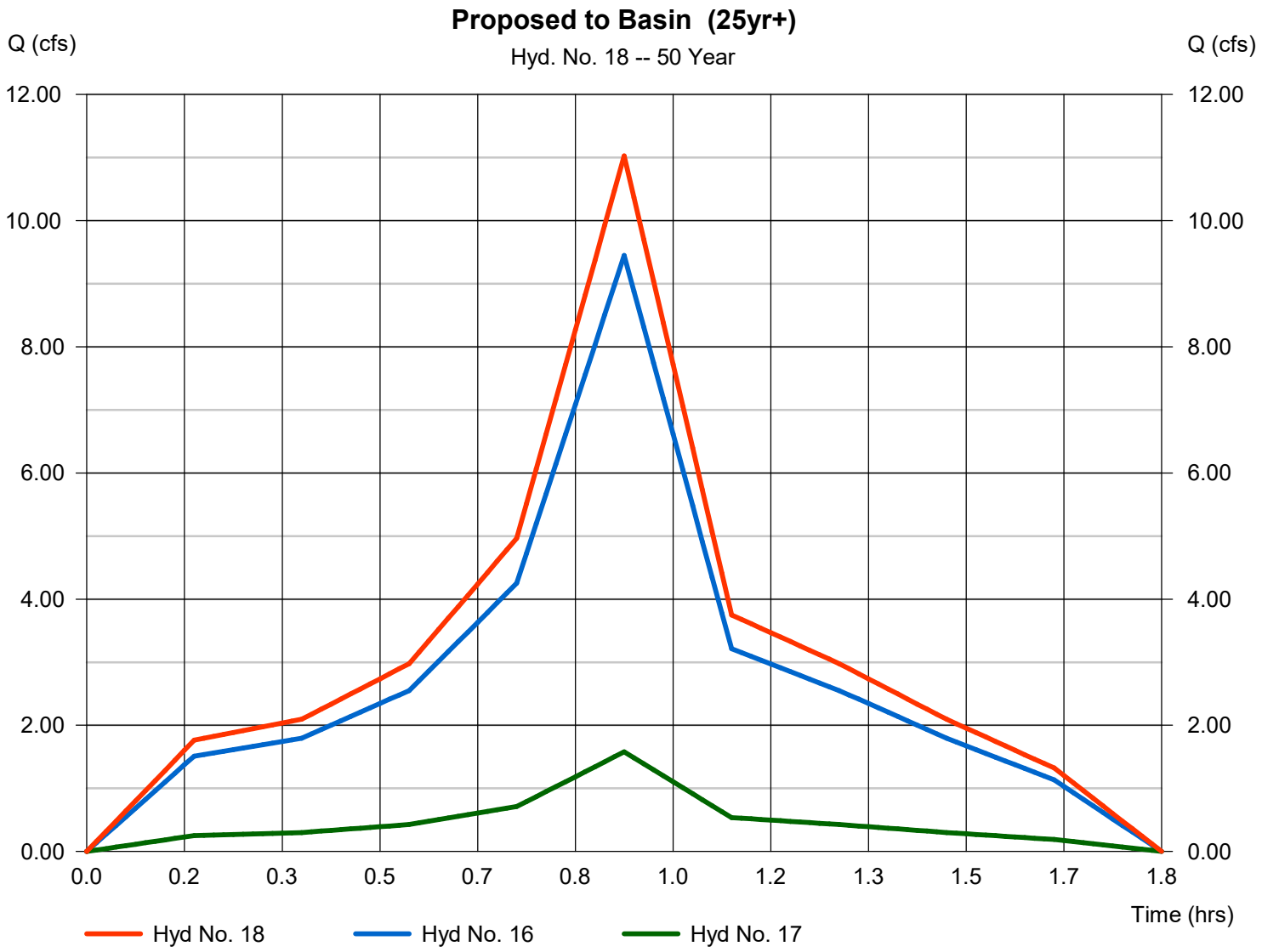
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 18

Proposed to Basin (25yr+)

Hydrograph type	= Combine	Peak discharge	= 11.03 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 21,761 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.640 ac



Hydrograph Report

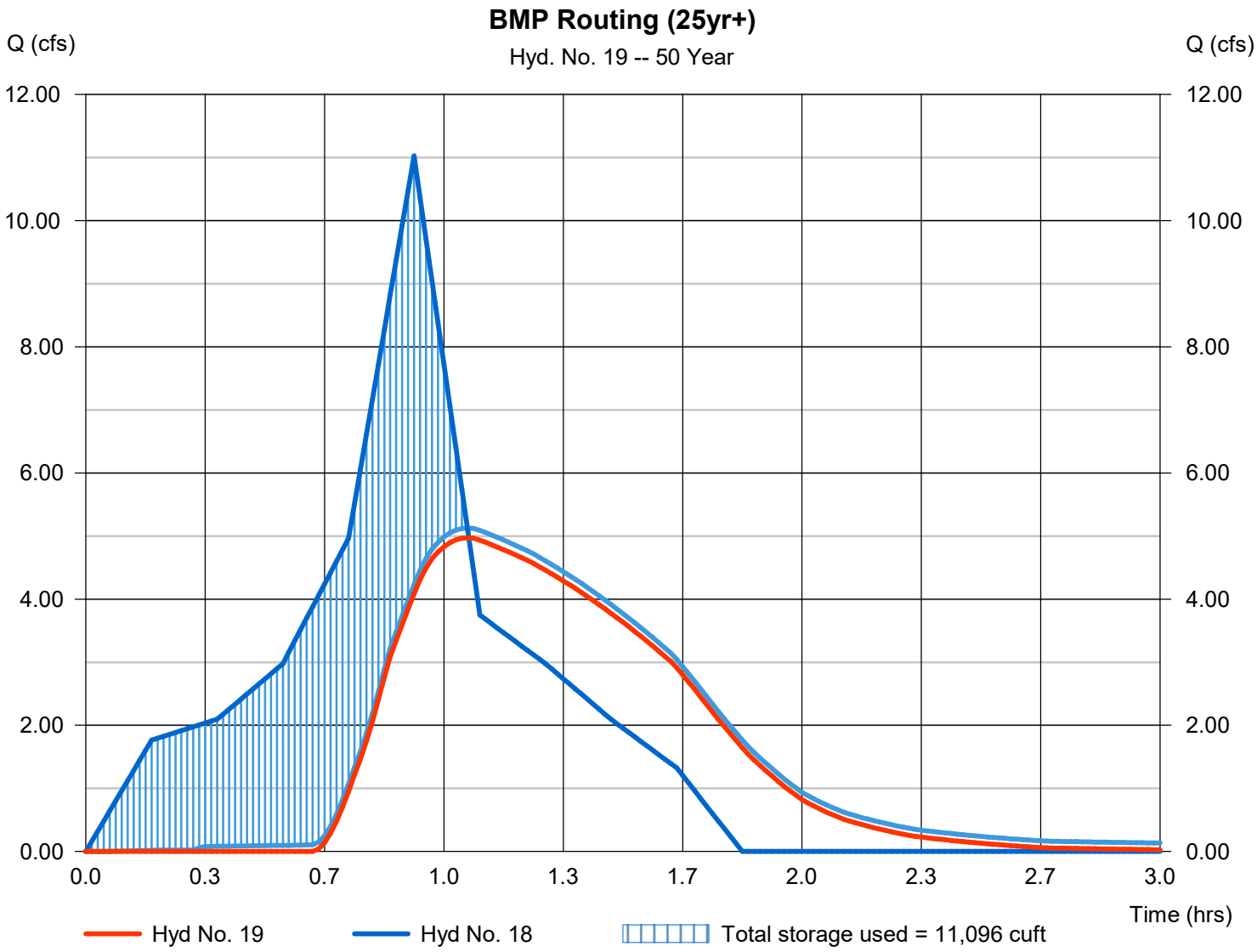
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 19

BMP Routing (25yr+)

Hydrograph type	= Reservoir	Peak discharge	= 4.974 cfs
Storm frequency	= 50 yrs	Time to peak	= 1.07 hrs
Time interval	= 1 min	Hyd. volume	= 16,008 cuft
Inflow hyd. No.	= 18 - Proposed to Basin (25yr+)	Max. Elevation	= 64.17 ft
Reservoir name	= Rain Garden	Max. Storage	= 11,096 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



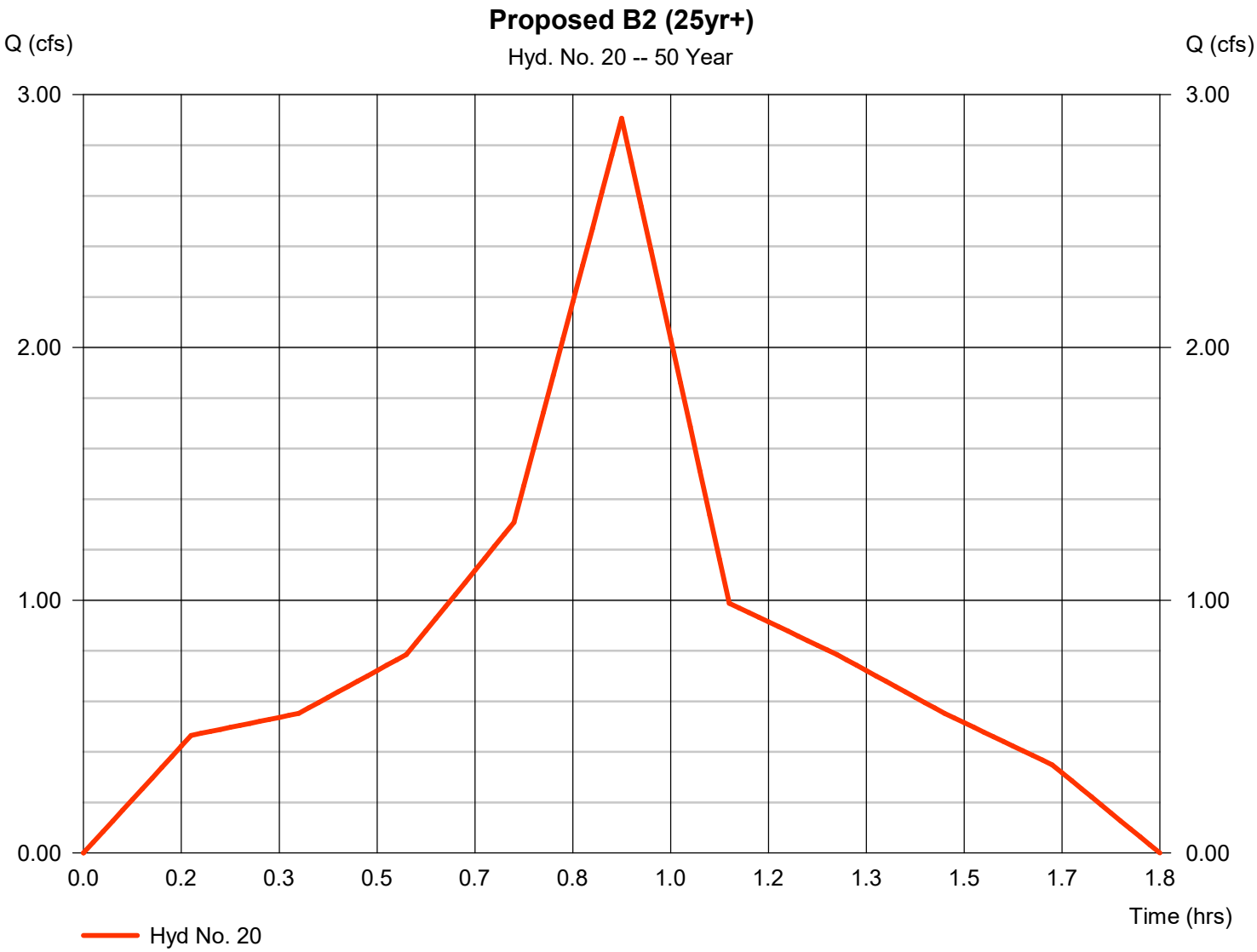
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 20

Proposed B2 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 2.907 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 5,736 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.34
Intensity	= 7.434 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



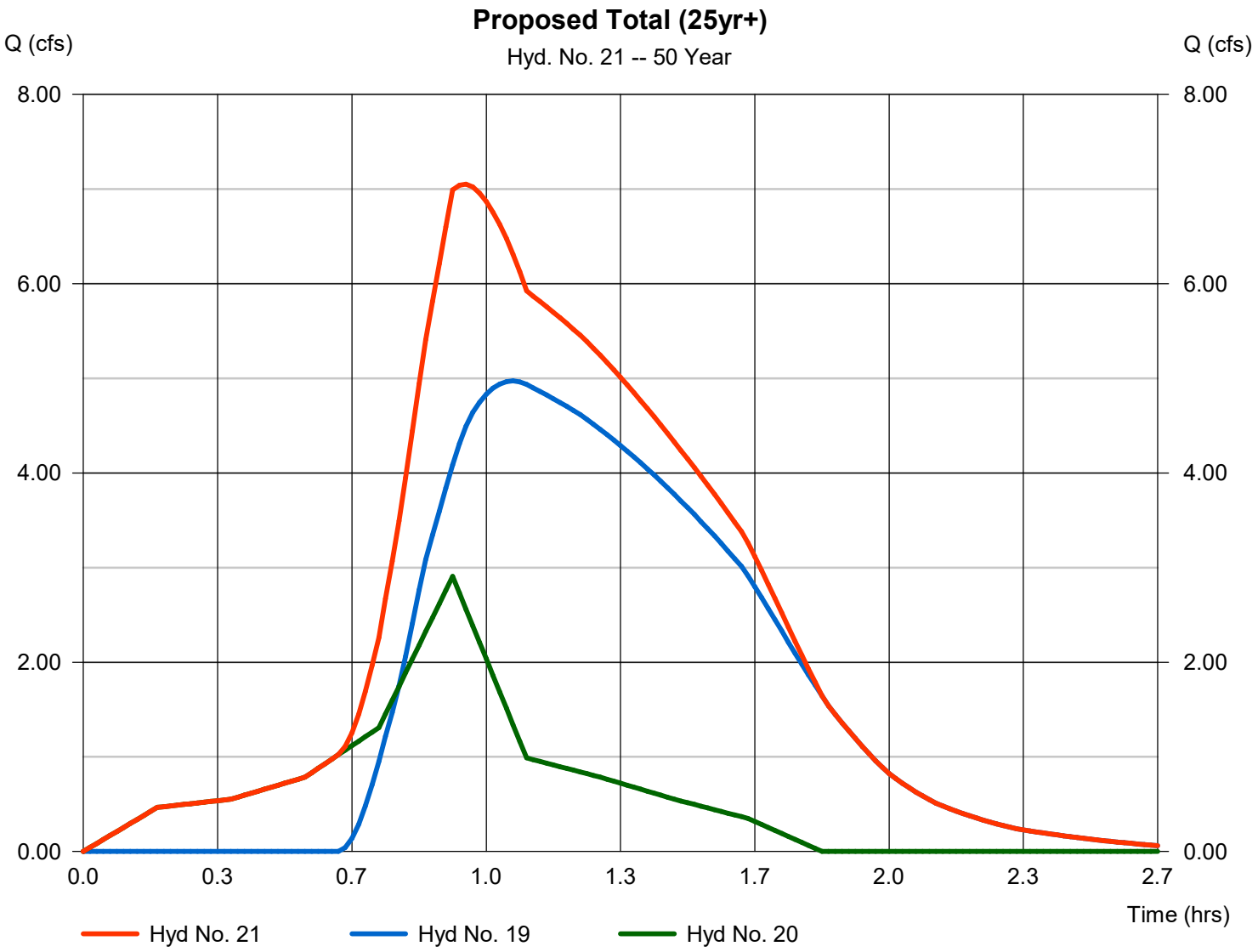
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 21

Proposed Total (25yr+)

Hydrograph type	= Combine	Peak discharge	= 7.052 cfs
Storm frequency	= 50 yrs	Time to peak	= 0.95 hrs
Time interval	= 1 min	Hyd. volume	= 21,744 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 1.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Dekalb	5.934	1	120	17,858	------	------	------	Existing A1 (<25yr)
2	Dekalb	0.988	1	120	2,974	------	------	------	B3 Offsite (<25yr)
3	Combine	6.922	1	120	20,832	1, 2	------	------	Total Existing (<25yr)
5	Dekalb	8.984	1	55	17,730	------	------	------	Proposed B1 (<25yr)
6	Dekalb	1.341	1	55	2,646	------	------	------	B3 Offsite (<25yr)
7	Combine	10.33	1	55	20,376	5, 6	------	------	Proposed to Basin (<25yr)
8	Reservoir	4.715	1	64	14,653	7	64.05	10,522	BMP Routing (<25yr)
9	Dekalb	2.520	1	55	4,973	------	------	------	Proposed B2 (<25yr)
10	Combine	6.435	1	57	19,626	8, 9	------	------	Proposed Total (<25yr)
12	Dekalb	7.274	1	120	21,891	------	------	------	Existing A1 (25yr+)
13	Dekalb	1.270	1	120	3,824	------	------	------	B3 Offsite (25Yr+)
14	Combine	8.544	1	120	25,714	12, 13	------	------	Total Existing (25yr+)
16	Dekalb	10.32	1	55	20,357	------	------	------	Proposed B1 (25yr+)
17	Dekalb	1.724	1	55	3,402	------	------	------	B3 Offsite (25Yr+)
18	Combine	12.04	1	55	23,758	16, 17	------	------	Proposed to Basin (25yr+)
19	Reservoir	5.983	1	63	17,965	18	64.31	11,829	BMP Routing (25yr+)
20	Dekalb	3.173	1	55	6,262	------	------	------	Proposed B2 (25yr+)
21	Combine	7.703	1	62	24,227	19, 20	------	------	Proposed Total (25yr+)

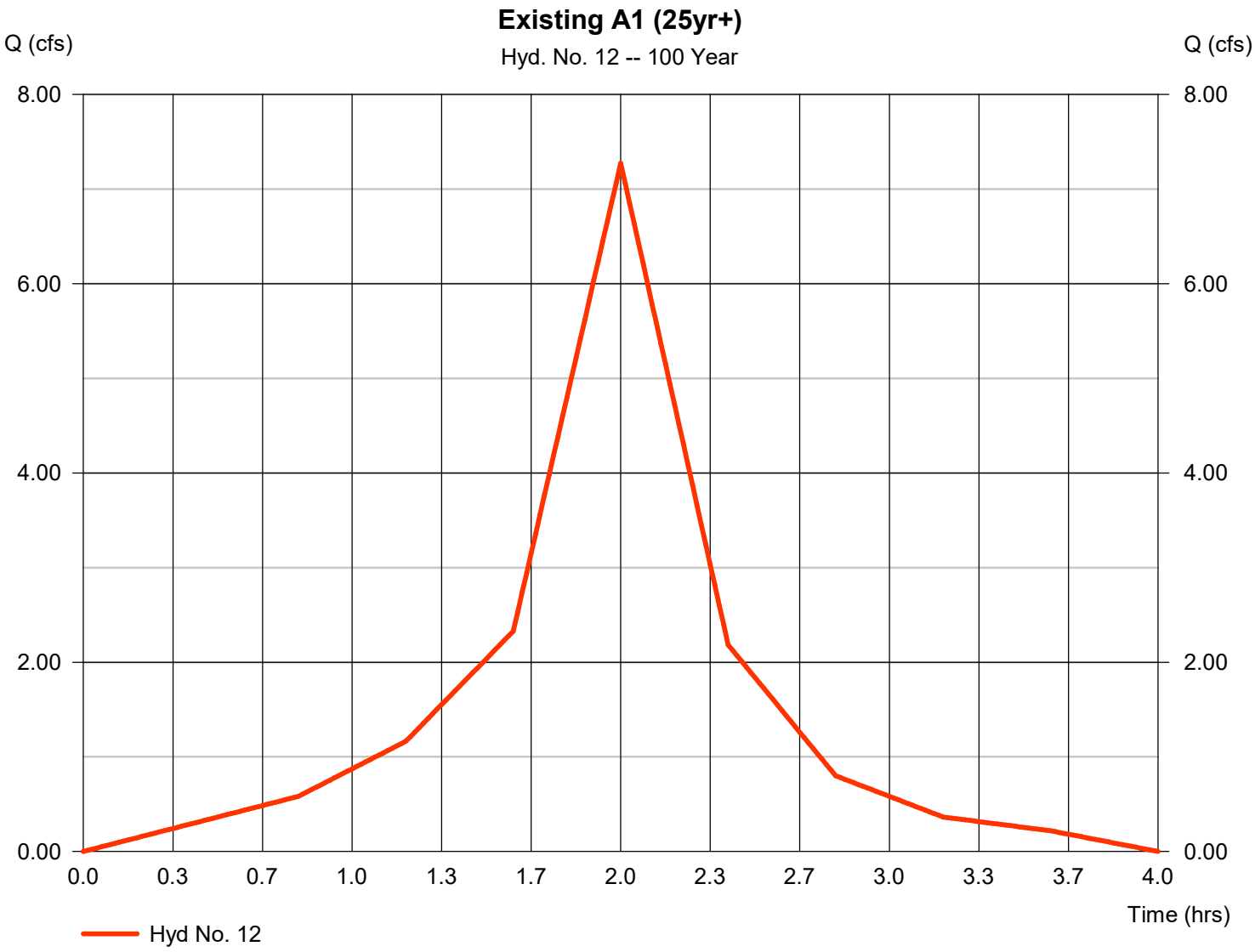
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 12

Existing A1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 7.274 cfs
Storm frequency	= 100 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 21,891 cuft
Drainage area	= 3.200 ac	Runoff coeff.	= 0.38
Intensity	= 5.982 in/hr	Tc by TR55	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



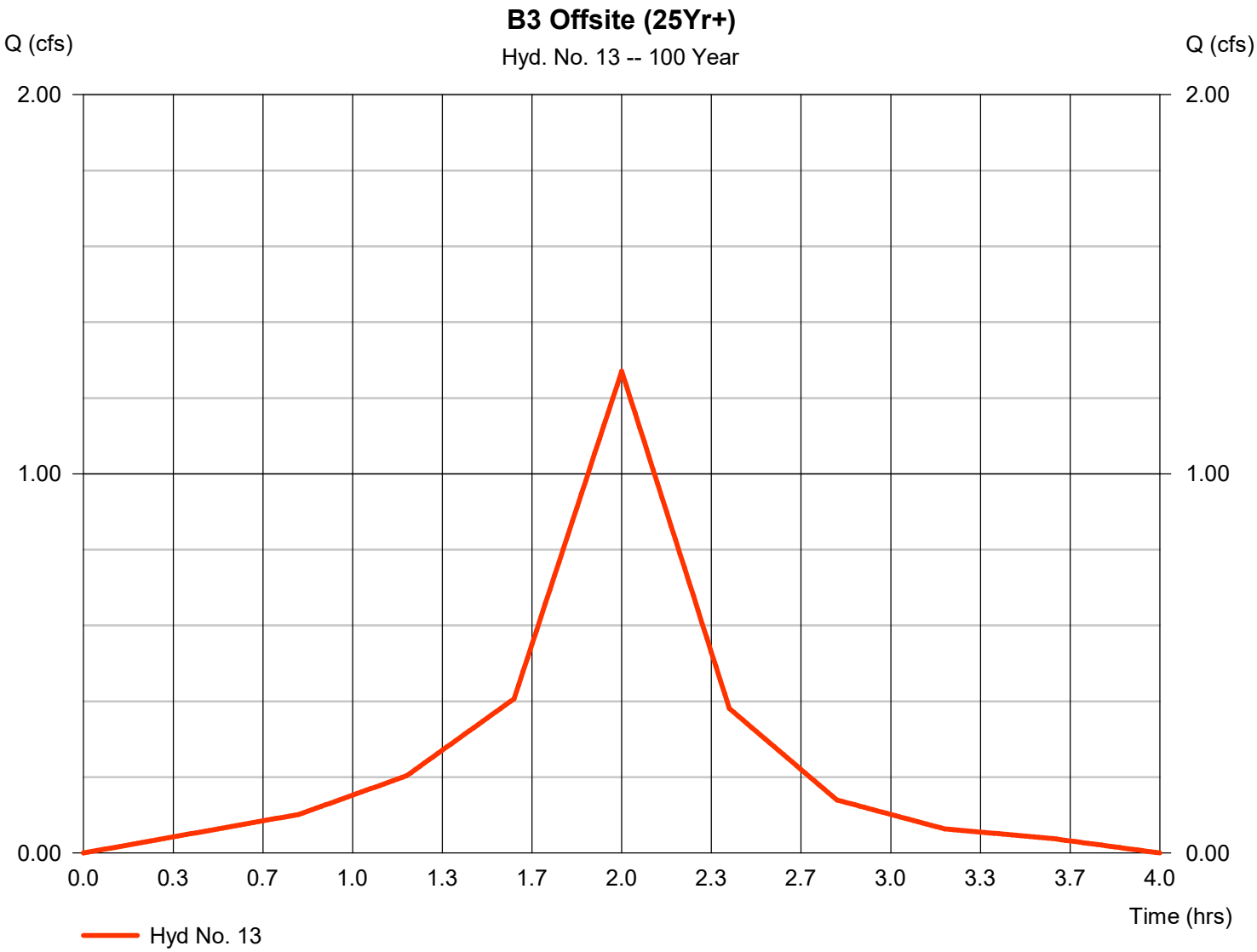
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 13

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.270 cfs
Storm frequency	= 100 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 3,824 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 5.982 in/hr	Tc by User	= 24.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



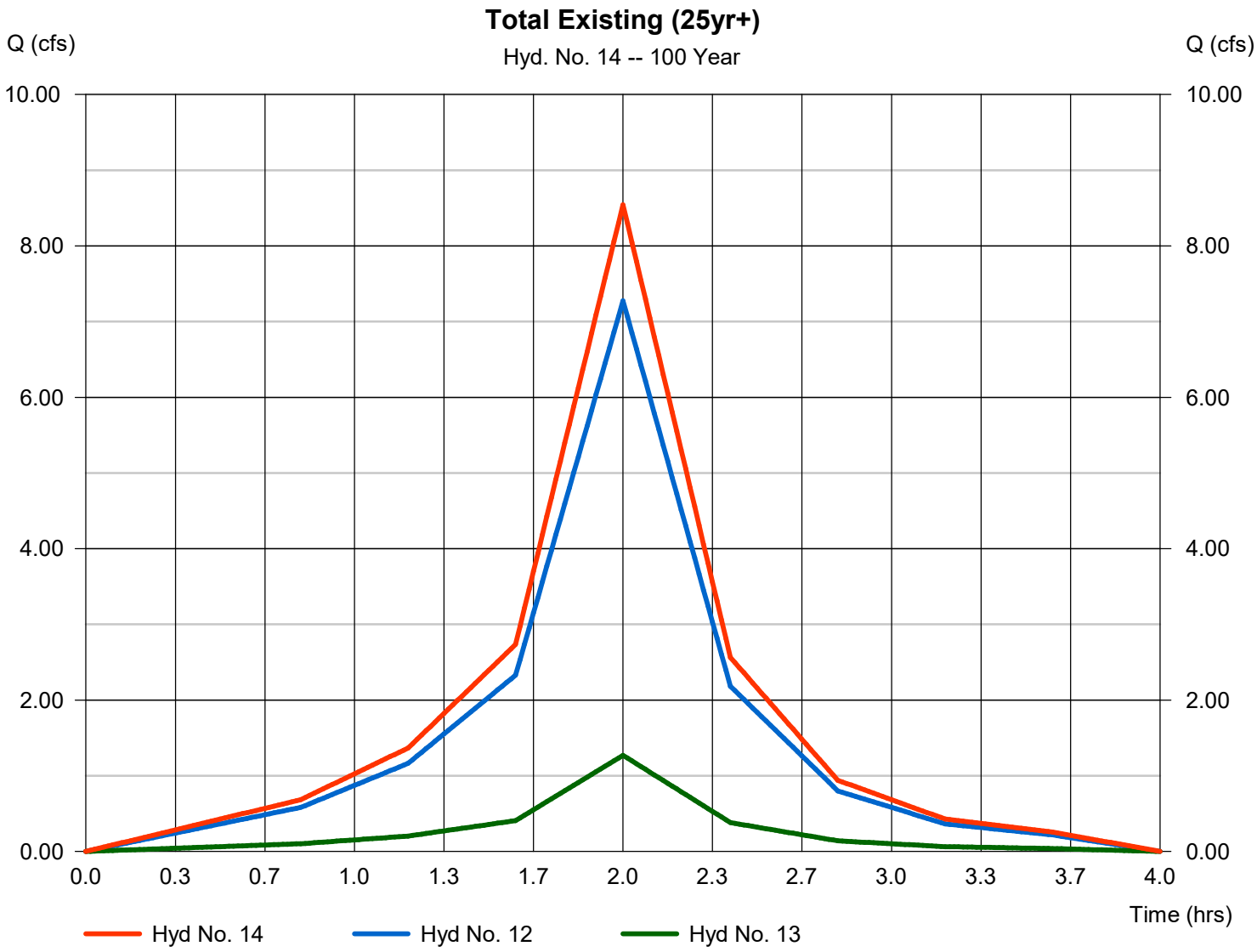
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 14

Total Existing (25yr+)

Hydrograph type	= Combine	Peak discharge	= 8.544 cfs
Storm frequency	= 100 yrs	Time to peak	= 2.00 hrs
Time interval	= 1 min	Hyd. volume	= 25,714 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 3.790 ac



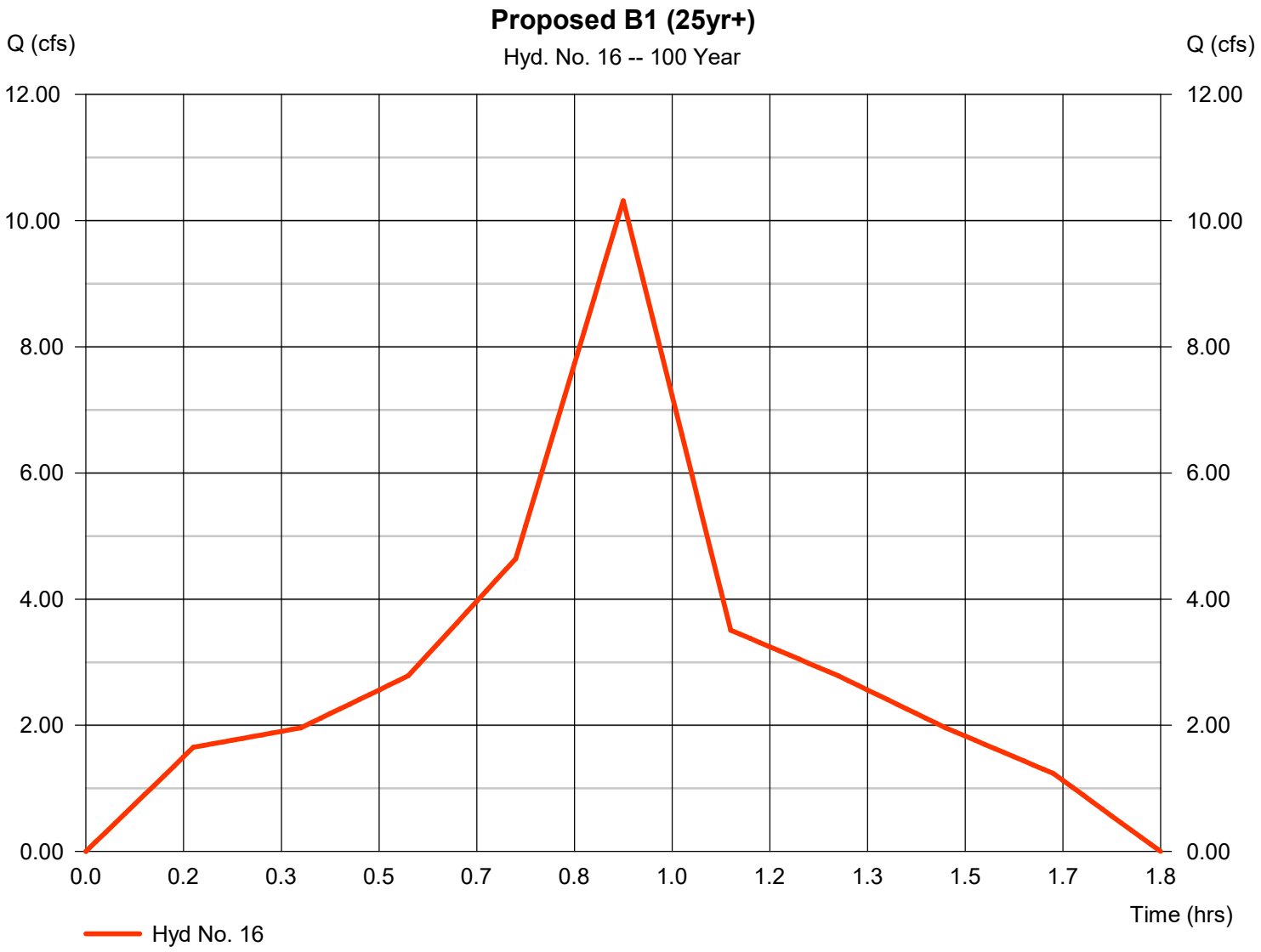
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 16

Proposed B1 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 10.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 20,357 cuft
Drainage area	= 2.050 ac	Runoff coeff.	= 0.62
Intensity	= 8.116 in/hr	Tc by TR55	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



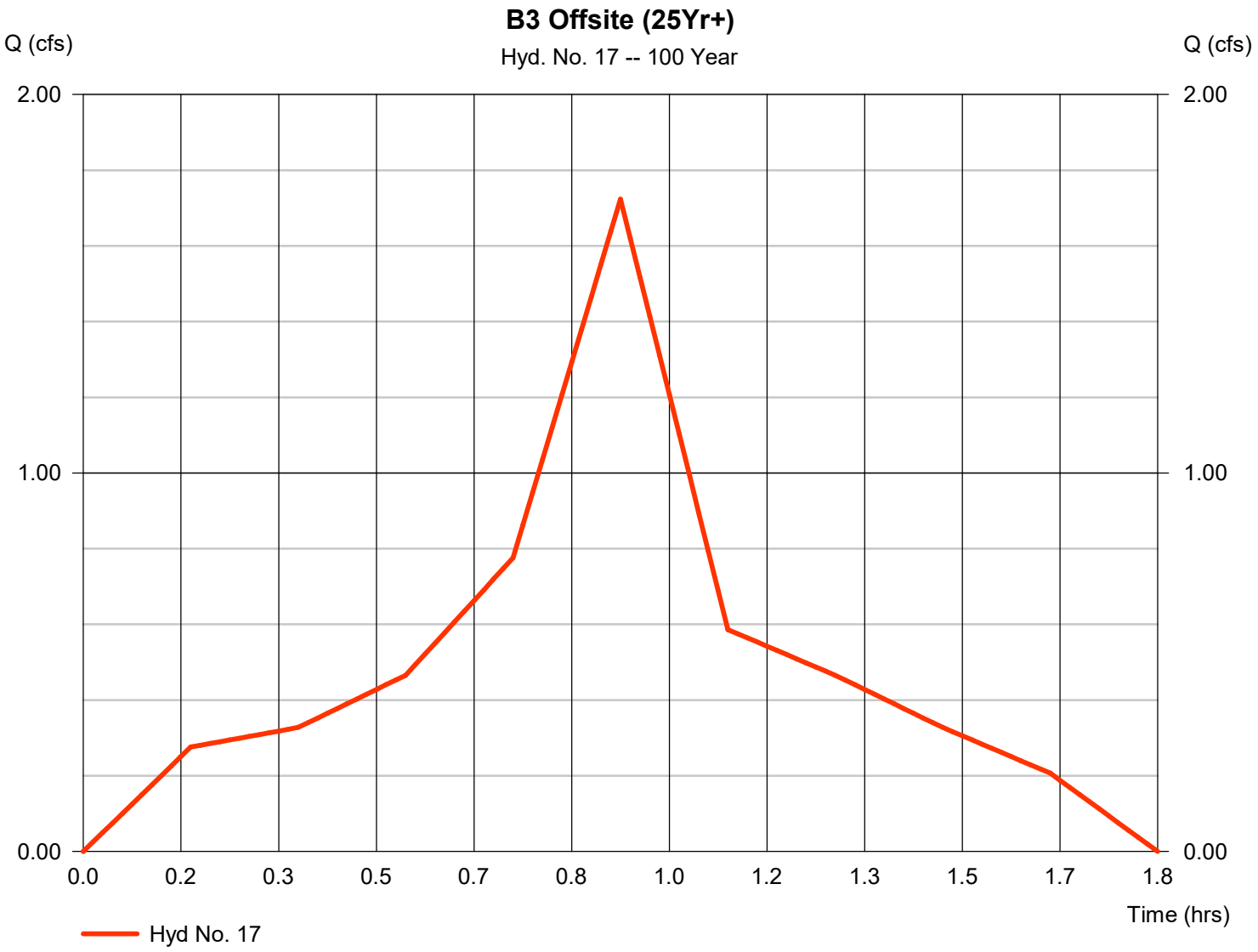
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 17

B3 Offsite (25Yr+)

Hydrograph type	= Dekalb	Peak discharge	= 1.724 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 3,402 cuft
Drainage area	= 0.590 ac	Runoff coeff.	= 0.36
Intensity	= 8.116 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



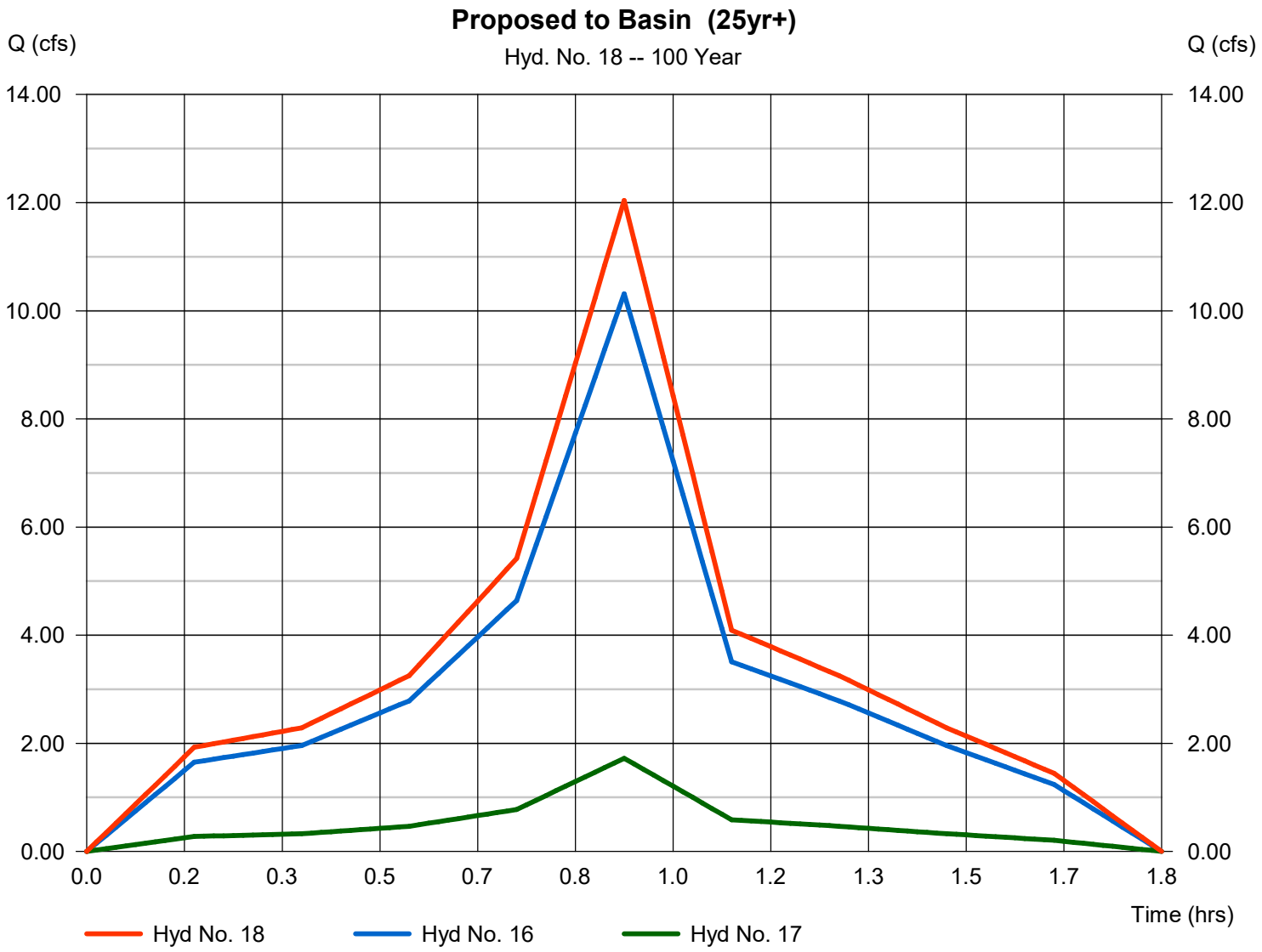
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 18

Proposed to Basin (25yr+)

Hydrograph type	= Combine	Peak discharge	= 12.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 23,758 cuft
Inflow hyds.	= 16, 17	Contrib. drain. area	= 2.640 ac



Hydrograph Report

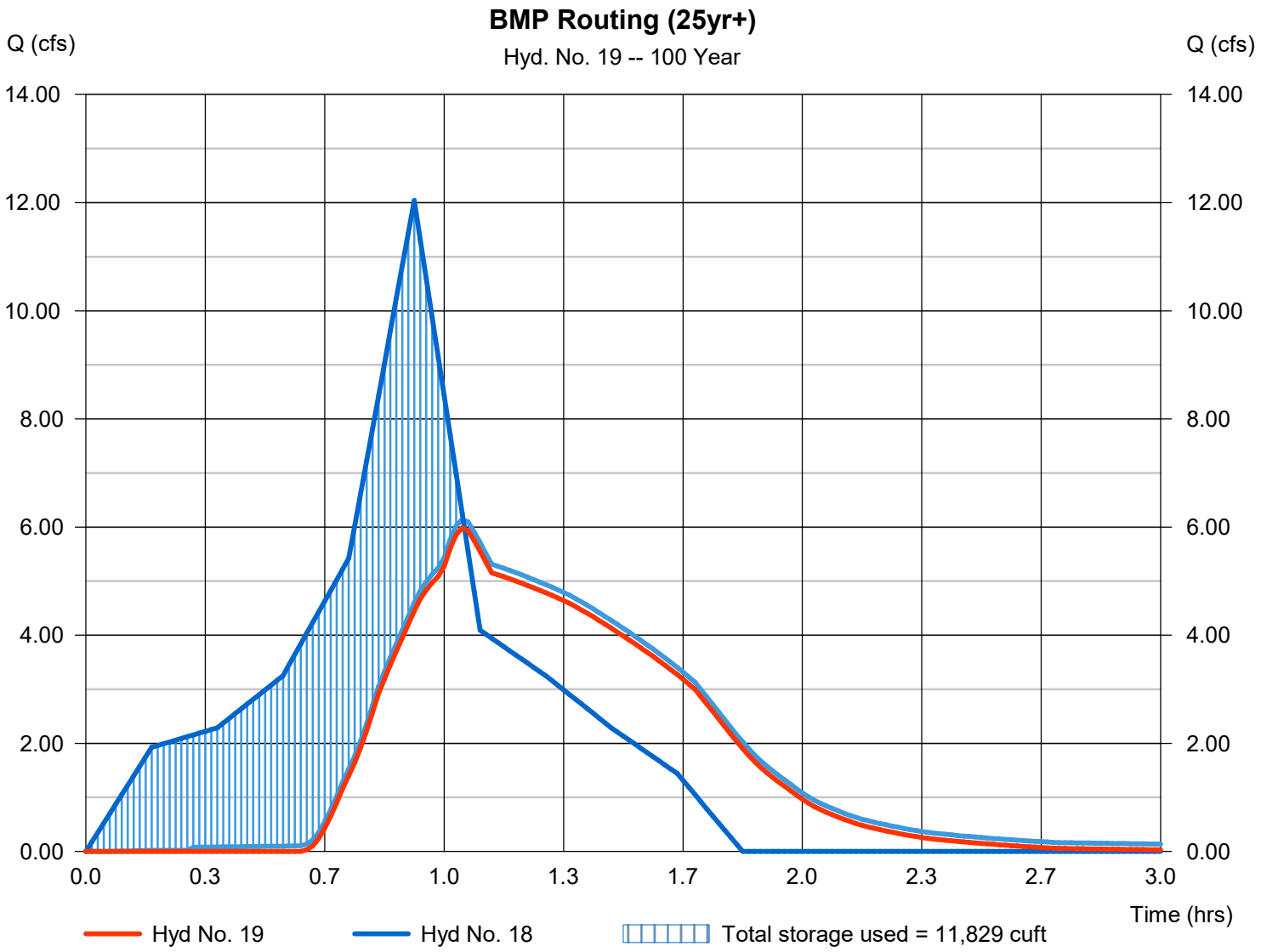
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 19

BMP Routing (25yr+)

Hydrograph type	= Reservoir	Peak discharge	= 5.983 cfs
Storm frequency	= 100 yrs	Time to peak	= 1.05 hrs
Time interval	= 1 min	Hyd. volume	= 17,965 cuft
Inflow hyd. No.	= 18 - Proposed to Basin (25yr+)	Max. Elevation	= 64.31 ft
Reservoir name	= Rain Garden	Max. Storage	= 11,829 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



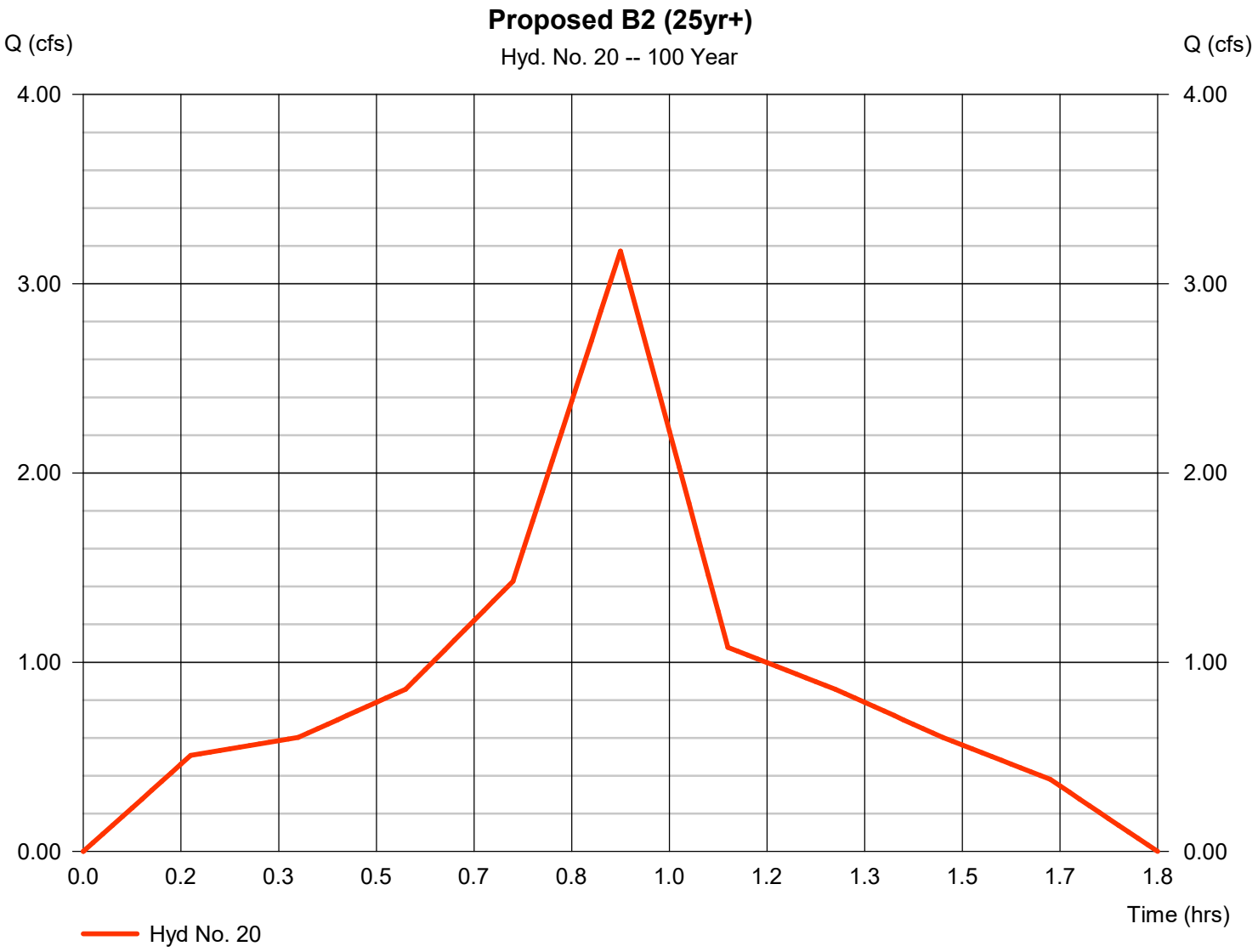
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 20

Proposed B2 (25yr+)

Hydrograph type	= Dekalb	Peak discharge	= 3.173 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.92 hrs
Time interval	= 1 min	Hyd. volume	= 6,262 cuft
Drainage area	= 1.150 ac	Runoff coeff.	= 0.34
Intensity	= 8.116 in/hr	Tc by User	= 11.00 min
IDF Curve	= NOAA Doylestown.IDF	Asc/Rec limb fact	= n/a



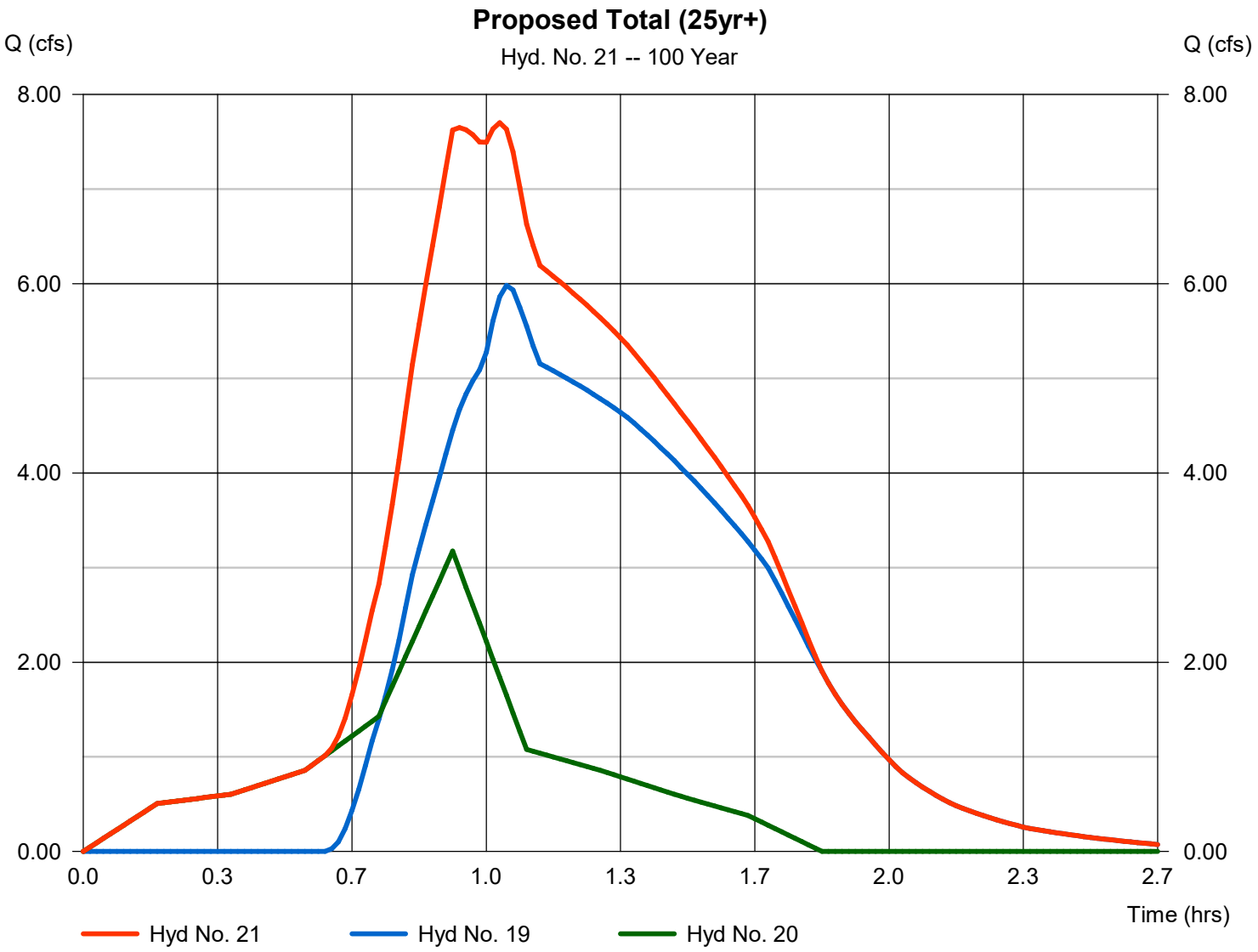
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Thursday, 07 / 14 / 2022

Hyd. No. 21

Proposed Total (25yr+)

Hydrograph type	= Combine	Peak discharge	= 7.703 cfs
Storm frequency	= 100 yrs	Time to peak	= 1.03 hrs
Time interval	= 1 min	Hyd. volume	= 24,227 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 1.150 ac



NOAA Atlas 14, Volume 2, Version 3 NESHAMINY FALLS
Station ID: 36-6194
Location name: Bensalem, Pennsylvania, USA*
Latitude: 40.1358°, Longitude: -74.955°
Elevation:
Elevation (station metadata): 60 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.347 (0.315-0.381)	0.414 (0.376-0.455)	0.491 (0.444-0.539)	0.546 (0.494-0.600)	0.614 (0.553-0.675)	0.663 (0.594-0.730)	0.713 (0.636-0.785)	0.758 (0.671-0.838)	0.814 (0.715-0.906)	0.857 (0.746-0.959)
10-min	0.554 (0.504-0.609)	0.662 (0.601-0.728)	0.786 (0.711-0.863)	0.873 (0.790-0.960)	0.979 (0.881-1.08)	1.06 (0.947-1.16)	1.13 (1.01-1.25)	1.20 (1.06-1.33)	1.29 (1.13-1.43)	1.35 (1.18-1.51)
15-min	0.692 (0.629-0.762)	0.832 (0.756-0.915)	0.994 (0.900-1.09)	1.11 (1.00-1.21)	1.24 (1.12-1.36)	1.34 (1.20-1.47)	1.43 (1.28-1.58)	1.52 (1.34-1.68)	1.62 (1.42-1.80)	1.70 (1.48-1.90)
30-min	0.949 (0.863-1.04)	1.15 (1.04-1.26)	1.41 (1.28-1.55)	1.60 (1.45-1.76)	1.84 (1.65-2.02)	2.02 (1.81-2.22)	2.19 (1.96-2.42)	2.36 (2.09-2.61)	2.58 (2.27-2.87)	2.74 (2.39-3.07)
60-min	1.18 (1.08-1.30)	1.44 (1.31-1.59)	1.81 (1.64-1.99)	2.08 (1.89-2.29)	2.45 (2.20-2.69)	2.73 (2.45-3.00)	3.02 (2.69-3.33)	3.31 (2.93-3.66)	3.70 (3.25-4.12)	4.01 (3.49-4.48)
2-hr	1.42 (1.29-1.57)	1.73 (1.57-1.91)	2.18 (1.97-2.40)	2.53 (2.28-2.78)	3.00 (2.69-3.30)	3.38 (3.01-3.72)	3.77 (3.33-4.15)	4.16 (3.66-4.60)	4.71 (4.09-5.23)	5.14 (4.42-5.74)
3-hr	1.56 (1.41-1.73)	1.89 (1.71-2.10)	2.39 (2.16-2.65)	2.78 (2.50-3.08)	3.32 (2.97-3.67)	3.75 (3.34-4.15)	4.21 (3.72-4.66)	4.68 (4.09-5.19)	5.33 (4.60-5.95)	5.86 (4.99-6.57)
6-hr	1.97 (1.78-2.18)	2.38 (2.16-2.65)	3.00 (2.71-3.32)	3.50 (3.15-3.87)	4.22 (3.77-4.66)	4.82 (4.27-5.32)	5.46 (4.80-6.04)	6.15 (5.34-6.81)	7.14 (6.08-7.97)	7.96 (6.68-8.94)
12-hr	2.39 (2.19-2.66)	2.90 (2.64-3.22)	3.67 (3.34-4.07)	4.33 (3.92-4.79)	5.30 (4.75-5.85)	6.14 (5.45-6.79)	7.06 (6.18-7.81)	8.07 (6.96-8.99)	9.59 (8.08-10.8)	10.9 (9.00-12.3)
24-hr	2.77 (2.57-2.99)	3.34 (3.11-3.61)	4.24 (3.93-4.57)	4.99 (4.62-5.38)	6.11 (5.61-6.57)	7.06 (6.43-7.58)	8.10 (7.32-8.70)	9.25 (8.27-9.94)	10.9 (9.65-11.8)	12.4 (10.8-13.4)
2-day	3.20 (2.96-3.47)	3.87 (3.58-4.20)	4.91 (4.54-5.33)	5.78 (5.32-6.26)	7.03 (6.44-7.59)	8.09 (7.36-8.74)	9.23 (8.35-9.97)	10.5 (9.38-11.3)	12.3 (10.9-13.3)	13.8 (12.1-15.0)
3-day	3.39 (3.15-3.67)	4.10 (3.81-4.43)	5.17 (4.80-5.59)	6.06 (5.61-6.54)	7.34 (6.76-7.91)	8.41 (7.70-9.06)	9.56 (8.69-10.3)	10.8 (9.74-11.7)	12.6 (11.2-13.6)	14.1 (12.4-15.3)
4-day	3.59 (3.35-3.86)	4.32 (4.04-4.66)	5.43 (5.06-5.85)	6.34 (5.90-6.82)	7.65 (7.07-8.22)	8.73 (8.03-9.38)	9.89 (9.04-10.6)	11.1 (10.1-12.0)	12.9 (11.6-13.9)	14.4 (12.8-15.5)
7-day	4.20 (3.93-4.51)	5.05 (4.72-5.42)	6.26 (5.85-6.73)	7.27 (6.77-7.80)	8.72 (8.08-9.34)	9.92 (9.16-10.6)	11.2 (10.3-12.0)	12.6 (11.5-13.5)	14.6 (13.1-15.6)	16.2 (14.5-17.4)
10-day	4.80 (4.51-5.12)	5.74 (5.39-6.13)	7.02 (6.58-7.49)	8.06 (7.54-8.59)	9.52 (8.87-10.1)	10.7 (9.94-11.4)	11.9 (11.0-12.7)	13.2 (12.2-14.1)	15.0 (13.7-16.1)	16.5 (15.0-17.7)
20-day	6.49 (6.14-6.86)	7.71 (7.30-8.14)	9.22 (8.72-9.74)	10.4 (9.83-11.0)	12.0 (11.3-12.7)	13.3 (12.5-14.0)	14.6 (13.6-15.4)	15.9 (14.8-16.8)	17.7 (16.4-18.7)	19.0 (17.5-20.2)
30-day	8.08 (7.67-8.49)	9.52 (9.05-10.0)	11.1 (10.6-11.7)	12.4 (11.8-13.0)	14.1 (13.3-14.8)	15.4 (14.5-16.1)	16.6 (15.6-17.5)	17.9 (16.8-18.8)	19.5 (18.2-20.6)	20.7 (19.3-21.9)
45-day	10.3 (9.84-10.8)	12.1 (11.6-12.7)	14.0 (13.3-14.6)	15.4 (14.7-16.1)	17.2 (16.3-18.0)	18.5 (17.6-19.4)	19.8 (18.7-20.7)	21.0 (19.8-22.0)	22.5 (21.2-23.7)	23.6 (22.2-24.8)
60-day	12.3 (11.8-12.9)	14.5 (13.8-15.1)	16.5 (15.8-17.3)	18.1 (17.3-18.9)	20.0 (19.1-20.9)	21.4 (20.4-22.4)	22.8 (21.7-23.8)	24.0 (22.8-25.1)	25.5 (24.2-26.8)	26.6 (25.2-28.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

APPENDIX B

Stormwater Volume Calculations

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **1515 Gibson Road Subdivision**

Application Type: **PAG-02 NOI**

County: **Bucks**

Municipality: **Bensalem Township**

Project Type: **Single-Family Housing**

◉ New Project ○ Minor / Major Amendment

Area: **3.58** acres
(In Watershed)

Total Earth Disturbance: **2.81** acres
(In Watershed)

No. of Post-Construction Discharge Points: **1**

Start DP Numbering at: **001**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	2.05	2.05	0.06	1.01	UNT to Neshaminy Creek	WWF, MF	Yes
Undetained Areas	0.76	0.76	0.29	0.33	UNT to Neshaminy Creek	WWF, MF	
Totals:	**2.81**	**2.81**	**0.35**	**1.34**			

Volume Management

Project: 1515 Gibson Road Subdivision

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.34** inches

Alternative 2-Year / 24-Hour Storm Event [ ] inches

Alternative Source: [ ]

Pre-Construction Conditions: *No. Rows:* **8**

☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Pervious as Meadow	1.46	C	71	0.817	0.96	5,106
Pervious as Meadow	0.38	B	58	1.448	0.39	540
Forested (Good Condition)	0.32	C	70	0.857	0.91	1,058
Forested (Good Condition)	0.19	B	55	1.636	0.29	197
Impervious as Meadow	0.02	C	71	0.817	0.96	70
Impervious as Meadow	0.02	B	58	1.448	0.39	28
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	0.02	N/A	98	0.041	3.11	226
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	0.40	N/A	93	0.151	2.58	3,747
TOTAL (ACRES):	**2.81**				**TOTAL (CF):**	**10,972**

Post-Construction Conditions: *No. Rows:* **6**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)

Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	1.28	C	74	0.703	1.13	5,254
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.18	B	61	1.279	0.50	332
Woods (Good Condition)	0.00	C	70	0.857	0.91	0
Woods (Good Condition)	0.00	B	55	1.636	0.29	0
Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)	0.94	N/A	98	0.041	3.11	10,602
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	0.40	N/A	93	0.151	2.58	3,747
TOTAL (ACRES):	**2.80**				**TOTAL (CF):**	**19,935**

IET CHANGE IN VOLUME TO MANAGE (CF): **8,962**

Non-Structural BMP Volume Credits:

☑ Tree Planting Credit

Number of new deciduous trees that will be planted within disturbed area: 37 **CREDIT (CF):** **222**

Number of new evergreen trees that will be planted within disturbed area: 4 **CREDIT (CF):** **40**

☑ Other (attach calculations):

Description: BMP 5.8.1: Rooftop Disconnection & BMP 5.8.2 Disconnection from Storm Sewers **CREDIT (CF):** **574**

Structural BMP Volume Credits: *No. Structural BMPs:* **1** *Start BMP Numbering at:* **1**

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Infiltration Basin	-	Off-Site	1.82	11,175	2,447	1.38	72	Yes	2.0	3,854	**6,882**	**1,287**
												Totals:	**6,882**	**1,287**

INFILTRATION & ET CREDITS (CF): **8,169**

NET CHANGE IN VOLUME TO MANAGE (CF): **8,962**

TOTAL CREDITS (CF): **9,005**

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: 1515 Gibson Road Subdivision

Instructions | General | Volume | ***Rate*** | Quality

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	**3.34**	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):		Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):		Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):		Alternative 100-Year 24-Hour Storm Event (in):	

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**3.55**	**2.77**	**-0.78**	***Rate Control Satisfied***
10-Year Storm:	**4.87**	**4.50**	**-0.36**	***Rate Control Satisfied***
50-Year Storm:	**7.78**	**7.05**	**-0.73**	***Rate Control Satisfied***
100-Year Storm:	**8.54**	**7.70**	**-0.84**	***Rate Control Satisfied***

Water Quality

Project: 1515 Gibson Road Subdivision

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Pervious as Meadow	Grassland/Herbaceous	1.46	C	5,106	48.8	0.22	2.30	15.56	0.07	0.73
Pervious as Meadow	Grassland/Herbaceous	0.38	B	540	48.8	0.22	2.30	1.65	0.01	0.08
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.32	C	1,058	45.0	0.13	1.05	2.97	0.01	0.07
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.19	B	197	45.0	0.13	1.05	0.55	0.00	0.01
Impervious as Meadow	Grassland/Herbaceous	0.02	C	70	48.8	0.22	2.30	0.21	0.00	0.01
Impervious as Meadow	Grassland/Herbaceous	0.02	B	28	48.8	0.22	2.30	0.09	0.00	0.00
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	0.02	N/A	226	65.0	0.29	2.05	0.92	0.00	0.03
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	Highway (general)	0.40	N/A	3,747	141.0	0.43	2.65	32.99	0.10	0.62
	TOTAL (ACRES):	**2.81**					**TOTALS:**	**54.94**	**0.19**	**1.56**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	1.28	C	5,254	78.0	0.25	1.25	25.59	0.08	0.41
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	0.18	B	332	78.0	0.25	1.25	1.62	0.01	0.03
Woods (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.00	C	0	45.0	0.13	1.05	0.00	0.00	0.00
Woods (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.00	B	0	45.0	0.13	1.05	0.00	0.00	0.00
Impervious Areas: Streets and Roads - Paved; Curbs and Storm Sewers (Excluding ROW)	Urban Highway	0.94	N/A	10,602	142.0	0.32	3.00	94.00	0.21	1.99
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	Highway (general)	0.40	N/A	3,747	141.0	0.43	2.65	32.99	0.10	0.62
	TOTAL (ACRES):	**2.80**					**TOTALS:**	**154.20**	**0.40**	**3.04**

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS): **99.26** **0.21** **1.49**

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* **4**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.01**	**B**	**61**	**1.279**	**0.50**	**18**
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.44**	**C**	**74**	**0.703**	**1.13**	**1,806**
Impervious Areas: Streets and Roads - Paved; Open Ditches (Including ROW)	**0.47**	**N/A**	**93**	**0.151**	**2.58**	**4,403**
Woods (Good Condition)	**0.08**	**C**	**70**	**0.857**	**0.91**	**264**

Non-Structural BMP Water Quality Credits:

☑ Pervious Undetained Area Credit

TSS	TP	TN
1.59	0.01	0.04

☑ Other (attach calculations)

Description: **BMP 5.8.1: Rooftop Disconnection**

TSS	TP	TN

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Infiltration Basin	-	1.82	11,175	8,169		3,006	10.00	0.24	0.96	1.88	0.05	0.18

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	**1.88**	**0.05**	**0.18**
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	**48.39**	**0.15**	**0.89**
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):	**1.59**	**0.01**	**0.04**
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	**48.68**	**0.19**	**1.02**
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	**54.94**	**0.19**	**1.56**

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

E.Claycomb	7/15/2022
Spreadsheet User Name	Date

Worksheet 3. Nonstructural BMP Credits

PROTECTED AREA

1.1 Area of Protected Sensitive/Special Value Features (see WS 2)	1.04	**Ac.**
1.2 Area of Riparian Forest Buffer Protection	0.00	**Ac.**
3.1 Area of Minimum Disturbance/Reduced Grading	0.25	**Ac.**
TOTAL	1.29	**Ac.**

Site Area	Minus	Protected Area	=	Stormwater Management Area
3.22		1.29	=	1.93
		This is the area that requires stormwater management		

VOLUME CREDITS

3.1 Minimum Soil Compaction (See Chapter 8, page 22 – SW BMP Manual)

Lawn		ft^2	x 1/4" x 1/12	=	0	ft^3
Meadow		ft^2	x 1/3" x 1/12	=	0	ft^3

3.3 Protect Existing Trees (See Chapter 8, page 23 – SW BMP Manual)

For Trees within 100 feet of impervious area:

Tree Canopy	3,655	ft^2	x 1/2" x 1/12	=	152	ft^3

5.1 Disconnect Roof Leaders to Vegetated Areas (See Chapter 8 page 25 – SW BMP Manual)

For runoff directed to areas protected under 5.8.1 and 5.8.2

Roof Area		ft^2	x 1/3" x 1/12	=	0	ft^3

For all other disconnected roof areas

Roof Area	10,500	ft^2	x 1/4" x 1/12	=	219	ft^3

5.2 Disconnect Non-Roof impervious to Vegetated Areas (See Chapter 8, page 26 – SW BMP Manual)

For Runoff directed to areas protected under 5.8.1 and 5.8.2

Impervious Area		ft^2	x 1/3" x 1/12	=	0	ft^3

For all other disconnected roof areas

Impervious Area	9,734	ft^2	x 1/4" x 1/12	=	203	ft^3

TOTAL NON-STRUCTURAL VOLUME CREDIT* **574** **ft^3**

**For use on Worksheet 5*

BMP DEWATERING TIME				
BMP	**DESIGN INFILTRATION RATE (IN/HR)**	**INFILTRATION AREA (SF)**	**MAXIMUM VOLUME/PEAK FLOW VOLUME OF STORMWATER (CF)**	**INFILTRATION TIME (HRS)**
Raingarden	1.380	2,447	11,175	39.7

Raingarden Emergency Spillway

BMP:	RG
Project:	1608
Date:	Dec-21

The basin will use an emergency spillway over the proposed berm to serve as an emergency outflow device. The spillway has been designed to convey the respective 100 year design flow entirely through the spillway in the event that all primary outfall devices fail. The following calculations demonstrate the adequacy of the emergency spillway:

1 - Q_{req} for the 100 year Post-Development = 8.54 CFS

z = 3.00

100 yr WS Elev. In Basin = 64.30

2. Spillway Capacity = Q_{design}

C = Weir Coefficient = 2.80

L = Weir Length = 80.00

H = Flow Depth = 0.12

Freeboard = 1.00

$Q = CLH^{3/2}$

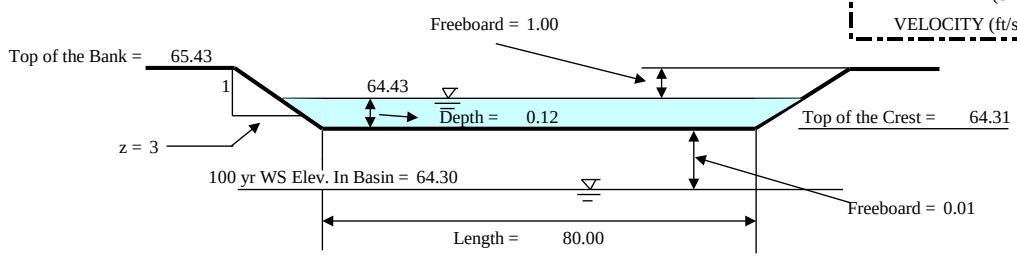
Q (cfs) = 9.31

9.31	>	8.54	GOOD

3. Top of the Crest Elevation = 64.31

4. Top of the Berm Elevation = 65.43

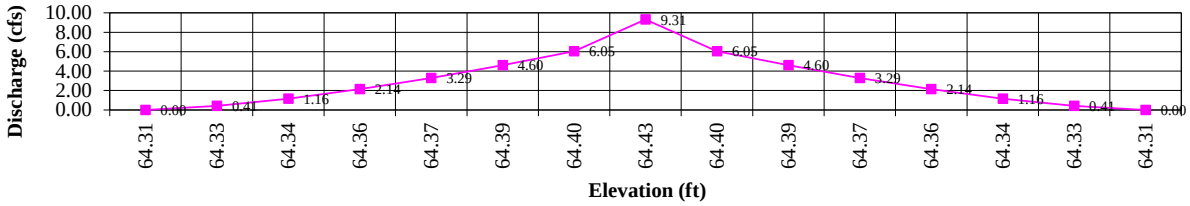
Top Width (ft) =	86.72
AREA (SF)=	9.64
VELOCITY (ft/s)=	0.89



Velocity (ft/s)	Median Stone Size (in)	d_{50} (in)	Filter Size NSA-No.	Filter Thickness NSA-No.	*d (in)
0.89	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

*d = 1.5 times the maximum stone diameter but not less than 6 inches.

Discharge Curve



SCHETTER ENVIRONMENTAL

260 Thousand Acre Road
Sellersville, PA 18960
Phone / Fax: (215) 257-5776

May 13, 2021

Mr. Rob Cunningham
Holmes Cunningham Engineering
409 E. Butler Avenue, Unit 5
Doylestown, PA 18901

Re: Stormwater Infiltration Testing Services
1515 Gibson Road
Tax Parcel 02-054-005
Bensalem Township, Bucks County, PA

Dear Mr. Cunningham:

Schetter Environmental completed soil testing services at the above referenced property on May 10, 2021. Our scope of work included performing soil test pit evaluations and Double Ring Infiltrometer testing so the results can be used by your office to design the appropriate type of stormwater management system for a proposed residential subdivision at the subject property. Our soil investigation was conducted using Site Evaluation and Soil Testing protocol as outlined in the *Pennsylvania Department of Environmental Protection (PADEP) Pennsylvania Stormwater Best Management Practices Manual*, December 30, 2006. TandM Associates witnessed various tasks of our site testing.

Site Description and Watershed

The site consists of approximately 3.232 acres. An existing house, garage, and paved driveway are present within the southern side of the site. The remainder of the site is wooded, with the exception of the central portion which is generally open and herbaceously covered. Freshwater wetlands are present along the northern side of the site. The wetlands were delineated by our group in March 2021. An unnamed tributary to Neshaminy Creeks borders the site to the north. According to Chapter 93 Water Quality, this portion of the Neshaminy Creek watershed is classified as Warm Water Fisheries, Migratory Fisheries (WWF, MF) and is not high quality or exceptional value. The site grades northeasterly with on-site elevations ranging from 84 to elevation 48.

Soil Mapping and Geology

The USDA NRCS Web Soil Survey maps Doylestown (Typic Fragiaqualfs) silt loam, 0 to 3 percent slopes (DdA) and Hatboro (Fluvaquentic Endoaquepts) silt loam (Ha) within the northern side of the site. Lawrenceville silt loam, 3 to 8 percent slopes (LkB) is mapped for the southern half of the site with the exception of the extreme southeastern corner, which is mapped as Urban land-Duffield complex, 0 to 8 percent slopes (UnB).

The Lawrenceville series (Oxyaquic Fragiudalfs) is a moderately well drained non-hydric soil in hydrologic soil group (HSG) C. The depth to water table is about 18 to 36 inches. A fragipan is present between 24 to 38 inches and the depth to bedrock is typically 48 to 99 inches. The capacity of the most limiting layer to transmit water (Ksat) is moderately high (0.20 to 0.60 in/hr). Parent material is loess over residuum weathered from shale and siltstone.

The Duffield series (Ultic Hapludalfs) is a well-drained non-hydric soil in HSG B. The depth to water table is more than 80 inches and the depth to bedrock is typically 48 to 120 inches. The capacity of the most limiting layer to transmit water (Ksat) is moderately high to high (0.60 to 2.00 in/hr). Parent material is residuum weathered from limestone.

The Doylestown series (Typic Fragiaqualfs) is a poorly drained hydric soil in HSG C/D. The depth to water table is about 0 to 6 inches. A fragipan is present between 15 to 30 inches and the depth to bedrock is typically 60 to 72 inches. The capacity of the most limiting layer to transmit water (Ksat) is moderately low to moderately high (0.06 to 0.20 in/hr). Parent material is eolian deposits over residuum weathered from shale and siltstone.

The Hatboro series (Fluvaquentic Endoaquepts) is a poorly drained hydric soil in HSG B/D. The depth to water table is about 0 to 6 inches. Bedrock is typically encountered between 60 to 99 inches. The capacity of the most limiting layer to transmit water (Ksat) is moderately high to high (0.60 to 2.0 in/hr). Parent material is alluvium derived from metamorphic and sedimentary rock.

According to eMapPA, bedrock geology is the Pennsauken and Bridgeton Formations, Undifferentiated (Dark reddish-brown, cross-stratified, feldspathic quartz sand, some thin beds of fine gravel, rare layers of clay or silt). The site is not underlain by carbonate geology.

Site Investigation and Methodology

Four (4) soil test pits (TP1-TP4) were excavated within the northern side of the site at potential locations for stormwater management systems. A soil scientist from our staff examined the soil profile within the test pits to determine soil texture, structure, consistency, and depth to limiting zones such as hydraulically restrictive horizons, water table and bedrock using USDA/NRCS soil profile methodology. Soil color determinations were made using Munsell Soil Color Charts. The test pit locations are shown on the attached reduced copy of a portion of a site plan.

Subsequent to the test pit evaluation, Double-Ring Infiltrometer tests were performed at each test pit location. Double-ring infiltrometer testing is performed to determine the infiltration capacity of the soil. A double-ring infiltrometer test estimates the vertical movement of water through the bottom of the test area. The outer ring helps to reduce the lateral movement of water in the soil.

The two concentric rings consisted of an outer 10" ring diameter with an inner 6" ring diameter. Each test area was presoaked at 30-minute intervals for 1 hour. The minimum water depth was 4 inches. Subsequent to the pre-soak, 10 or 30-minute time reading intervals were used as appropriate to measure the water level drop in the center ring. After each reading, both rings were refilled to the water level indicator mark. The test was conducted until a stabilized rate of drop with a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings was obtained. The drop that occurs in the center ring during the final period or the average stabilized rate represents the infiltration rate for that test location. A discussion regarding the soil profile encountered and infiltration test results at the test pit locations is provided below.

Subsurface Conditions

Disturbed soil condition with some man-made plastic artifacts were encountered to an approximate depth of 18 inches below grade at TP2. Otherwise, the surface horizon (Ap) at each test pit consisted of Dark brown silt loam with very friable consistency. The subsurface (B horizon) generally consisted of Dark yellowish brown silt loam and channery silt loam with friable to firm consistency. The substratum (C horizon) consisted of variegated channery to cobbly silt loam and sandy loam. The C3 horizon at TP4 consisted of variegated cobbly loamy sand. Rock fragments generally consisted of sandstone. Redoximorphic features (RMFs) and groundwater were not encountered in any of the test pits. RMFs and groundwater observation are indicators of a seasonal high water table. Soil drainage is based on soil morphology and presence, or absence, of RMFs and evidence of a seasonal high water table. The presence of hydric soil is limited to the northern side of the site where the wetlands were delineated. The soils encountered are best described as well drained in HSGB.

Infiltration Testing

Following the BMP manual, infiltration rates should be between 0.10 inches per hour and less than or equal to 10.0 inches per hour. The separation distance between the water table/bedrock and bottom of a stormwater basin should be two (2) feet to assure adequate pollutant removal.

TP-1: We performed infiltration testing at 5.0 feet below grade at this test pit location, which is more than two (2) feet above a limiting zone. This test depth was chosen due to cobbly soil condition below this test depth. An Average Infiltration Rate of 2.625 in/hr was obtained.

TP-2: We performed infiltration testing at 5.0 feet below grade at this test pit location, which is more than two (2) feet above a limiting zone. This test depth was chosen due to cobbly soil condition below this test depth. An Average Infiltration Rate of 2.75 in/hr was obtained.

TP-3: We performed infiltration testing at 2.0 feet below grade at this test pit location, which is more than two (2) feet above a limiting zone. This test depth was chosen due to cobbly soil condition below this test depth. An Average Infiltration Rate of 0.75 in/hr was obtained.

TP-4: We performed infiltration testing at 6.0 feet below grade at this test pit location, which is more than two (2) feet above a limiting zone. This test depth was chosen due to cobbly soil condition below this test depth. An Average Infiltration Rate of 3.75 in/hr was obtained.

The infiltration rates obtained are within acceptable parameters for a stormwater BMP. The above information is provided so that your office can design the appropriate type of stormwater management system for the proposed project based on soil conditions encountered. Please do not hesitate to contact me at (215) 520-6207 or mschetter@verizon.net if you have questions or require additional information.

Sincerely,
Schetter Environmental

Michelle A. Schetter
Soil Scientist, SEO Cert. #03876

Encl.

Soil Log and Infiltration Test Results

SITE LOCATION: **1515 Gibson Road**
TMP 02-054-005
Bensalem Township, Bucks County, PA

TP1

Ap	0-6"	Dark brown (10YR3/3) silt loam; moderate, fine, granular structure; very friable; abrupt smooth boundary
Bt1	6-22"	Dark yellowish brown (10YR4/6) heavy silt loam; moderate, medium subangular blocky structure; friable to firm; clear smooth boundary
Bt2	22-36"	Dark yellowish brown (10YR4/6) channery silt loam; weak, medium, subangular blocky structure; friable; gradual smooth boundary
C1	36-64"	Variegated yellowish brown (10YR5/6) and dark yellowish brown (10YR3/4) channery sandy loam; weak, fine, granular; very friable; clear smooth boundary
C2	64-84"	Variegated dark brown (7.5YR3/4) and yellowish brown (10YR5/4) extremely cobbly sandy loam; massive; friable; sandstone rock fragments
R	84"+	Weathered sandstone

No redoximorphic features or groundwater encountered
Seasonal high water table: >84"

Double Ring Infiltration Test

Test No.	Depth	Reading 1	Reading 2	Reading 3	Reading 4	Final
S-1	5.0 ft	1 ¼"	1 ¼"	1 1/8"	1 ¼"	1 ¼"= 2.5 in/hr
S-2	5.0 ft	1 ¼"	1 ¼"	1 1/8"	1 3/8"	1 3/8" =2.75 in/hr

Raw Average Infiltration Rate: 2.625 in/hr

TP2

A	0-18"	Variegated dark yellowish brown (10YR4/4) and brown (10YR5/3) gravelly silt loam; structureless; friable to firm; claer smooth boundary (disturbed, plastic artifacts)
Bt1	18-30"	Dark yellowish brown (10YR4/6) heavy silt loam; moderate, medium subangular blocky structure; firm; clear smooth boundary
C1	30-45"	Yellowish brown (10YR5/4) cobbly silt loam; weak, fine, granular structure; friable; gradual smooth boundary
C2	45-62"	Variegated yellowish brown (10YR5/6) and dark yellowish brown (10YR3/4) cobbly sandy loam; weak, fine, granular; friable; clear smooth boundary
C3	62-84"	Variegate brown (7.5YR5/4) and yellowish brown (10YR5/4) extremely cobbly sandy loam; massive; friable; sandstone rock fragments
R	84"	Weathered sandstone

No redoximorphic features or groundwater encountered
Seasonal high water table: >84"

Double Ring Infiltration Test

Test No.	Depth	Reading 1	Reading 2	Reading 3	Reading 4	Final
S-3	5.0 ft	1 ½"	1 ½"	1 ¼"	1 ¼"	1 ¼"= 2.5 in/hr
S-4	5.0 ft	1 5/8"	1 ½"	1 ½"	1 ½"	1 ½" = 3.0 in/hr

Raw Average Infiltration Rate: 2.75 in/hr

TP3

Ap	0-5"	Dark brown (10YR3/3) silt loam; moderate, fine, granular structure; very friable; abrupt smooth boundary
Bt1	5-23"	Dark yellowish brown (10YR4/6) heavy silt loam; moderate, medium subangular blocky structure; friable; gradual wavy boundary
Bt2	23-28"	Dark yellowish brown (10YR3/6) very channery silt loam; weak, medium, subangular blocky structure; friable; gradual smooth boundary
C1	28-36"	Dark yellowish brown (10YR3/6) very cobbly silt loam; weak, fine, granular; clear smooth boundary
C2	36-74"	Variegated dark brown (7.5YR3/4) extremely cobbly sandy loam; massive; friable; sandstone rock fragments
R	74"	Weathered sandstone

No redoximorphic features or groundwater encountered
Seasonal high water table: >74"

Double Ring Infiltration Test (30 min readings)

Test No.	Depth	Reading 1	Reading 2	Reading 3	Reading 4	Final
S-5	2.0 ft	3/8"	3/8"	3/8"	3/8"	3/8"= 0.75 in/hr
S-6	2.0 ft	3/8"	3/8"	3/8"	3/8"	3/8" = 0.75 in/hr

Raw Average Infiltration Rate: 0.75 in/hr

TP4

Ap	0-4"	Dark brown (10YR3/3) silt loam; moderate, fine, granular structure; very friable; abrupt smooth boundary
BA	4-8"	10YR4/3 silt loam; weak, thin, platy structure; friable; clear smooth boundary
Bt1	8-22"	Dark yellowish brown (10YR4/6) heavy silt loam; moderate, medium subangular blocky structure; friable to firm; clear smooth boundary
Bt2	22-45"	Strong brown (7.5YR4/6) silt loam; weak, fine, granular structure; friable; gradual wavy boundary
C1	45-76"	Variegated Dark yellowish brown (10YR3/4) and yellowish brown (10YR5/4) channery sandy loam; massive; friable; clear smooth boundary
C2	76-96"	Variegated dark brown (7.5YR3/4) and yellowish brown (10YR5/4) cobbly loamy sand; massive; friable; sandstone rock fragments

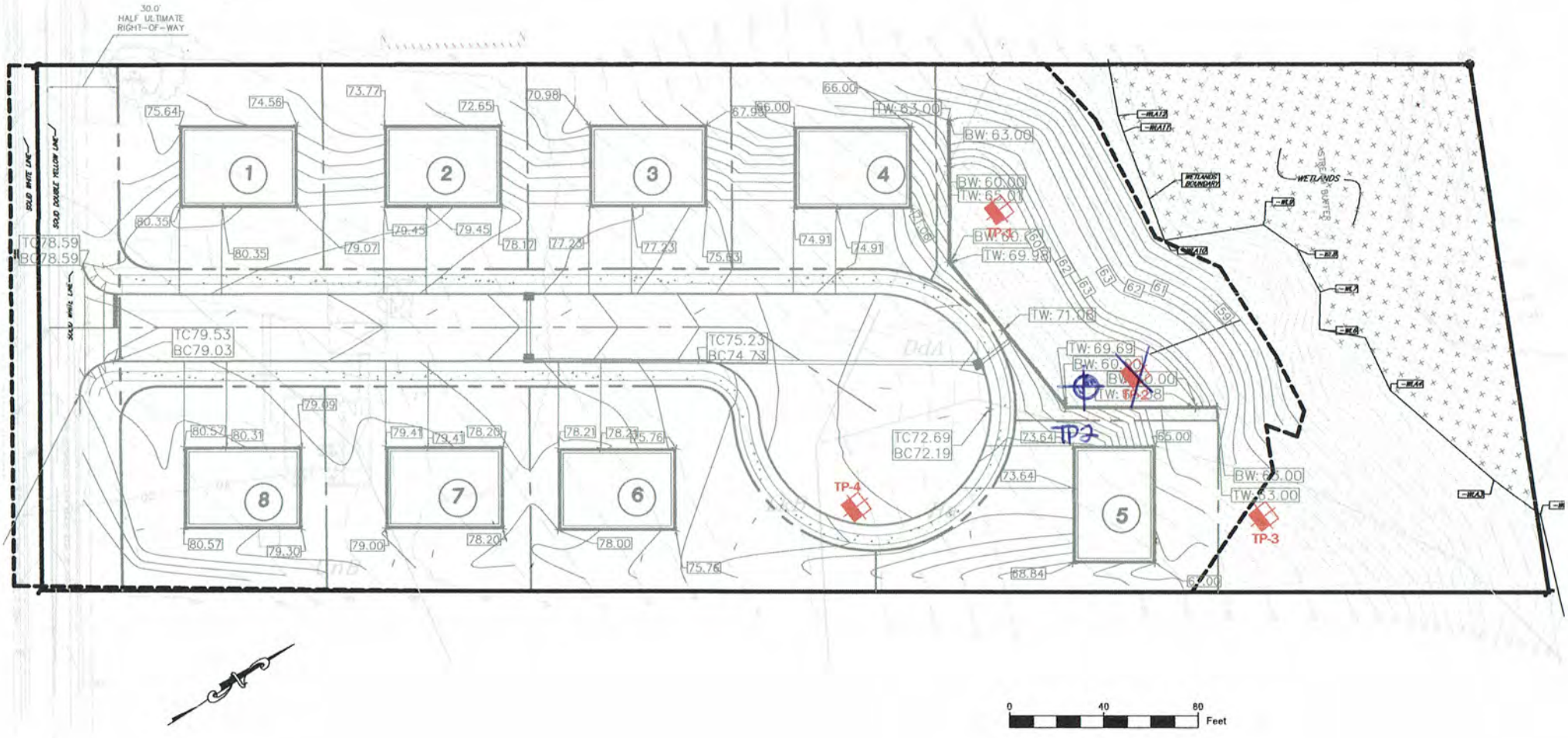
No redoximorphic features, groundwater or bedrock encountered
Seasonal high water table: >96"

Double Ring Infiltration Test (10 min readings)

Test No.	Depth	Reading 1	Reading 2	Reading 3	Reading 4	R5	Final
S-7	6.0 ft	2 ¾"	¾"	¾"	½"	½"	½"= 3.0 in/hr
S-8	6.0 ft	3"	¾"	¾"	¾"	¾"	¾" = 4.5 in/hr

Raw Average Infiltration Rate: 3.75 in/hr

SOIL BORINGS LOGGED BY: Michelle A. Schetter, Soil Scientist, Schetter Environmental
DATE: 5/10/2021


30.0'
HALF ULTIMATE
RIGHT-OF-WAY
SOLID WHITE LINE
SOLID DOUBLE YELLOW LINE
SOLID WHITE LINE
1
2
3
4
5
6
7
8
TC78.59
BC78.59
TC79.53
BC79.03
TC75.23
BC74.73
TC72.69
BC72.19
BW: 63.00
TW: 63.00
BW: 60.00
TW: 63.00
TW: 69.98
TW: 71.08
TW: 69.69
TW: 63.00
TP-1
TP-2
TP-3
TP-4
WETLANDS BOUNDARY
WETLANDS
STREAM BUFFER
0
40
80
Feet

APPENDIX C

On-Site Storm Sewer Calculations

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)		**CB-1**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Open Space	0.32	0.00	0.000
B (Slope 6%+)	Open Space	0.26	0.00	0.000
C (Slope 6%+)	Forest	0.20	0.00	0.000
B (Slope 6%+)	Forest	0.18	0.00	0.000
B &C (Slope 6%+)	Impervious (includes 8,000 SF future impervious)	0.97	0.09	0.088
		Totals =	0.09	0.088

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{0.09}{0.09} = 0.97$

Use Runoff Coeff. = **0.97**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)		**CB-2**		

1. Runoff Coefficient (C)

hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Open Space	0.32	0.12	0.039
B (Slope 6%+)	Open Space	0.26	0.13	0.034
C (Slope 6%+)	Forest	0.20	0.00	0.000
B (Slope 6%+)	Forest	0.18	0.00	0.000
B &C (Slope 6%+)	Impervious (includes 8,000 SF future impervious)	0.97	0.32	0.307
		Totals =	0.57	0.379

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{0.38}{0.57} = 0.67$

Use Runoff Coeff. = **0.67**

Project	**Gibson Road**	By	**EC**	Date	**11/22/2021**
Location	**Bensalem Township, Bucks County, PA**	Checked	**RC**	Date	**11/22/2021**
Circle one:	Present (Developed)		**CB-3**		

1. Runoff Coefficient (C)

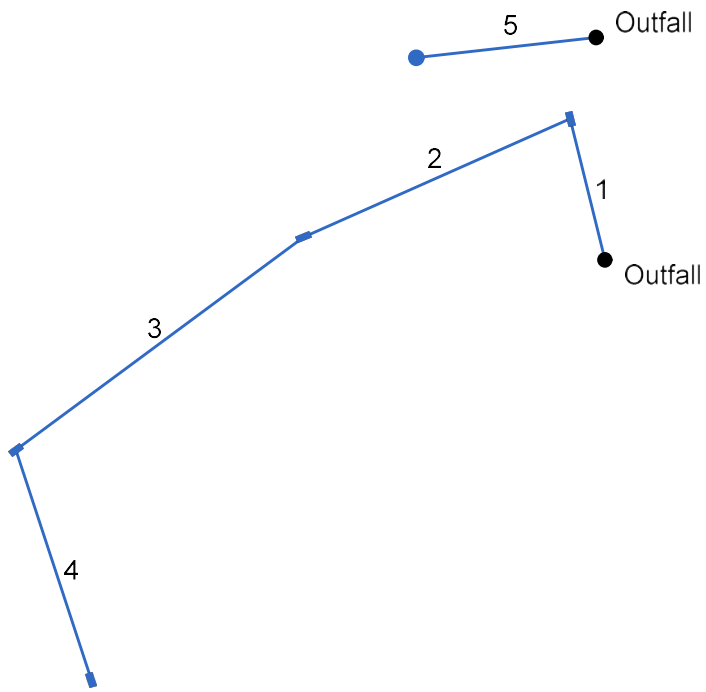
hydrologic group and Slope Range (Table 2)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	C [1] Table B7	Area [x] acres [ ] mi² [ ] %	Product of C x area
C (Slope 6%+)	Open Space	0.32	0.20	0.065
B (Slope 6%+)	Open Space	0.26	0.01	0.002
C (Slope 6%+)	Forest	0.20	0.00	0.000
B (Slope 6%+)	Forest	0.18	0.00	0.000
B &C (Slope 6%+)	Impervious (includes 8,000 SF future impervious)	0.97	0.40	0.384
		Totals =	0.61	0.452

1 Use only one runoff coefficient source per line

Runoff Coefficient (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{0.45}{0.61} = 0.74$

Use Runoff Coeff. = **0.74**

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: STORMSEWERS.stm	Number of lines: 5	Date: 7/15/2022

Storm Sewer Tabulation

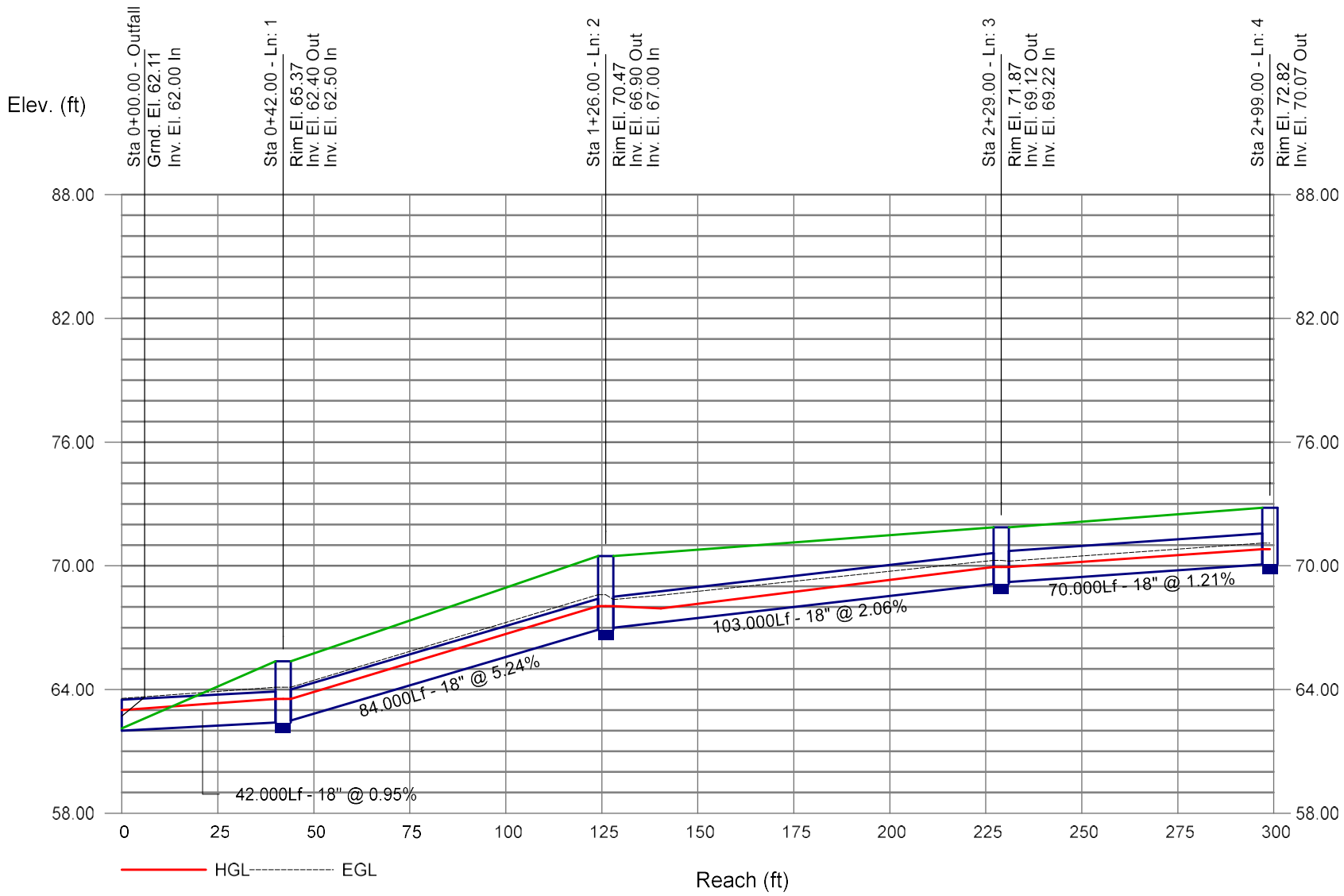
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	42.000	0.04	1.31	0.32	0.01	0.93	5.0	6.5	9.3	8.71	11.10	6.50	18	0.95	62.00	62.40	63.00	63.54	62.11	65.37	CB4-HW1
2	1	84.000	0.61	1.27	0.74	0.45	0.92	5.0	6.2	9.4	8.67	26.04	6.32	18	5.24	62.50	66.90	63.54	68.04	65.37	70.47	CB-3 - CB-4
3	2	103.000	0.09	0.66	0.97	0.09	0.47	5.0	5.5	9.6	4.52	16.32	4.03	18	2.06	67.00	69.12	68.04	69.94	70.47	71.87	CB1-CB3
4	3	70.000	0.57	0.57	0.67	0.38	0.38	5.0	5.0	9.8	3.75	12.54	4.42	18	1.21	69.22	70.07	69.94	70.81	71.87	72.82	CB-2 - CB-1
5	End	52.000	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	5.98	8.04	5.00	18	0.50	59.24	59.50	60.18	60.48	63.14	64.14	OCS1-LS1

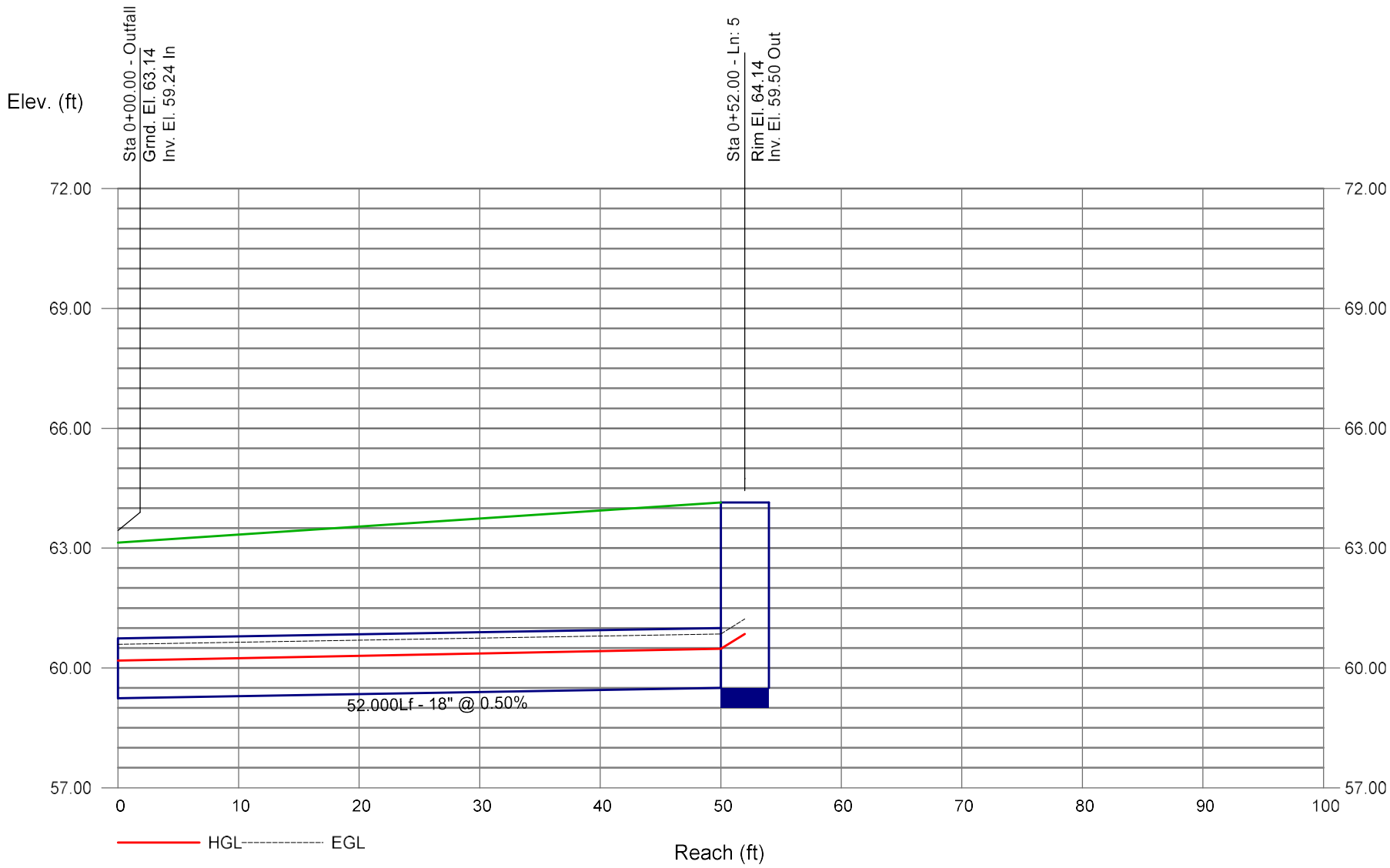
Project File: STORMSEWERS.stm | Number of lines: 5 | Run Date: 7/15/2022

NOTES:Intensity = 124.57 / (Inlet time + 17.60) ^ 0.81; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: STORMSEWERS.stm



Storm Sewer Profile

Proj. file: STORMSEWERS.stm