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November 3, 2025

Lee Newman
Planning Director
Town of Needham
500 Dedham Avenue
Needham, MA 02492

Re: Site Plan Review
Needham Enterprises, LLC
242 Hillside Avenue, Needham, MA

Dear Lee,

Please be advised that this office represents Needham Enterprises, LLC, a Massachusetts Limited Liability Company with an address of 105 Chestnut Street, Unit 28, Needham, MA 02492 (hereinafter, and in the materials submitted herewith, interchangeably, the “Applicant” and “Needham Enterprises”) relative to the mixed-use property known and numbered 242 Hillside Avenue, Needham, MA (the “Premises”). In connection therewith, submitted herewith pursuant to M.G.L. Chapter 40A and the Town of Needham Zoning By-Law (the “By-Law”), please find the following materials.

1. Completed Application for Site Plan Review with Addendum A;
2. Site Plan, titled “Site Development Plans, 14 Unit Multi-Family Building, 242 Hillside Avenue, Needham, MA October 14, 2025”, prepared by Glossa Engineering, Inc., 46 East Street, East Walpole, MA 02032, consisting of 8 sheets and one appendix as follows
 - a. Sheet 1 of 8, Cover Sheet
 - b. Sheet 2 of 8, Existing Conditions Plan, Scale 1” = 30’, dated October 14, 2025;
 - c. Sheet 3 of 8, Site Plan, Scale 1” = 20’, dated October 14, 2025;
 - d. Sheet 4 of 8, Grading and Drainage Plan, Scale 1” = 20’, dated October 14, 2025;
 - e. Sheet 5 of 8, Utilities Plan, Scale 1” = 20’, dated October 14, 2025;
 - f. Sheets 6 and 7 of 8, Details, Scale as Noted, dated October 14, 2025;
 - g. Sheet 8 of 8, Construction Period Plan, Scale 1” = 20’, dated October 14, 2025; and
 - f. Appendix 1, Building Height Calculation Plan, Scale 1” = 20’, dated October 14, 2025.

3. Architectural Plans, titled “242 Hillside Avenue, Needham, MA 02494, Needham Enterprises, Needham, MA 02492”, prepared by Scott Melching Architect, LLC, Needham, MA 02492, consisting of 11 sheets, as follows:

- a. Sheet T-1, Title Page, Rendering, DWG List & Building Dept Notes, dated October 27, 2025;
- b. Sheet L-1, Landscape Plan, dated October 27, 2025;
- c. Sheet A-1, Lower Level Plan, dated October 27, 2025;
- d. Sheet A-2, Ground Floor Plan, dated October 27, 2025;
- e. Sheet A-3, Second Floor Plan, dated October 27, 2025;
- f. Sheet A-4, Third Floor Plan, dated October 27, 2025;
- g. Sheet A-5, Roof Plan, dated October 27, 2025;
- h. Sheet A-6, Front Elevation and Section at Front Facing Gable, dated October 27, 2025;
- i. Sheet A-7, Right Elevation and Section at Side Facing Gable, dated October 27, 2025;
- j. Sheet A-8, Rear Elevation and Section at Stair, dated October 27, 2025;
- k. Sheet A-9, Left Elevation, dated October 27, 2025;

4. Drainage Report, “242 Hillside Avenue, A Residential Development in Needham, MA”, dated October 14, 2025, prepared by Glossa Engineering, Inc.; and

5. Check in the amount of \$1,199.40 for the requisite filing fee.¹

The Premises is located in both the Hillside Avenue Business Zoning District (“ASB”) and the HAB subdistrict of the Multi-Family Overlay District (“MFOD”). It is located on the east side of Hillside Avenue, a short distance from the intersection with Hunnewell Street and is bounded to the north by an existing mixed-use property, to the west by the MBTA Railroad Right of Way, and to the south by another mixed-use property. It is identified as Parcel 10 on Town of Needham Assessor’s Map No. 99 and consists of approximately 17,630 square feet of land with 100 feet of frontage on Hillside Avenue. It is currently occupied by a two-story residential dwelling, a detached garage, a detached storage container and extensive asphalt and gravel parking and yard areas. The property appears to have been used for several years for mixed use purposes including both residential and commercial activities.

Needham Enterprises is proposing to demolish the existing structures and completely redevelop the entire site pursuant to the provisions of the MFOD. In connection therewith, the Applicant is proposing to construct a new, three-story, multi-family residential building, containing 11,994 square feet of floor area, and a total of 14 units. The building will have a primary entrance at the front of the building, directly off Hillside Avenue, including an entry vestibule with mailboxes and room for package storage. There will be a secondary entrance at the rear of the building, accessed off the parking area, described below.

Two units, together with unfinished mechanical space, will be located on the lower level, situated below grade. Four units, a laundry room and the building lobby will be located on the grade level. The remaining two floors, namely, levels two and three, will each contain four units

¹ Such fee is calculated as follows: \$1,000 base fee + .10 per square foot in excess of 10,000. Whereas the proposed new structure contains a total of 11,994 square feet, the calculation is: \$1,000 + (.10 x 1,994 SF) = \$1,199.40.

and a laundry room. Six of the units, on the north side of the building will include small balcony areas. Two of the 14 units will be designated affordable units, namely, Unit 1-D, which will also be accessible, and Unit 3-C, with all units to have the same level of interior finish.

A parking area will be located behind the building, accessed by a two-way driveway along the south side of the property, between the building and the property line. There will be a total of 17 parking spaces, divided between 9 full size and 8 compact spaces, and including two van accessible spaces. The parking area will also include a screened enclosure, containing receptacles for both trash and recycling collection.

A concrete walkway will run along the north side of the building, in the area between the building and the north property line. This walkway will provide access to two common patio areas, for use by all 14 units in the building, as well as seven Dero round bicycle racks in proximity to the rear parking area. These racks will provide for easily accessible storage of up to fourteen bicycles.

Analysis

I. Use

Pursuant to Section 3.17.4.1 of the By-Law, the use of property in the MFOD for multi-family housing is allowed as a matter of right.² And pursuant to Section 3.17.4.2, parking and other uses customarily incident to multi-family housing are also allowed as of right. Therefore, the proposed redevelopment of the property for use as a multi-family residential structure with off-street parking, driveway, walkways and patios will comply with the applicable use related provisions of the By-Law.

II. Dimensional Regulations

A. Lot Area, Frontage and Setback Requirements

Pursuant to Section 3.17.5.1, redevelopment of property in the HAB subdistrict of the MFOD is subject to the following dimensional requirements: (a) a minimum lot area of 10,000 square feet, (b) minimum lot frontage of 80 feet, (c) a minimum front setback of 20 feet, and (d) minimum side and rear yard setbacks of 20 feet, provided further that any surface parking abutting a residential district shall be set back 10 feet from such buffer.

As set forth above, the Premises contains 17,630 square feet of area and 100 feet of frontage. As a result, the Premises exceeds the minimum 10,000 square foot area requirement, as well as the 80 foot frontage minimum. Therefore, the lot complies with applicable lot area and frontage requirements.

² Pursuant to Section 3.2.2 of the By-Law, apartment or multi-family use in the HAB is allowed pursuant to special permit.

The proposed new building is setback 22.5' from Hillside Avenue, 20.5' from the left sideline, 27.5' from the right sideline and 76.5' from the rear lot line. As a result, the setbacks on all four sides of the proposed new building meet or exceed the applicable minimums and the building complies with setback requirements.

B. Building Height Requirements

Pursuant to Section 3.17.5.2 of the By-Law, the maximum building height in the HAB subdistrict of the MFOD is 3 stories and 40 feet, subject to certain specified exceptions.³ Whereas the proposed new building is three stories tall, and 38.6' high, it complies with such requirement.

C. Building Bulk and Other Requirements

Pursuant to Section 3.17.5.3, buildings in the HAB subdistrict of the MFOD are subject to a maximum Floor Area Ratio (FAR) of .7. The FAR of the proposed building is .68, based on a total of 11,994 square feet of gross floor area and lot size of 17,630 square feet.⁴ Therefore, the proposed building complies with the maximum FAR requirement.

III. Parking

Pursuant to Section 3.17.6 (a) of the By-Law, the minimum number of off-street parking spaces required for multi-family development within the HAB subdistrict of the MFOD is one space per dwelling unit. Whereas the proposed building will contain a total of 14 units, pursuant to the By-Law, a total of 14 off-street parking spaces is required. Furthermore, pursuant to the other applicable sub-paragraphs of Section 3.17.6, parking areas shall be designed and constructed in accordance with Section 5.1.3 Parking Plan and Design Requirements, provided further that (a) no parking shall be allowed within the front setback, (b) parking shall be on the side or to the rear of the building, or below grade, and (c) the minimum number of bicycle parking spaces shall be one space per dwelling unit.⁵

As mentioned above, 17 total parking spaces are proposed, located to the rear of the building. In addition, 14 total bicycle storage spaces are proposed, located to the side of the building. Therefore, the project will provide more than the required number of parking spaces, a conforming number of bicycle spaces, and all proposed spaces will be located to the rear or side of the building with no parking within the front setback.

³ Exceptions include: chimneys, ventilators, towers, silos, spires, stair overruns, elevator overruns, mechanical equipment, roof parapets, architectural screening, or other ornamental features of buildings, which features (i) are in no way used for living purposes; (ii) do not occupy more than 25% of the gross floor area of the building and (iii) do not project more than 15 feet above the maximum allowable height. Furthermore, a waiver may be issued excepting solar photovoltaic, solar thermal, living, and other eco-roofs, energy storage, and air-source heat pump equipment may, subject to screening and architectural requirements.

⁴ Note that the calculation includes the two dwelling units and common hallway in the basement level, but not the unfinished mechanical space as such space features a measurement from the top of the concrete slab to the underside of the floor joist next above of six feet, zero inches or less, thus prohibiting use and occupancy thereof.

⁵ See Section 3.17.6 (b), (e) and (f).

Section 5.1.3 of the By-Law, Parking Plan and Design Requirements, as applicable to the Premises, imposes a number of specific requirements. Those requirements and project compliance are as follows:

(a) Parking Lot Illumination – All parking areas which are proposed to be illuminated shall provide an illumination level of an average of one foot candle. All illumination shall be shielded so as not to shine directly onto a public or private way or onto any property in a residential district.

Lighting in the parking area will be designed to achieve an average of one foot candle without any off-site impact.

(b) Loading Requirements – Adequate off-street loading facilities and space with unimpeded access shall be provided for all new construction and for all building additions greater than 100 square feet of floor area. Facilities shall be so sized and arranged that no trucks shall be parked on a public way while loading, unloading, or waiting to do so.

Given the multi-family residential nature of the redevelopment, loading requirements are limited to those of movers and occasional deliveries. Needham Enterprises asserts that adequate loading facilities have been provided for such purposes, as there is ample room in both the driveway and the rear parking area for temporary parking of moving and delivery trucks, for limited time periods, consistent with such activities.

(c) Handicapped Parking – Parking spaces for the exclusive use of handicapped individuals shall be provided in accordance with the most recent rules and regulations of the Architectural Access Barriers Board, specifically Section 23 thereof.

As indicated above, two van accessible handicapped parking spaces are proposed, in proximity to the rear building entrance, in compliance with such requirement.

(d) Driveway Openings—Ingress and egress shall be located so as to minimize conflict with traffic on streets and where good visibility and sight distances are available to observe approaching pedestrian and vehicular traffic. See Sections 4.4.5, 4.6.6 and 4.10.3 for Driveway Openings Regulations in Business, Industrial, and Industrial-1 Districts.

The proposed driveway opening providing ingress and egress to the property and parking area has been located to minimize conflicts with street traffic and to provide sufficient visibility and sight distance for both vehicles and pedestrians.

(e) Compact Cars – Off-street parking areas may be designated to allow up to a maximum of 50% of the total number of parking spaces to be used by compact cars. Compact car spaces shall not be less than 8 feet by 16 feet.

As indicated above, the parking area will contain a total of 17 parking spaces, including 9 full size spaces and 8 compact size parking spaces. Whereas the number of compact spaces does not exceed 50% of the total number of spaces, and whereas the compact spaces are not less than 8 feet by 16 feet, the parking area complies with such requirement.

(f) Parking Space Size – Each parking space, except for the allowable percentage for compact cars, shall measure at least 9 feet in width and 18.5 feet in length; however, parallel parking spaces shall be at least 22 feet in length. The required parking space dimensions, including those for compact car spaces, shall not be reduced by obstructions, including, but not limited to, light poles and columns.

The proposed parking spaces, except for the compact spaces referenced above, have been designed to measure 9 feet by 18.5 feet. Therefore, the full-size spaces comply with such requirement.

(g) Bumper Overhang – The minimum length requirements stated in the above two paragraphs may include no more than one foot of area beyond the curb at the front or rear of a space, used for bumper over-hang.

The parking space dimensions, as referenced above, do not include any curb over-hang and therefore this requirement is not applicable.

(h) Parking Space Layout – Required parking areas shall be designed so that each motor vehicle may proceed to and from its parking space without requiring the movement of any other vehicle. In no case shall spaces be so located as to require the backing or maneuvering onto the sidewalk or into a public or private way upon entering or leaving the space.

The proposed parking has been designed to allow for parking in each space without the movement of any other vehicle or backing or maneuvering onto the sidewalk or any way. Therefore, the parking complies with such requirement.

(i) Width of Maneuvering Aisle – The minimum width of aisles within parking areas providing access to parking spaces for one-way traffic shall be as follows:

<i>Angle of Parking Space</i>	<i>Minimum Width of Aisle</i>
<i>90 degree</i>	<i>24 feet/25 feet*</i>
<i>60 degree</i>	<i>18 feet/19 feet*</i>
<i>45 degree</i>	<i>14 feet</i>
<i>30 degree</i>	<i>12 feet</i>
<i>Parallel</i>	<i>12 feet</i>

** The greater width shall be used where one foot of bumper overhang occurs.*

The minimum width of maneuvering aisles within parking areas providing access to spaces for two-way traffic shall be twenty (20) feet or the width required above, whichever is greater. The required width of all maneuvering aisles shall not be reduced by obstructions, including, but not limited to, light poles and columns.

The maneuvering aisle within the proposed parking area is 24' wide and the spaces are angled at 90 degrees from such aisle. Therefore, the parking complies with such requirement.

(j) Parking Setbacks – Parking spaces and maneuvering aisles shall be setback a minimum of ten (10) feet from a front lot line or street right-of-way line; except, however, that such setback shall be twenty (20) feet in a Business or Industrial District, if the conditions set forth in Subsection 4.4.4 or 4.5.2 of this By-Law apply. Such parking setback shall also be twenty (20) feet in an Industrial-1 District and Highway Commercial 1 District unless a deeper parking setback is required by Section 4.11. Parking spaces, maneuvering aisles and driveways shall be set back a minimum of four (4) feet from the rear and side lot lines. Except in an enclosed structure or in an unenclosed parking facility beneath a structure, no parking space, maneuvering aisle or driveway shall be located within five (5) feet of a building line at the first floor.

The Parking spaces and maneuvering aisles are set back more than 20 feet from the front lot line or street right-of-way line. Furthermore, the driveway providing access to the parking area is setback 4 feet from the next closest property line, excepting only a very small section within the

first 30 feet of the driveway. As a result, the parking generally and materially complies with such requirement, and as set forth below, a waiver has been requested for the limited aspect of deviation.

(k) Landscaped Areas – Setback areas required under the above paragraph (j) shall be maintained as landscaped areas, except where driveway openings or sidewalks occur. Landscaped areas shall include trees, shrubs, flowers and grass. Planting beds shall be at least 4 feet wide. In any parking area requiring 10 or more spaces, ten (10) percent or more of such area shall be maintained as landscaped area. In parking areas requiring 20 or more spaces, a minimum of one-quarter of this amount shall be located in the interior of the parking area. Required landscape setback areas shall count towards the minimum ten percent requirement; provided, however, that the interior landscaped area requirement shall be met.

The setback areas between the parking spaces and maneuvering aisles and the side and rear property lines are proposed to be landscaped, with a variety of trees, shrubs and grasses.

(l) Trees – For all parking areas requiring 10 or more spaces, trees shall be required. One tree shall be provided for every 10 spaces or a fraction thereof. Such trees shall be located within or around the parking area so as to screen and soften the visual impact of parked vehicles as much as possible. They shall be at least 2" trunk diameter, with not less than 40 square feet of unpaved soil or other permeable surface area per tree. Planting beds shall be at least 4 feet wide.

A number of evergreen trees are proposed adjacent to the parking area, in excess of the two trees required pursuant to this provision.

(m) Location – Off-street parking required by this Section shall be located on either the same lot as the principal use or uses or on a lot within 300 feet which is under the same ownership. In the Avery Square Business District, required parking for non- residential uses shall be either on the same premises as the activity it serves, or on a separate parcel, which may be shared with other uses, if the parcel is located within five hundred (500) feet (800 feet for employees) walking distance of the building entrance to be served, is located in a zoning district permitting or allowing on special permit the activity it serves, and is permanently committed to serving the use involved. In the Avery Square Business District, no parking shall be located within 10 feet of a street line.

All parking is located on site, on the same lot as the principal use.

(n) Bicycle Racks – For parking areas of forty or more spaces, bicycle racks facilitating locking shall be provided to accommodate one bicycle per twenty parking spaces required, or fraction thereof.

The project requires a total of 14 spaces and 17 are proposed. As a result, this provision does not apply. However, a total of 14 bicycle storage spaces will be provided.

IV. Development Standards

Section 3.17.7 of the By-Law sets forth a number of different provisions applicable to developments in the MFOD, specifically including the following general development standards:

(b) Buildings shall be designed with due regard to their relationship to open spaces, existing buildings, and community assets in the area.

The Premises is located in a commercial district that contains a number of mixed-use properties, no significant open space and no substantial community assets. The building has been designed with due regard to these factors to present an attractive residential look and feel that is both consistent and in harmony with existing buildings in the immediate vicinity.

(c) Building entrances shall be available from one or more streets on which the building fronts and, if the building fronts Chestnut Street, Garden Street, Highland Avenue, Hillside Avenue, Rosemary Street, or West Street, the primary building entrance must be located on at least one such street.

The primary building entrance is located on Hillside Avenue, although in practice it is anticipated that the rear entrance will receive more utilization.

(d) The site shall be designed so that all collection and storage areas for residential refuse shall be internal to the building(s), or otherwise shall not be visible from any public way and appropriately screened from abutting properties, and adequate management and removal of refuse shall be provided for.

Bins for trash and recycling are proposed in the rear of the building, off the parking area. These bins will be located inside a fenced enclosure which will be screened from abutting properties and will not be visible from Hillside Avenue.

(e) Site arrangement and driveway layout shall provide sufficient access for emergency and service vehicles, including fire, police, and rubbish removal.

The site has been designed to provide sufficient access for emergency and service vehicles, including fire, police and rubbish removal. Truck turning movements have been modeled to confirm adequate access and circulation.

(f) Plantings shall be provided and include species that are native or adapted to the region. Plants on the Massachusetts Prohibited Plant List, as may be amended, are prohibited.

Plantings shall be native species, as set forth in the materials provided herewith. Prohibited plants will not be utilized.

(g) All construction shall be subject to the current town storm water bylaws, regulations, and policies along with any current regulations or policies from DEP, state, and federal agencies.

All construction will comply with applicable storm water bylaws, regulations and policies, as well as applicable DEP, state and federal requirements.

(h) Control measures shall be employed to mitigate any substantial threat to water quality or soil stability, both during and after construction.

Appropriate control measures shall be implemented to mitigate any substantial threat to water quality or soil stability, both during and after construction.

(i) There shall be adequate water, sewer, and utility service provided to serve the project.

Adequate water, sewer and utility services are available to the Premises via connection to existing infrastructure in Hillside Avenue.

(j) Off-site glare from headlights shall be controlled through arrangement, grading, fences, and planting. Off-site light over-spill from exterior lighting shall be controlled through luminaries selection, positioning, and mounting height so as to not add more than one foot candle to illumination levels at any point off-site.

Off-site glare will be controlled and mitigated through the use of a mixture of fences and plantings throughout the site. Site lighting will be designed and placed to avoid both over-spill to adjacent properties and illumination off-site in excess of one foot candle

(k) Pedestrian and vehicular movement within and outside the project site shall be protected, through selection of egress points, provision for adequate sight distances, and through reasonable mitigation measures for traffic attributable to the project.

The walkways, driveway and parking areas have all been designed to protect pedestrian and vehicular movement both within and outside the site and to provide for adequate sight distances. Direct pedestrian access is afforded through a walkway to the front of the building from the sidewalk on Hillside Avenue. Vehicular access is afforded through a two-way driveway running along the southerly boundary line, with such driveway flared at the entry for better access and safety.

(l) Site arrangements and grading shall minimize to the extent practicable the number of removed trees 8" trunk diameter or larger, and the volume of earth cut and fill.

No mature tree currently exist on site and the project has been designed to minimize the volume of cut and fill required.

(m) No retaining wall shall be built within the required yard setback except a retaining wall with a face not greater than four (4) feet in height at any point and a length that does not exceed forty (40) percent of the lot's perimeter. Notwithstanding the foregoing, retaining walls may graduate in height from four (4) to seven (7) feet in height when providing access to a garage or egress entry doors at the basement level, measured from the basement or garage floor to the top of the wall. In such cases, the wall is limited to seven (7) feet in height for not more than 25% of the length of the wall.

No retaining walls are proposed in connection with the project.

(n) Retaining walls with a face greater than twelve (12) feet in height are prohibited unless the Applicant's engineer certifies in writing to the Building Commissioner that the retaining wall will not cause an increase in water flow off the property and will not adversely impact adjacent property or the public.

No retaining walls are proposed in connection with the project.

(o) Construction activity shall be consistent with Section 3.8 of the General By-Laws and any reasonable conditions on construction activity that are warranted at a particular site and included in the applicable site plan approval, including but not limited to hours during which construction activity may take place, the movement of trucks or heavy equipment on or off the site, measures to control dirt, dust, and erosion and to protect existing vegetation to be preserved on the site.

Construction activity shall conform with Section 3.8, as applicable, and any additional reasonable conditions on construction.

V. Affordable Housing Requirements

Section 3.17.8 of the By-Law requires that any multi-family building in the MFOD, with six or more units, shall include affordable housing as defined in Section 1.3 of the By-Law, and subject to the following requirements:

A. Section 3.17.8.1 – Provision of Affordable Housing

Section 3.17.8.1 requires that not fewer than 12.5% of housing units constructed shall be Affordable Housing Units.⁶ Whereas a total of 14 units are proposed, not less than two units are required to be Affordable Units.⁷ As set forth above, a total of two units are proposed as Affordable Units, in compliance with such requirement.

B. Section 3.17.8.2 – Affordable Housing Development Standards

Pursuant to Section 3.17.8.2 of the By-Law, the Affordable Units shall be:

(a) Integrated with the rest of the development and shall be compatible in design, appearance, construction, and quality of exterior and interior materials with the other units and/or lots;

The Affordable Units are integrated with the rest of the development. They are the same general design, appearance, construction and quality of materials, with the same interior finish as other units.

(b) Dispersed throughout the development;

The two proposed Affordable Units are dispersed throughout the development, with one, accessible unit on the first floor in Unit 1D and the other unit on the third floor in Unit 3C.

(c) Located such that the units have equal access to shared amenities, including light and air, and utilities (including any bicycle storage and/or Electric Vehicle charging stations) within the development;

The two proposed Affordable Units have equal access to shared amenities, including light and air and utilities within the development.

(d) Located such that the units have equal avoidance of any potential nuisances as market-rate units within the development;

The two proposed Affordable Units are located such that they have equal avoidance of any potential nuisances as market-rate units within the development.

⁶ In the event that the Executive Office of Housing and Livable Communities (EOHLC) determines that such calculation does not comply with the provisions of Section 3A of MGL c.40A, then not fewer than 10% of housing units constructed shall be Affordable Housing Units. For purposes of calculating the number of Affordable Housing Units required, any fractional unit shall be rounded up to the nearest whole number and shall be deemed to constitute a whole unit.

⁷ Calculated as follows: 12.5% x 14 units = 1.75 units = 2 units, rounded up.

(e) Distributed proportionately among unit sizes; and

The proposed Affordable Units are distributed proportionately among unit sizes. The building is a mixture of one bedroom / one bathroom and two bedroom / one bathroom units. Unit 1D on the first floor is a one bedroom and one bath unit, and Unit 3C on the third floor is a two bedroom and one bath unit.

(f) Distributed proportionately across each phase of a phased development.

The project is not planned or intended to be phased.

(g) Occupancy permits may be issued for market-rate units prior to the end of construction of the entire development provided that occupancy permits for Affordable Units are issued simultaneously on a pro rata basis.

The Applicant understands that occupancy permits may be issued for market-rate units provided occupancy permits are simultaneously issued for Affordable Units on a pro rata basis.

VI. Conclusion

Based on the foregoing, the Applicant asserts that the proposed redevelopment and re-use of the Premises for multi-family purposes, in a new residential building containing a total of 14 units, two of which will be Affordable Units, as set forth above and in the materials submitted herewith, is both proper and appropriate. The Premises is located within both an existing commercial district wherein apartment or multi-family dwelling uses are allowed by special permit, and within the Multi-Family Overlay District wherein such uses are allowed as of right. The Premises and the proposed redevelopment of the site has been designed in a way that complies with applicable dimensional and density requirements, as well as the various standards that are applicable to developments pursuant the MFOD provisions, with the exception only of a very limited waiver that has been requested for the front-most portion of the driveway. Moreover, the project has been designed to be consistent with the surrounding neighborhood and present an attractive residential structure. Therefore, the Applicant asserts that the requested permits and zoning relief are proper and appropriate and requests that same be granted.

Your courtesy and attention are appreciated.

Sincerely,

A handwritten signature in black ink, appearing to read "George Giunta, Jr.", with a stylized, cursive script.

George Giunta, Jr

PLANNING BOARD

This application must be completed, signed, and submitted with the filing fee by the applicant or his representative in accordance with the Planning Board's Rules as adopted under its jurisdiction as a Special Permit Granting Authority.

Characteristics of Property:	Lot Area	17,630 SF	Present Use	Mixed Residential & Commercial
	Map # 99	Parcel # 10	Zoning District	Hillside Avenue Business (HAB) & HAB subdistrict of the Multi-Family Overlay District (MFOD)

Matt Borrelli

Received by Planning Board _____ Date _____
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____
Denied _____ Fee Paid _____ Fee Waived _____
Withdrawn _____

NOTE: Reports on Minor Projects must be issues within 35 days of filing date.

ADDENDUM A
TO
APPLICATION FOR SITE PLAN REVIEW
OF
Needham Enterprises, LLC
242 Hillside Avenue
Needham, Massachusetts

The following relief is or may be required, and is hereby requested:

1. Site Plan Review pursuant to Section 3.17;
2. Waiver, pursuant to Section 3.17.9.5 of the off-street parking requirements of Section 3.17.6 and Section 5.1.3;
3. Waiver, pursuant to Section 3.17.9.5 of the Zoning By-Law for the submission of any document, plan or information described in Section 3.17.9.2 but not provided in these materials or otherwise submitted herewith;
4. Any and all additional relief required or appropriate for the redevelopment and re-use of the Premises for multi-family residential purposes in a single building containing 14 units, two which will be Affordable Units, as detailed in the plans and materials submitted herewith.

Notwithstanding any of the above or anything in these materials to the contrary, the Applicant reserves and requests the right to revise the interior layout as depicted on the plans submitted herewith, without the need for further review, provided, in all cases, that the building footprint is not increased or expanded and that the total number and general arrangement of units remains unchanged.

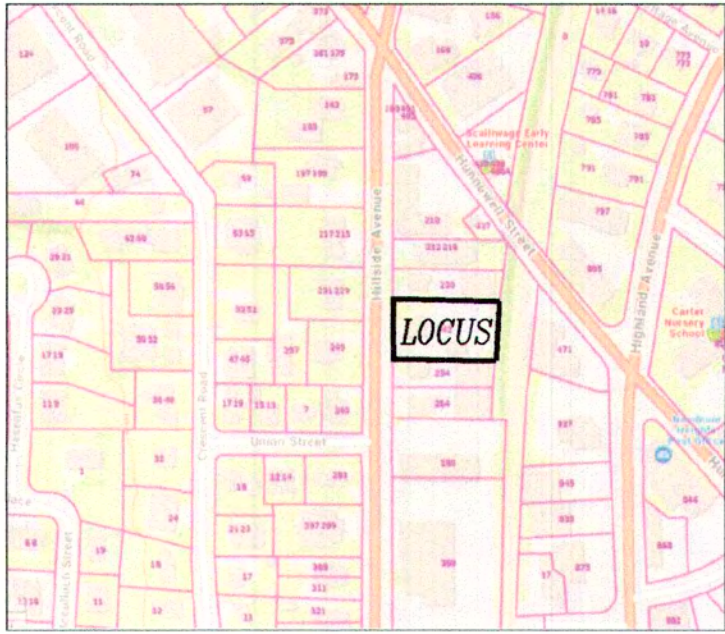
SITE DEVELOPMENT PLANS
14 UNIT MULTI-FAMILY BUILDING
242 HILLSIDE AVENUE
NEEDHAM, MA
OCTOBER 14, 2025

ZONING LEDGEND:				
MULTI FAMILY OVERLAY DISTRICT				
	REQUIRED/ALLOWED	EXISTING	PROPOSED	COMPLIANCE
MIN. AREA	10,000 S.F.	17,630 S.F.	17,630 S.F.	YES
MIN. FRONTAGE	80'	100.00'	100.00'	YES
MIN. SETBACK FRONT	20'	*31.7' **100.2'	22.5'	YES
MIN. SETBACK SIDE	20'	*28.0' **2.8'	20.5'	YES
MIN. SETBACK REAR	20'	*105.4' **41.7'	76.5'	YES
MAXIMUM STORIES	3	*2-1/2 **1	3	YES
MAXIMUM HEIGHT	40' (37.21')	NA	36.33'	YES
LOT COVERAGE	NA	NA	NA	YES
FLOOR AREA RATIO	.70		.70	YES
AFFORDABLE HOUSING	2 UNITS	NA	2 UNITS	YES
MAXIMUM DWELLING UNITS PER ACRE	NA	NA	14	YES
DRIVEWAY OPENINGS	18' – 25'	20'	24'	YES
PARKING REQUIRED (1 SPACE PER UNIT)	14	NA	17	YES

*EXISTING HOUSE (TO BE DEMOLISHED)
**OUT BUILDING –1 (TO BE DEMOLISHED)
*INCLUDES 2 HANDICAP SPACES

ZONING BYLAW 6.1.3 PARKING PLAN AND DESIGN REQUIREMENTS

	REQUIRED/ALLOWED	EXISTING	PROPOSED	COMPLIANCE
A) PARKING ILLUMINATION	AVG. 1 FOOT CANDLE	N/A	AVG. 1 FOOT CANDLE	YES
B) LOADING REQUIREMENTS	N/A	N/A	N/A	YES
C) HANDICAPPED REQUIREMENTS	2	N/A	2	YES
D) DRIVEWAY OPENINGS	1	1	1	YES
E) COMPACT CARS	50% (8'X18.5')	N/A	8	YES
F) PARKING SPACE SIZE	9'X18.5'	N/A	9	YES
G) BUMPER OVERHANG	1' OVERHANG	N/A	NONE REQUIRED	YES
H) PARKING SPACE LAYOUT	N/A	N/A	N/A	YES
I) WIDTH OF MANEUVERING AISLE	24' (90° STALL)	N/A	24' (90° STALL)	YES
J) PARKING SETBACK				
-FRONT	10'	N/A	108.1'	YES
-SIDE	4'	N/A	4.0'	YES
-REAR	4'	N/A	4.8'	YES
-BUILDING	5'	N/A	9.6'	YES
K) LANDSCAPE AREA		N/A		
L) TREES (ONE PER 10 SPACES)		N/A		
M) LOCATION	WITHIN LOT	N/A	WITHIN LOT	YES
N) BICYCLE RACKS (ONE PER DWELLING UNIT)	14	N/A	14	YES



LOCUS
N.T.S



OWNER:
NEEDHAM ENTERPRISES LLC
105 CHESTNUT STREET SUITE 28
NEEDHAM, MA 02492

APPLICANT:
NEEDHAM ENTERPRISES LLC
105 CHESTNUT STREET SUITE 28
NEEDHAM, MA 02492

ASSESSORS PARCELS:
PARCEL 199099000

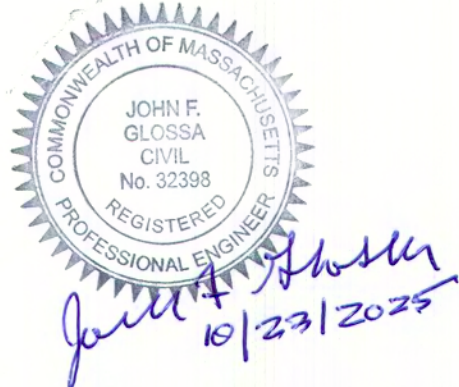
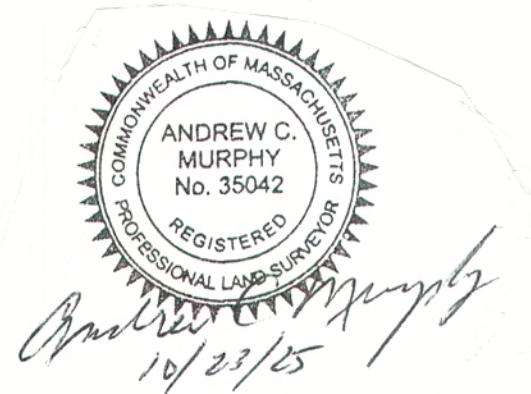
DEED REFERENCE:
BOOK 41958 PAGE 433

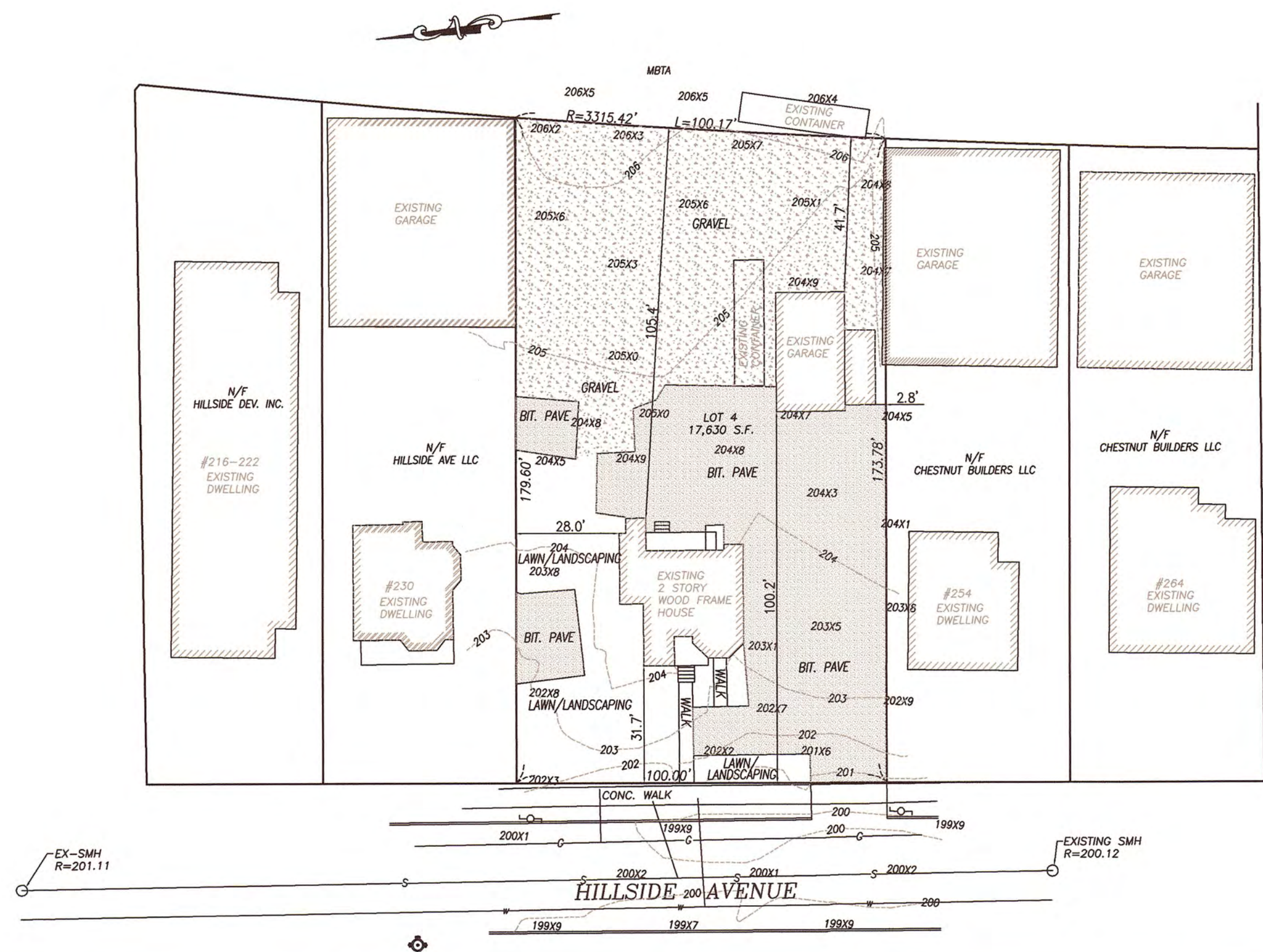
PLAN REFERENCE:
PLAN OF LAND DATED SEPTEMBER 1874
BOOK 460 PAGE 57

PLAN INDEX

SHEET	1:	COVER SHEET
SHEET	2:	EXISTING CONDITIONS PLAN
SHEET	3:	SITE PLAN
SHEET	4:	GRADING AND DRAINAGE PLAN
SHEET	5:	UTILITIES PLAN
SHEET	6 & 7:	DETAILS
SHEET	8:	CONSTRUCTION PERIOD PLAN
APPENDIX	1	BUILDING HEIGHT CALCULATION PLAN

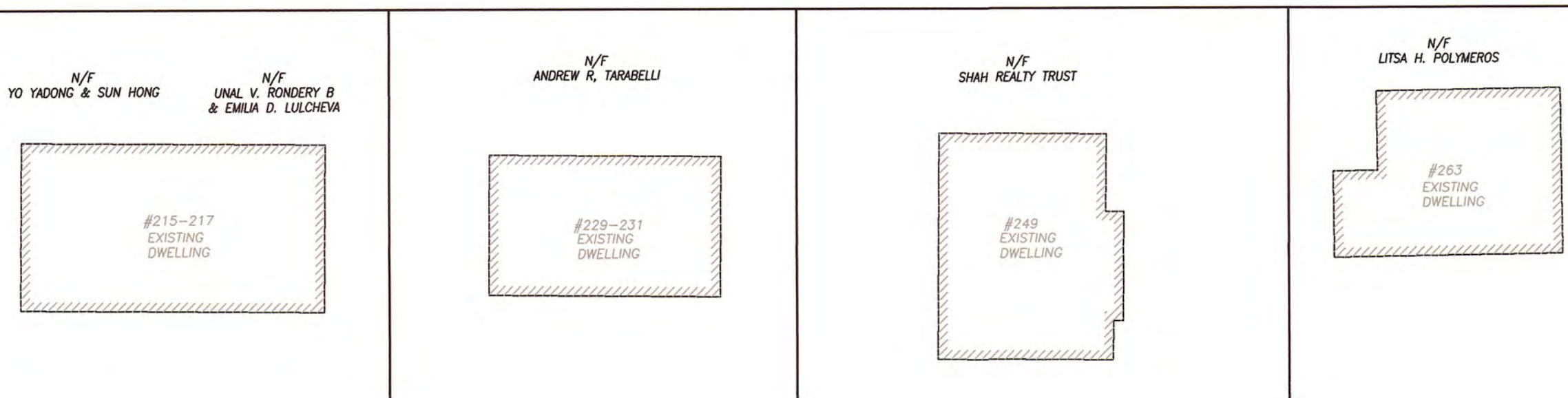
PREPARED BY
GLOSSA ENGINEERING, INC.
46 EAST ST
EAST WALPOLE, MA 02032
(508) 668-4401





LEDGEND:

EXISTING GRADE	----- 100 -----
EXISTING SPOT GRADE	200X02
EXISTING GAS MAIN	----- G -----
EXISTING SEWER MANHOLE	○ EX-SMH
EXISTING SEWER MAIN	----- S -----
EXISTING WATER MAIN	----- W -----
EXISTING UTILITY POLE	○
EXISTING FIRE HYDRANT	⊗



242 HILLSIDE AVENUE
EXISTING CONDITIONS
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=30' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401

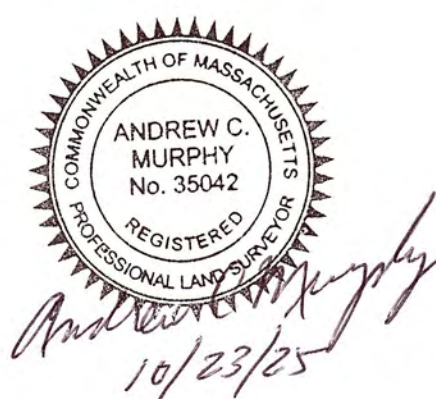


John F. Glossa
10/23/2025



Andrew C. Murphy
10/23/25

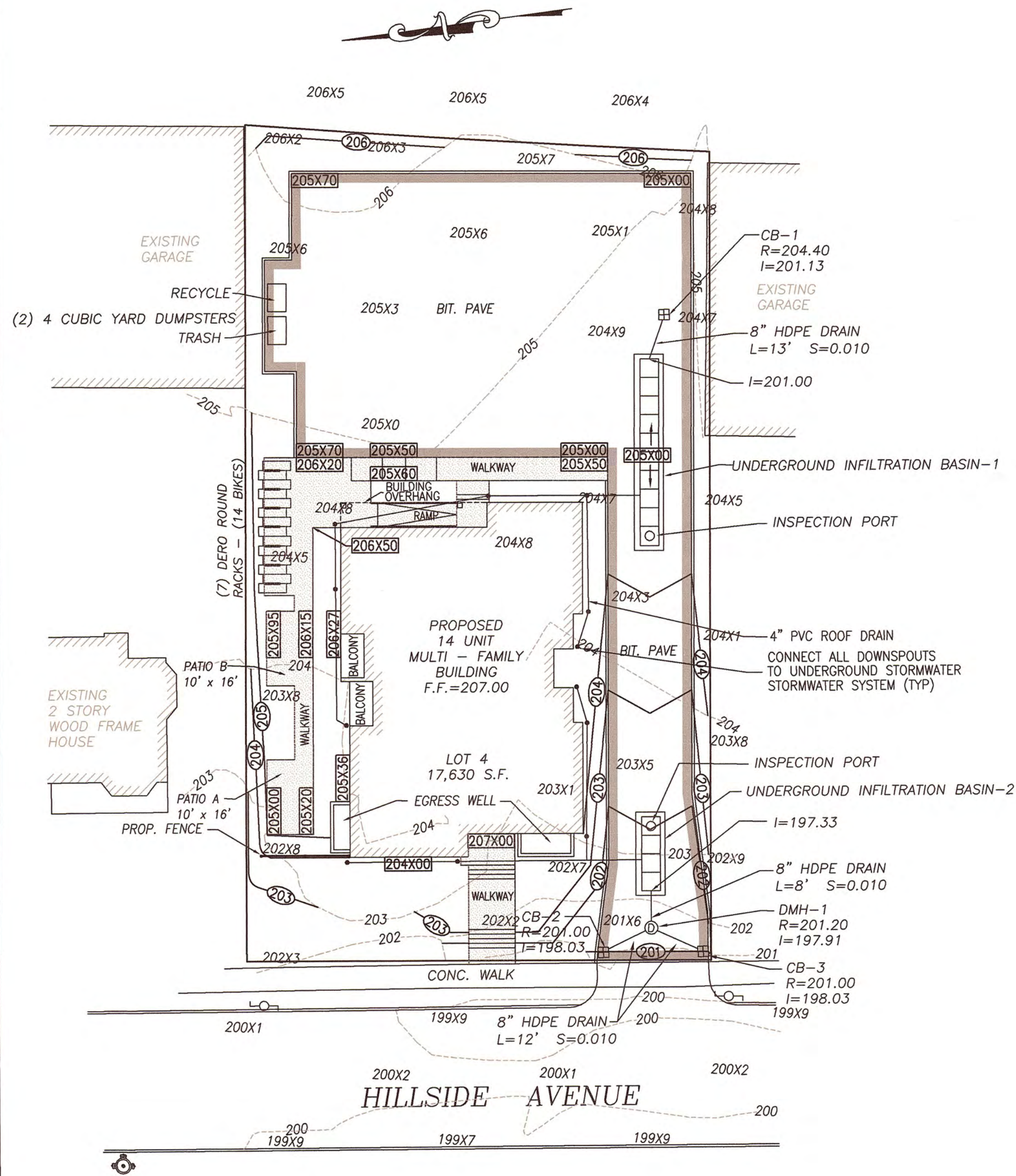




9

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401





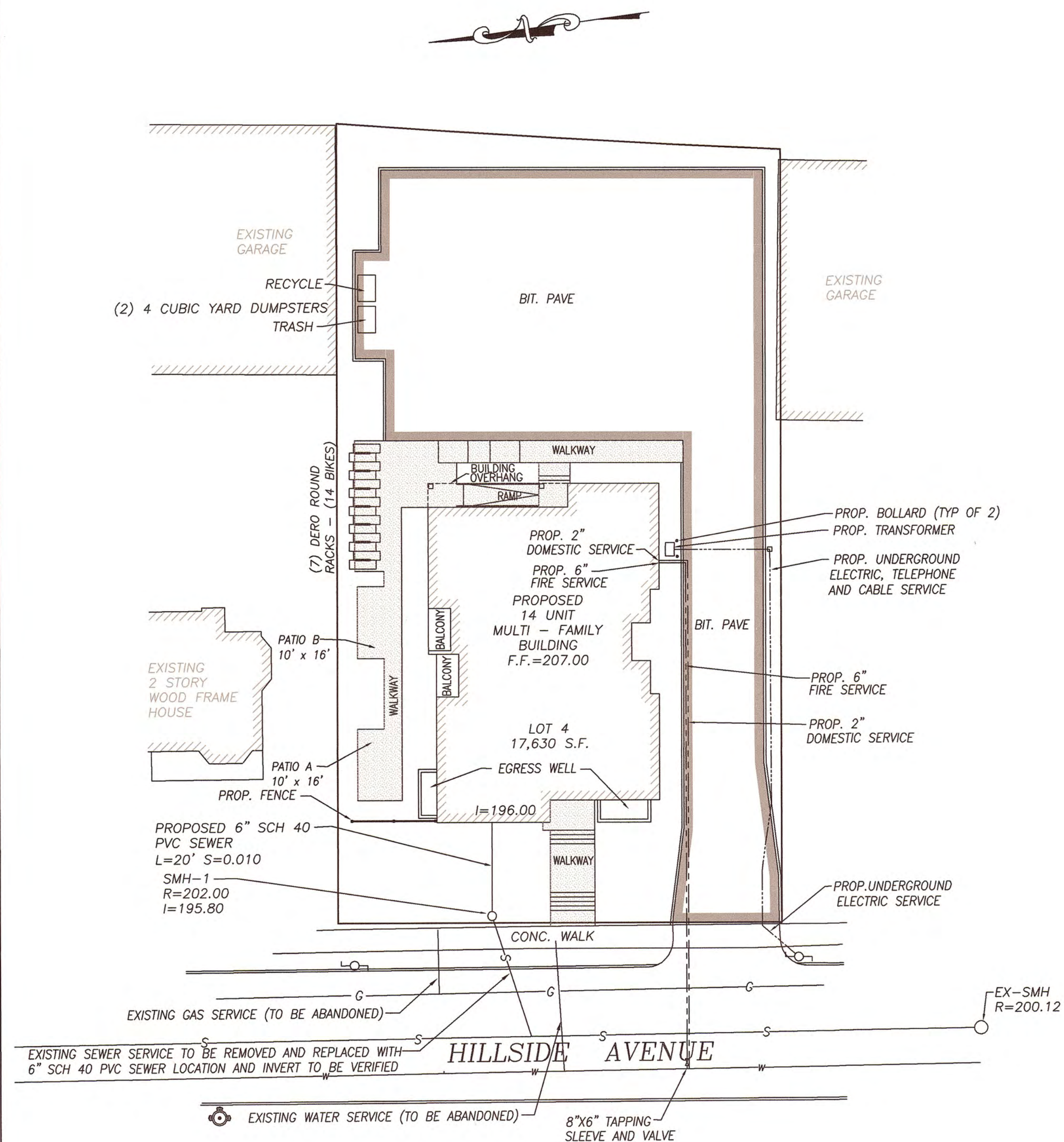
LEDGEND:

EXISTING GRADE	----- 100-----
EXISTING SPOT GRADE	205X6
EXISTING GAS MAIN	----- G -----
EXISTING SEWER MANHOLE	○ EX-SMH
EXISTING SEWER MAIN	----- S -----
EXISTING WATER MAIN	----- W -----
EXISTING UTILITY POLE	⊥ ○ ⊥
EXISTING FIRE HYDRANT	⊙
PROPOSED GRADE	----- 205-----
PROPOSED SPOT GRADE	205X35
PROPOSED CATCH BASIN	⊞ CB-1
PROPOSED DRAIN MANHOLE	⊙ DMH-1
PROPOSED TAPPING SLEEVE AND VALVE	⊞ PROPOSED 8"X6" TS&V

242 HILLSIDE AVENUE
GRADING AND DRAINAGE
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401





LEDGEND:

EXISTING GRADE	100
EXISTING SPOT GRADE	205X6
EXISTING GAS MAIN	G
EXISTING SEWER MANHOLE	EX-SMH
EXISTING SEWER MAIN	S
EXISTING WATER MAIN	w
EXISTING UTILITY POLE	LO
EXISTING FIRE HYDRANT	
PROPOSED GRADE	205
PROPOSED SPOT GRADE	205X35
PROPOSED CATCH BASIN	CB-1
PROPOSED DRAIN MANHOLE	DMH-1
PROPOSED TAPPING SLEEVE AND VALVE	PROPOSED 8"X6" TS&V

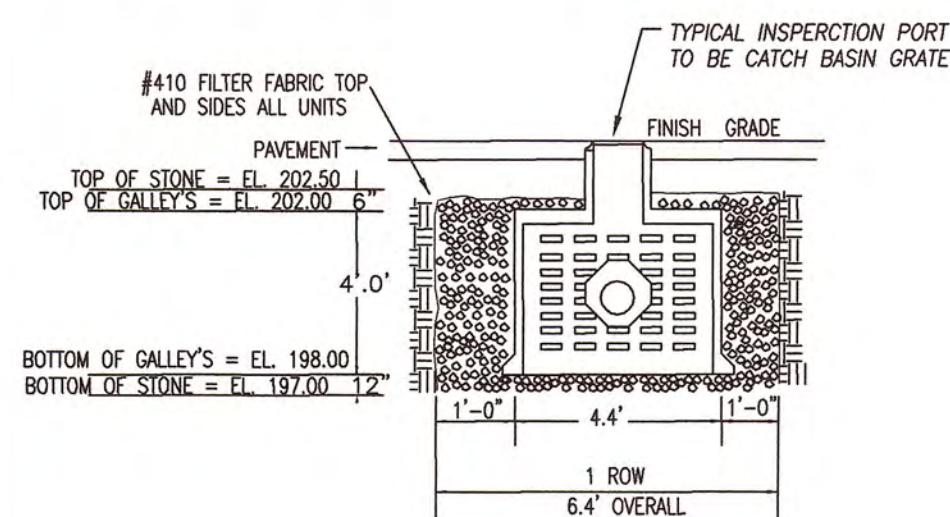
242 HILLSIDE AVENUE
UTILITIES
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401

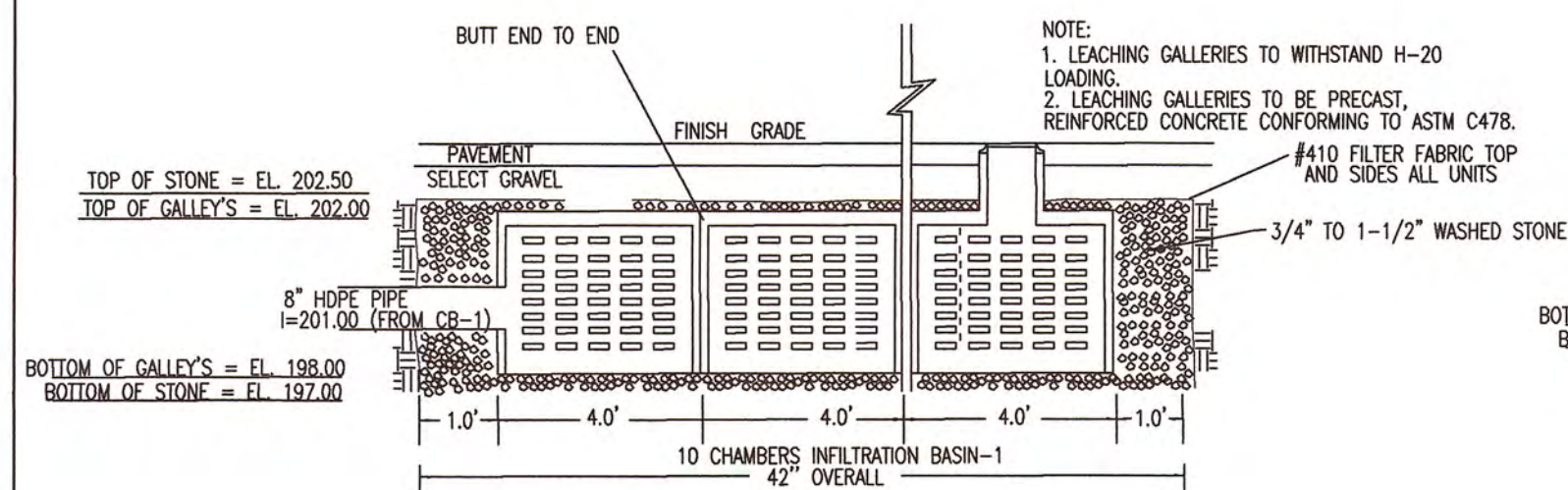


John F. Glossa
10/23/2025





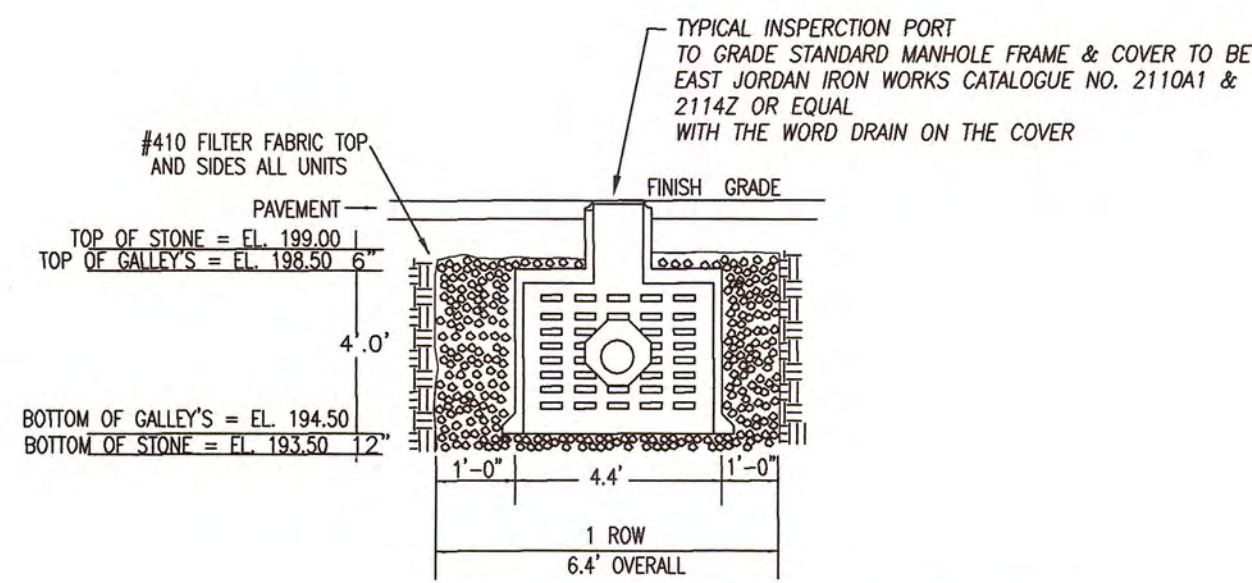
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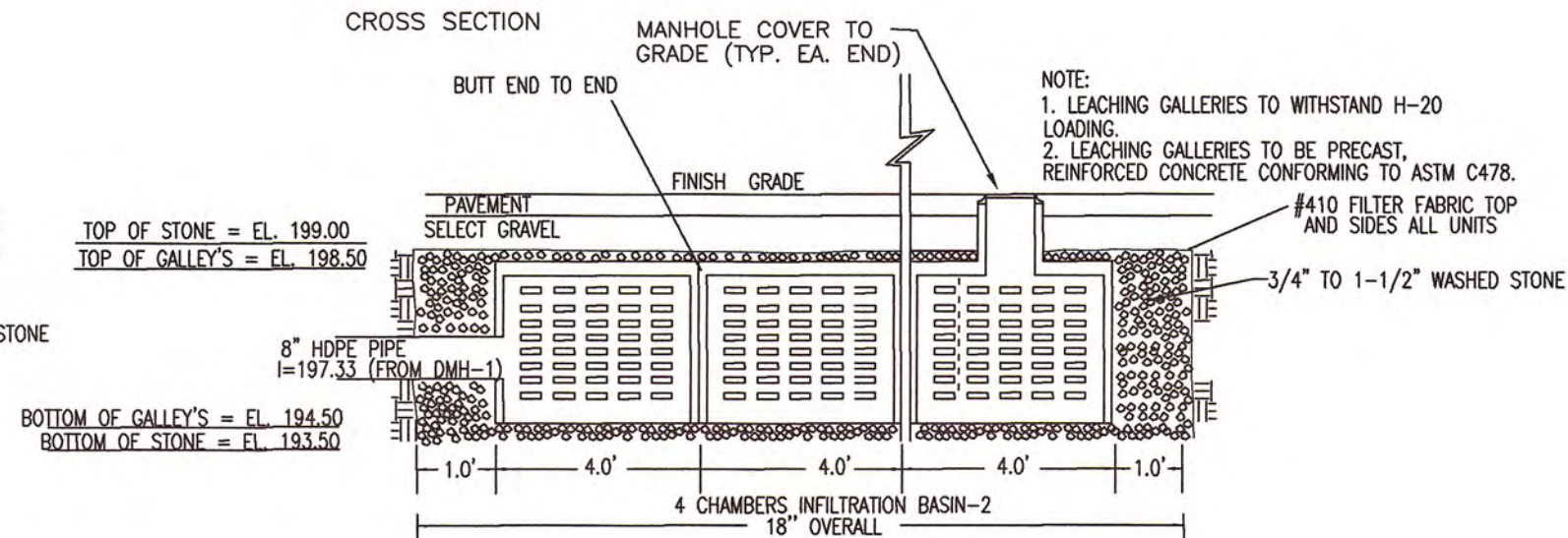
LONGITUDINAL SECTION

NOTE: REMOVE ALL UNSUITABLE MATERIAL FROM BENEATH THE INFILTRATION BASIN TO THE TOP OF THE SAND AND GRAVEL LAYER AS DETERMINED BY A DEP APPROVED SOIL EVALUATOR. REPLACE WITH COMPACTED GRAVEL BORROW

UNDERGROUND INFILTRATION BASIN-1



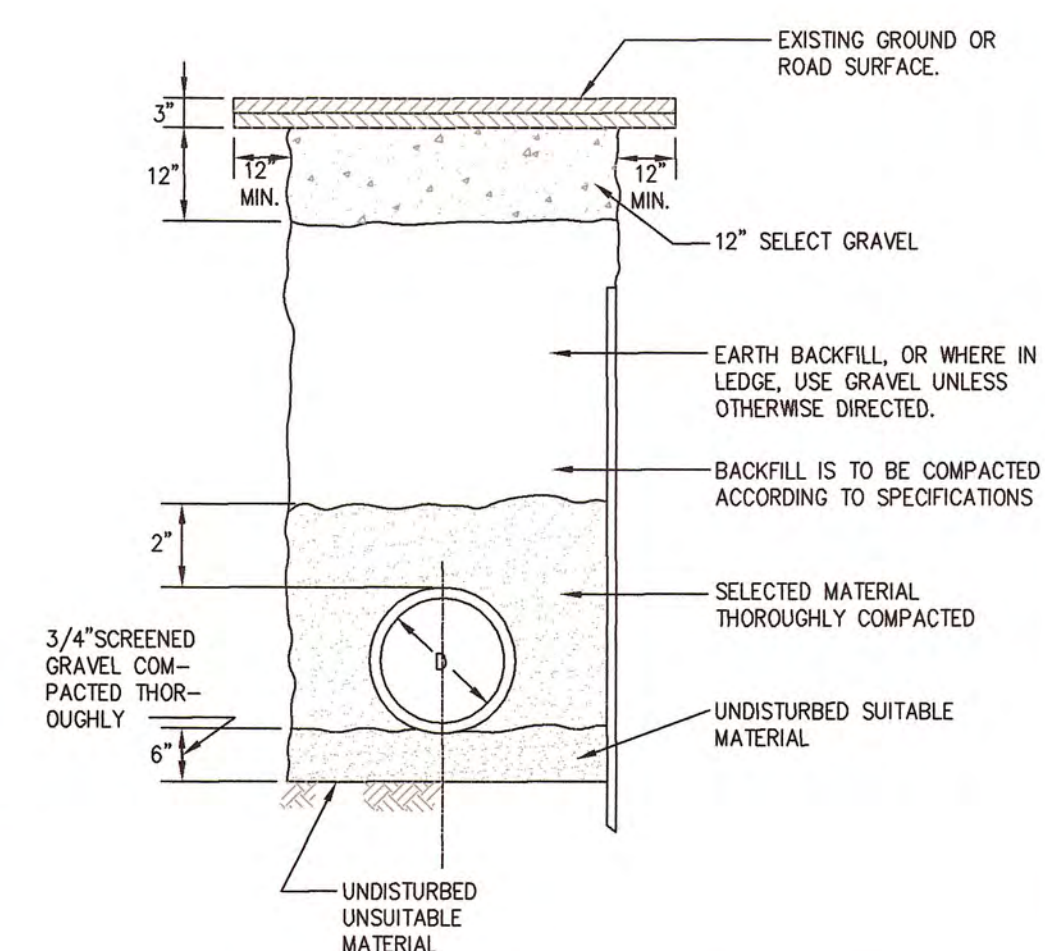
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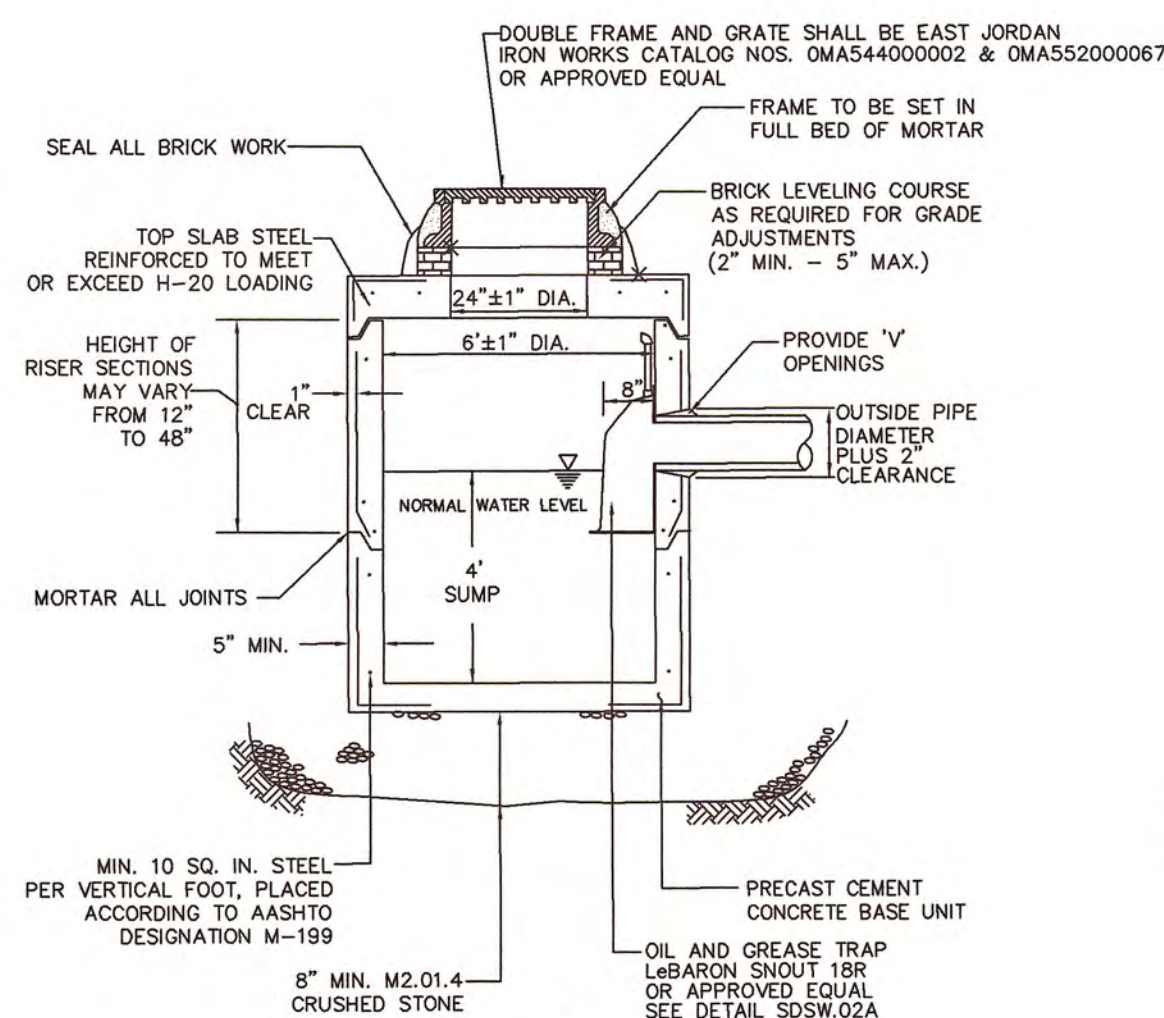
LONGITUDINAL SECTION

NOTE: REMOVE ALL UNSUITABLE MATERIAL FROM BENEATH THE INFILTRATION BASIN TO THE TOP OF THE SAND AND GRAVEL LAYER AS DETERMINED BY A DEP APPROVED SOIL EVALUATOR. REPLACE WITH COMPACTED GRAVEL BORROW

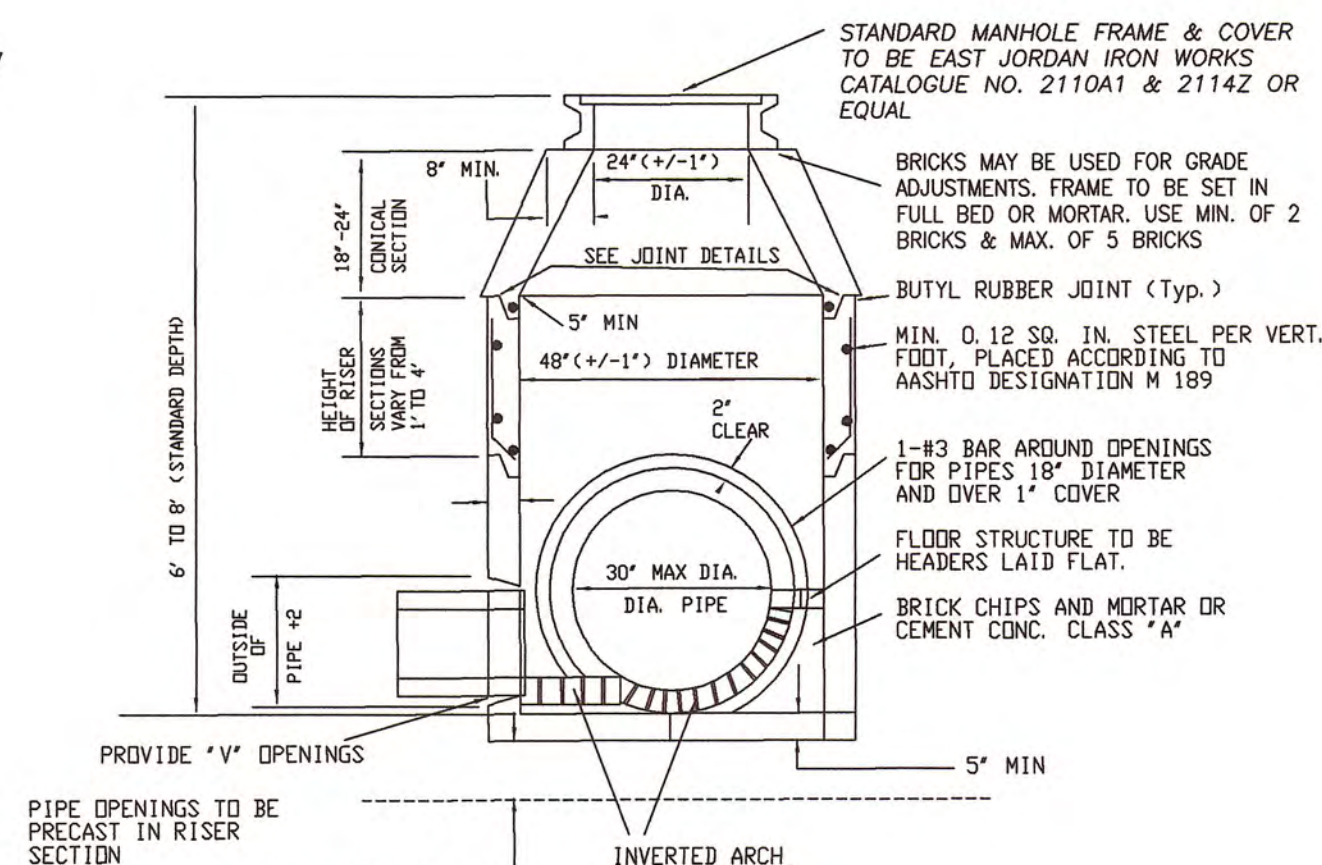
UNDERGROUND INFILTRATION BASIN-2



TYPICAL DRAIN TRENCH DETAILS
NOT TO SCALE



CATCH BASIN
NOT TO SCALE

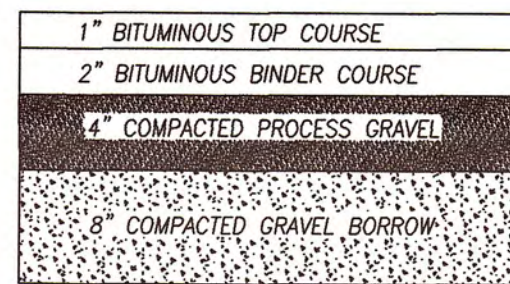


PRECAST CONCRETE DRAIN MANHOLE DETAILS
NOT TO SCALE

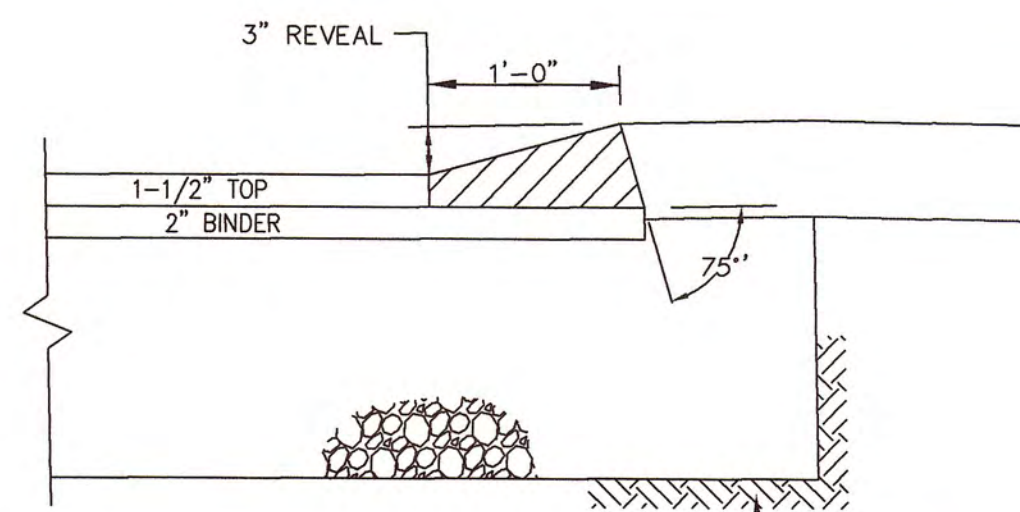
242 HILLSIDE AVENUE
DETAILS
PLAN OF LAND
IN
NEEDHAM MA

SCALE: AS NOTED OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401

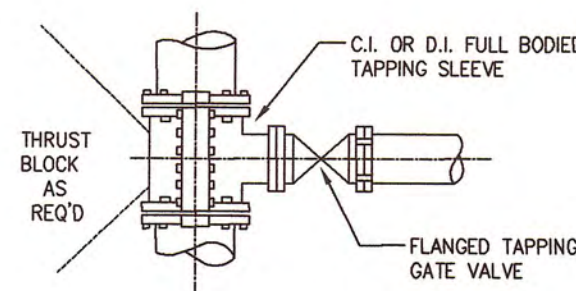




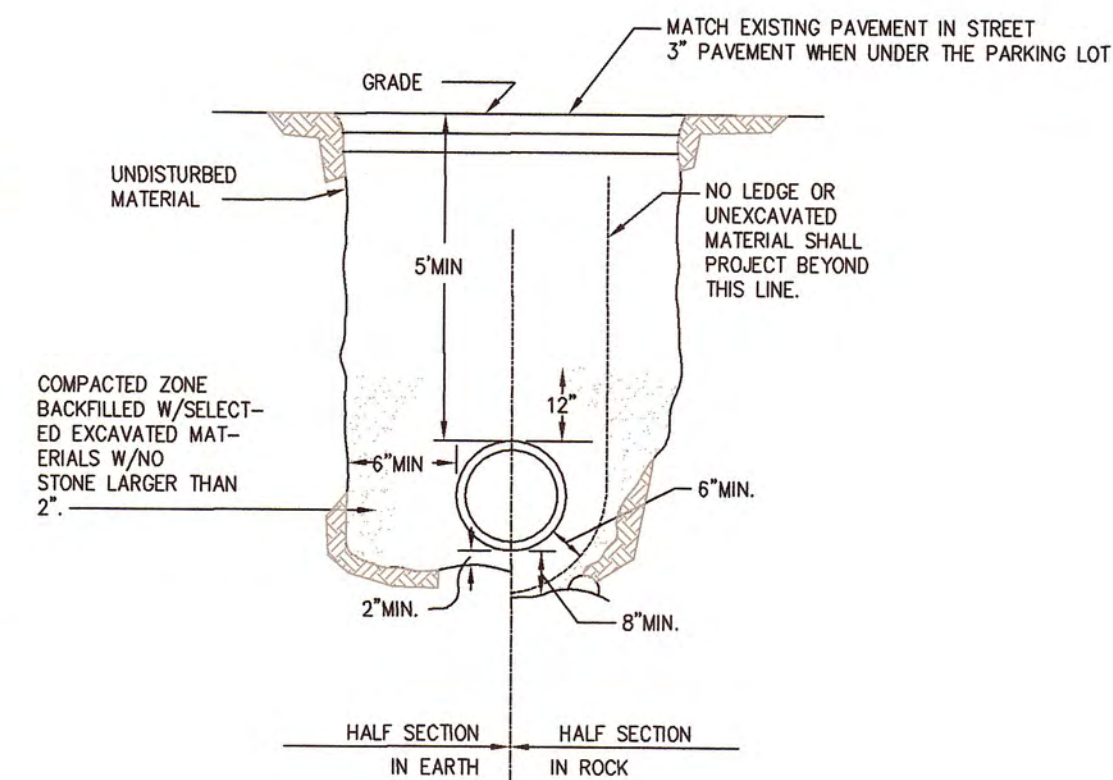
PAVEMENT DETAIL
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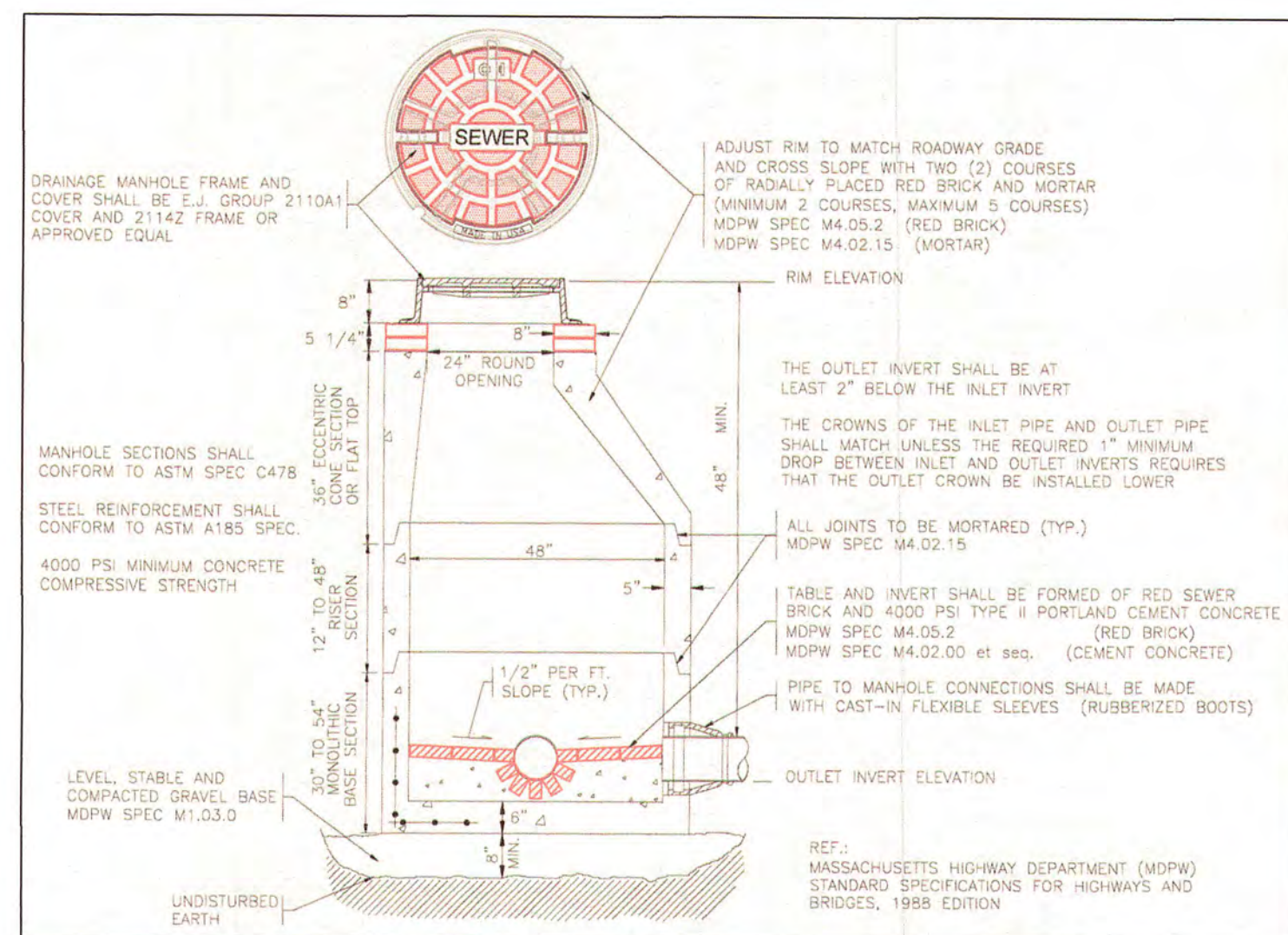
TYPICAL CAPE COD BERM DETAIL
NOT TO SCALE



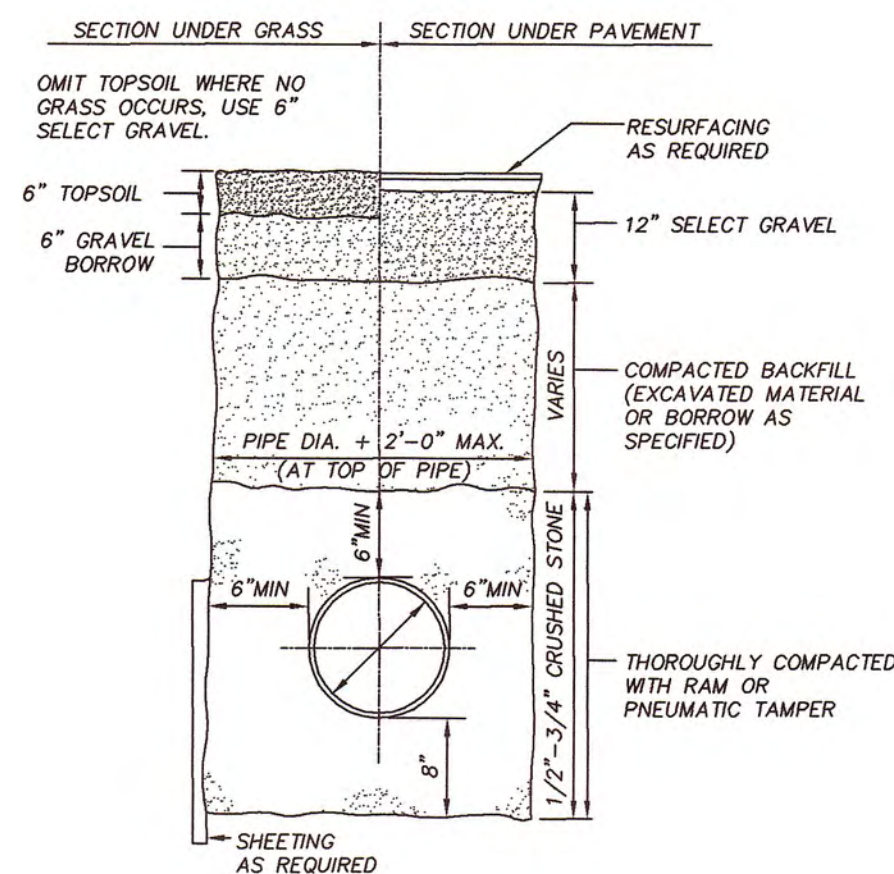
TAPPING SLEEVE AND
VALVE DETAILS
NOT TO SCALE



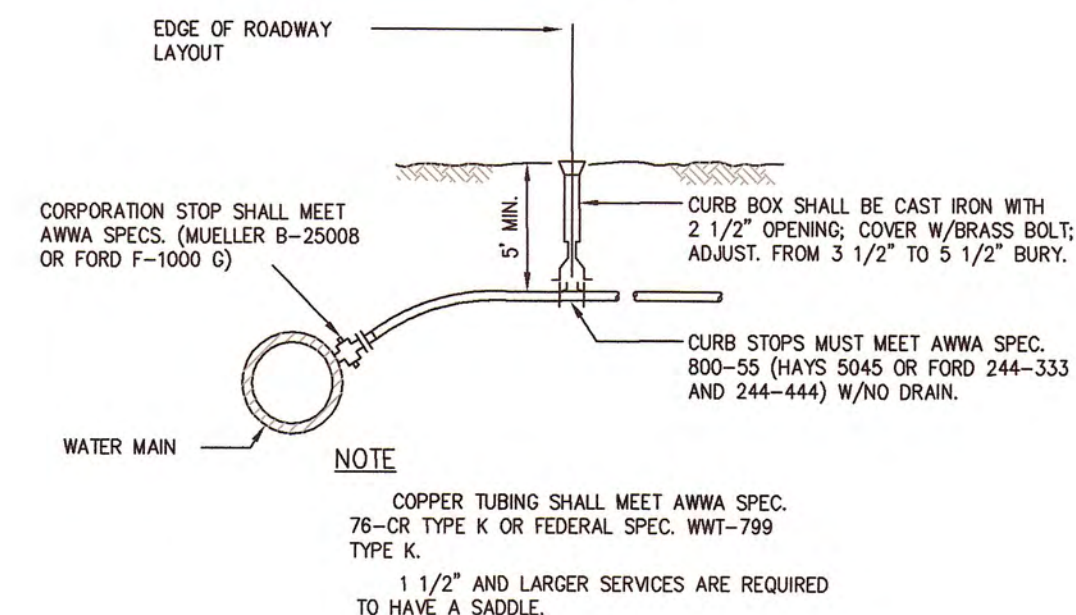
WATER MAIN TRENCH DETAIL
NOT TO SCALE



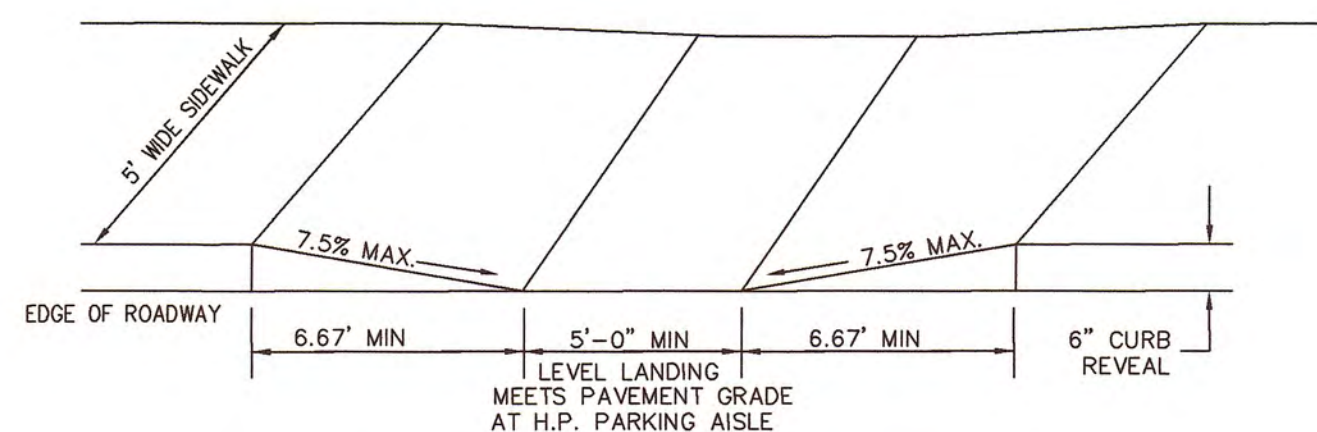
TYPICAL SEWER MANHOLE DETAIL
NOT TO SCALE



TYPICAL SEWER TRENCH DETAIL
NOT TO SCALE



TYPICAL SERVICE CONNECTION
NOT TO SCALE



H.P. PARKING AISLE DETAIL
NOT TO SCALE

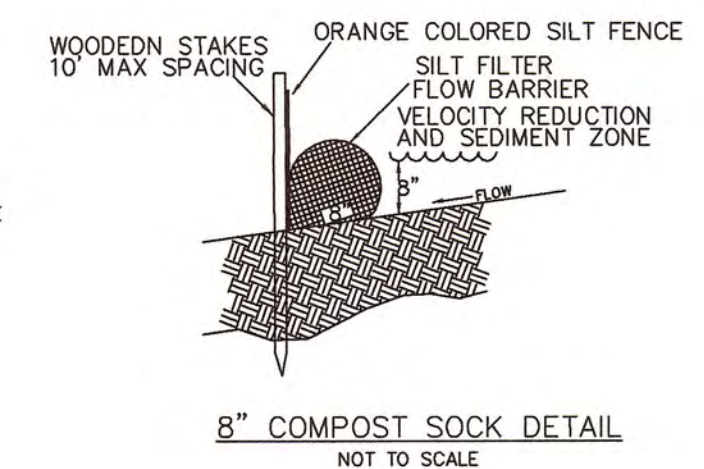
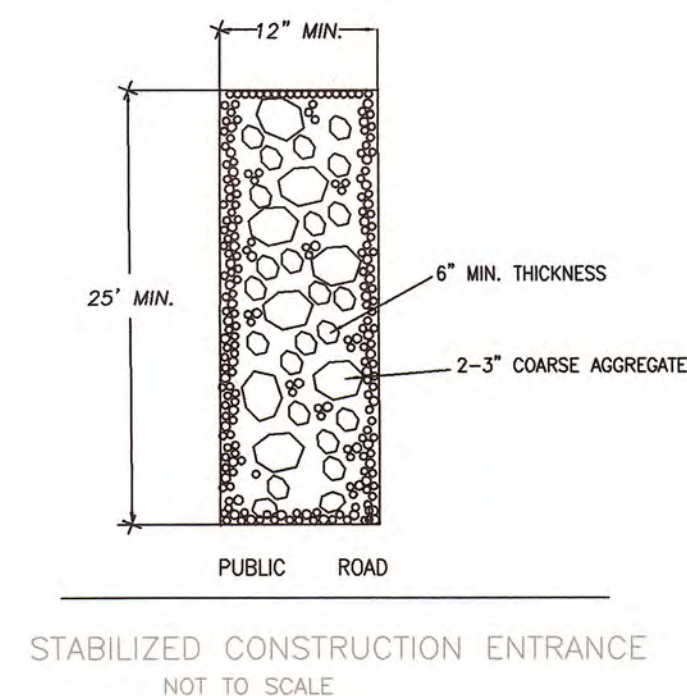
242 HILLSIDE AVENUE
DETAILS
PLAN OF LAND
IN
NEEDHAM MA

SCALE: AS NOTED OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401



- CONSTRUCTION SEQUENCING:
1. INSTALLATION OF SILT BARRIERS AND STABILIZED CONSTRUCTION ENTRANCE AS SHOWN ON THE PLANS
 2. DEMOLISH EXISTING BUILDINGS AND REMOVE ALL DELETERIOUS MATERIALS FROM THE SITE
 3. BRING SITE TO SUBGRADE
 4. CONSTRUCT BUILDING FOUNDATION AND BACKFILL THE FOUNDATION
 5. CONSTRUCT THE BUILDING
 6. INSTALL THE SEWER, WATER, AND ELECTRIC UNDERGROUND UTILITIES
 7. INSTALL THE LEACHING GALLEYS, DRAIN MANHOLES AND CATCH BASINS
 8. BRING THE ACCESS DRIVEWAY AND PARKING AREAS TO GRAVEL GRADE AND INSTALL THE BINDER COURSE OF ASPHALT
 9. INSTALL CURBS AND SIDEWALKS
 10. INSTALL PLANTINGS AND MULCH BEDS. LOAM AND SEED OR SOD ALL REMAINING DISTURBED AREAS
 11. INSTALL FINAL COURSE OF ASPHALT FOR PARKING LOT
 12. CLEAN UP AND DEMOBILIZE

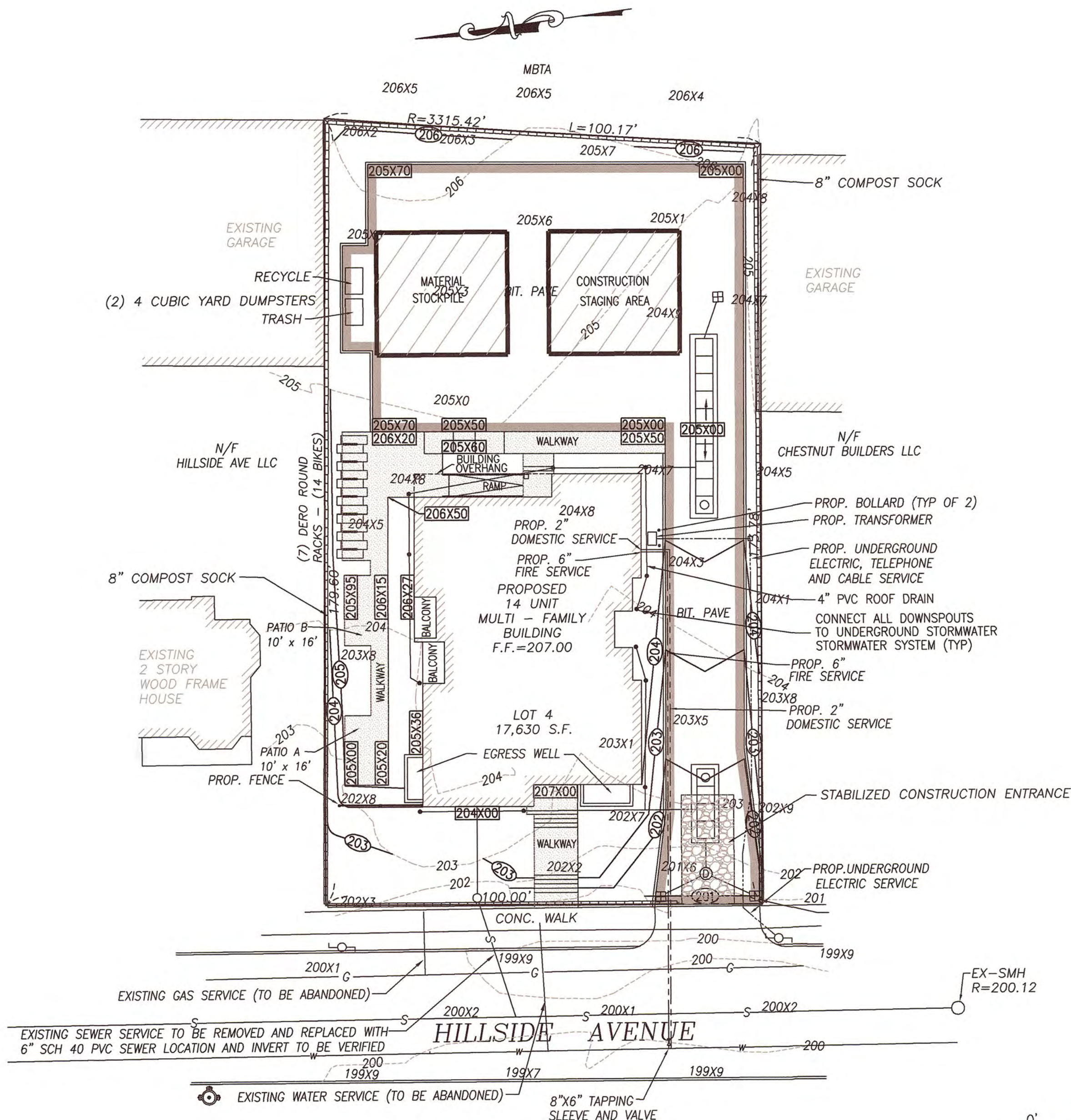
- CONSTRUCTION NOTES:
1. ALL AREAS TO BE ALTERED SHALL BE BROUGHT TO SUB GRADE OR FINAL GRADE AT THE START OF CONSTRUCTION
 2. AREAS ONCE BROUGHT TO GRADE THAT WILL NOT BE ALTERED AGAIN SHALL BE LOAMED AND SEEDED AND PROTECTED WITH STRAW GUARD AS NEEDED
 3. DRAINAGE BASIN AS SHOWN SHALL NOT BECOME OPERATIONAL UNTIL THE SITE IS FINISHED AND SWEEPED OF ALL DEBRIS
 4. TEMPORARY SEDIMENT BASINS SHALL BE USED AND MAINTAINED UNTIL ALL PROPOSED PAVED AREAS ARE COMPLETE AND SWEEPED OF ALL DEBRIS
 5. CATCH BASINS SHALL BE PROTECTED FROM SEDIMENTS AT ALL TIMES UNTIL CONSTRUCTION IS COMPLETE
 6. INSTALL SILT SACKS IN ALL EXISTING AND PROPOSED CATCH BASINS



STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE

242 HILLSIDE AVENUE
CONSTRUCTION PERIOD
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401





ILLUSTRATIVE VIEW FROM HILLSIDE AVENUE

242 HILLSIDE AVENUE, NEEDHAM, MA 02494

PROJECT TEAM

OWNER / BUILDER

NEEDHAM ENTERPRISES, LLC
105 CHESTNUT STREET
NEEDHAM MA 02492
E : NEEDHAMENTERPRISES105@GMAIL.COM

ARCHITECT

SCOTT MELCHING ARCHITECT LLC
116 ARCH STREET
NEEDHAM MA 02492
E : SCOTT@SCOTTMELCHINGARCHITECT.COM
W : WWW.SCOTTMELCHINGARCHITECT.COM

CIVIL ENGINEER

GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
T: 508.668.4401

PROJECT INFORMATION

APPLICABLE CODES:

- C.1 MASSACHUSETTS STATE BUILDING CODE 780 10TH EDITION
- C.2 MASSACHUSETTS STATE ELECTRICAL CODE 524 CMR 12:00
- C.3 MASSACHUSETTS STATE COMP.REHENSIVE FIRE SAFETY CODE 527 CMR 1.00 (NFPA 2021)
- C.4 MASSACHUSETTS STATE UNIFORM PLUMBING CODE 248 CMR 10.00
- C.5 MASSACHUSETTS STATE FUEL GAS CODE 248 CMR 4.00
- C.6 IECC 2018 W/ MASSACHUSETTS AMENDMENTS
- C.7 MASSACHUSETTS ACCESS BOARD 521 CMR

PROJECT SUMMARY

PROPOSED 3-STORY 14 UNIT MULTI-FAMILY RESIDENTIAL STRUCTURE WITH PARTIAL HEIGHT BASEMENT. BASEMENT TO BE POURED-IN-PLACE CONCRETE WITH WOOD FRAMED CONSTRUCTION ABOVE. BUILDING TO BE FULLY SPRINKLERED AND ALL ELECTRIC, IE, NO FOSSIL FUELS. OFF-STREET PARKING IS PROVIDED AT THE REAR OF THE SITE. 17 DEDICATED RESIDENTIAL PARKING SPOTS ARE TO BE PROVIDED. TWO PARKING SPOTS WILL BE VAN ACCESSIBLE. 2UNITS WILL BE DESIGNATED AFFORDABLE, PART OF INCLUSIONARY HOUSING PROGRAM.
ADDRESS : 242 HILLSIDE AVENUE, NEEDHAM MA 02494
ZONING DISTRICT : HILLSIDE AVENUE BUSINESS (HAB)
ZONING SUBDISTRICT (OVERLAY) : MULTIFAMILY OVERLAY DISTRICT (MFOOD)
EXISTING USE : SINGLE / TWO FAMILY RESIDENTIAL
PROPOSED USE : MULTI-FAMILY RESIDENTIAL
LOT AREA : +/- 17,630 SF

FLOOR AREA CALCULATION

FLOOR	SQUARE FOOTAGE (SF)	USE
LEVEL 03	3,500 SF	4 DWELLING UNITS & LAUNDRY ROOM
LEVEL 02	3,584 SF	4 DWELLING UNITS & LAUNDRY ROOM
LEVEL 01	3,418 SF	LOBBY, 4 DWELLING UNITS & LAUNDRY ROOM
LEVEL 00 (BASEMENT)	1,492 SF	2 DWELLING UNITS, BUILDING STORAGE / MECHANICAL
TOTAL	11,994 SF (GROSS FLOOR AREA)	
FLOOR AREA RATIO	.68 (11,994 SF / 17,630 SF)	< .7 MAXIMUM PERMITTED FAR

INCLUSIONARY HOUSING SUMMARY

2 AFFORDABLE UNITS / 14 TOTAL UNITS = 14% AFFORDABLE UNITS

AFFORDABLE UNITS TO BE FIXED. ALL UNITS TO HAVE THE SAME LEVEL OF INTERIOR FINISH. UNITS 1D & 3C TO BE A FIXED AFFORDABLE UNITS. SEE UNIT SUMMARY FOR THE PROPOSED UNIT LOCATIONS & SIZES.

DWELLING UNIT INFORMATION

FLOOR	DESCRIPTION	GROSS SQUARE FOOTAGE (SF)	USE
LEVEL 00	UNIT A	670 SF	1 BEDROOM / 1 BATH
	UNIT D	562 SF	1 BEDROOM / 1 BATH
LEVEL 01	UNIT 1-A	921 SF	2 BEDROOM / 1 BATH
	UNIT 1-B	834 SF	2 BEDROOM / 1 BATH
	UNIT 1-C	556 SF	1 BEDROOM / 1 BATH
	UNIT 1-D	541 SF	1 BEDROOM / 1 BATH
LEVEL 02	UNIT 2-A	920 SF	2 BEDROOM / 1 BATH
	UNIT 2-B	920 SF	2 BEDROOM / 1 BATH
	UNIT 2-C	815 SF	2 BEDROOM / 1 BATH
	UNIT 2-D	631 SF	1 BEDROOM / 1 BATH
LEVEL 03	UNIT 3-A	883 SF	2 BEDROOM / 1 BATH
	UNIT 3-B	909 SF	2 BEDROOM / 1 BATH
	UNIT 3-C	797 SF	2 BEDROOM / 1 BATH
	UNIT 3-D	613 SF	1 BEDROOM / 1 BATH
14 TOTAL DWELLING UNITS			

ZONING SUMMARY

ITEM	REQUIRED	PROPOSED	COMPLIANCE
PERMITTED USES (SECTION 3.2.2)	SINGLE / TWO-FAMILY / MULTI-FAMILY RESIDENTIAL & SOME COMMERCIAL	MULTI-FAMILY-RESIDENTIAL *	COMPLIANT (MFOOD)
LOT AREA (SECTION 3.9.4.1(a))	10,000 SF	17,630 SF (EXISTING)	COMPLIANT
LOT FRONTAGE MINIMUM (SECTION 3.9.4.1(b))	80 FEET	100.00' (EXISTING)	COMPLIANT
FRONT MAXIMUM SETBACK (FT) (SECTION 3.17.5.1)	20'	22'-6"	COMPLIANT
SIDE & REAR MINIMUM SETBACK (FT) (SECTION 3.17.5.1)	20'	20'-6" (LEFT) 76'-6" (REAR) 27'-6" (RIGHT)	COMPLIANT
BUILDING HEIGHT REQUIREMENT (SECTION 3.17.5.2)	40'-0" & 3 STORIES	38'-9-5/8" (RIDGE TO TOP OF FOUNDATION)	COMPLIANT
BUILDING BULK (FLOOR AREA) (SECTION 3.17.5.3)	0.70	.68 (11,997 SF / 17,630 SF)	COMPLIANT
OFF-STREET PARKING (SECTION 3.17.6)	(1) SPACE PER RENTAL UNIT	17 PARKING SPACES (14 DEDICATED & 3 VISITOR) (7 FULL, 8 COMPACT & 2 VAN ACCESSIBLE)	COMPLIANT
BICYCLE PARKING (SECTION 3.17.6 (f))	1 PER DWELLING UNIT.	14 BICYCLE SPACES	COMPLIANT

DOB PERMIT SET #			SITE PLAN SUBMISSION 2025 10-27																	
		ARCHITECTURE																		
1	T-1	TITLE SHEET W/ RENDERING / CONSULTANT LIST / DRAWING LIST	●																	
2	L-1	LANDSCAPE PLAN	●																	
3	A-1	LOWER LEVEL PLAN	●																	
4	A-2	GROUND FLOOR PLAN	●																	
5	A-3	SECOND FLOOR PLAN	●																	
6	A-4	THIRD FLOOR PLAN	●																	
7	A-5	ROOF PLAN	●																	
8	A-6	FRONT ELEVATION AND SECTION AT FRONT FACING GABLE	●																	
9	A-7	RIGHT ELEVATION AND SECTION AT SIDE FACING GABLE	●																	
10	A-8	REAR ELEVATION AND SECTION AT STAIR	●																	
11	A-9	LEFT ELEVATION	●																	
		SITE DEVELOPMENT PLANS																		
1		COVER SHEET	●																	
2		EXISTING CONDITIONS PLAN	●																	
3		SITE PLAN	●																	
4		GRADING AND DRAINAGE PLAN	●																	
5		UTILITIES PLAN	●																	
6		DETAILS	●																	
7		DETAILS	●																	
8		GRADING AND UTILITIES PLAN	●																	
9		APPENDIX 1 : BUILDING HEIGHT CALCULATION	●																	

242 HILLSIDE AVENUE

NEEDHAM MA 02494

NEEDHAM ENTERPRISES

NEEDHAM MA 02492

FOR DESIGN INTENT ONLY
NOT FOR CONSTRUCTION

REVISIONS | SUBMISSIONS

DATE

SITE PLAN SUBMISSION 2025 10-27

SCOTT MELCHING ARCHITECT LLC
ARCHITECT
NEEDHAM, MA 02492 | (T) 718.576.3354

PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
TITLE PAGE, RENDERING,
DWG LIST & BUILDING DEPT NOTES

SHEET NUMBER :

T - 1

1 OF 11

SCALE :

DATE : 2025 10 - 27

ISSUE : SITE PLAN SUBMISSION

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242
HILLSIDE
AVENUE

NEEDHAM MA 02494

NEEDHAM
ENTERPRISES
NEEDHAM MA 02492

FOR DESIGN INTENT ONLY
NOT FOR CONSTRUCTION

REVISIONS | SUBMISSIONS DATE

SITE PLAN SUBMISSION 2025 10-27

PROJECT:
242 HILLSIDE AVENUE
ARCHITECT
NEEDHAM, MA 02492 | (T) 718.578.3354

PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
LANDSCAPE PLAN

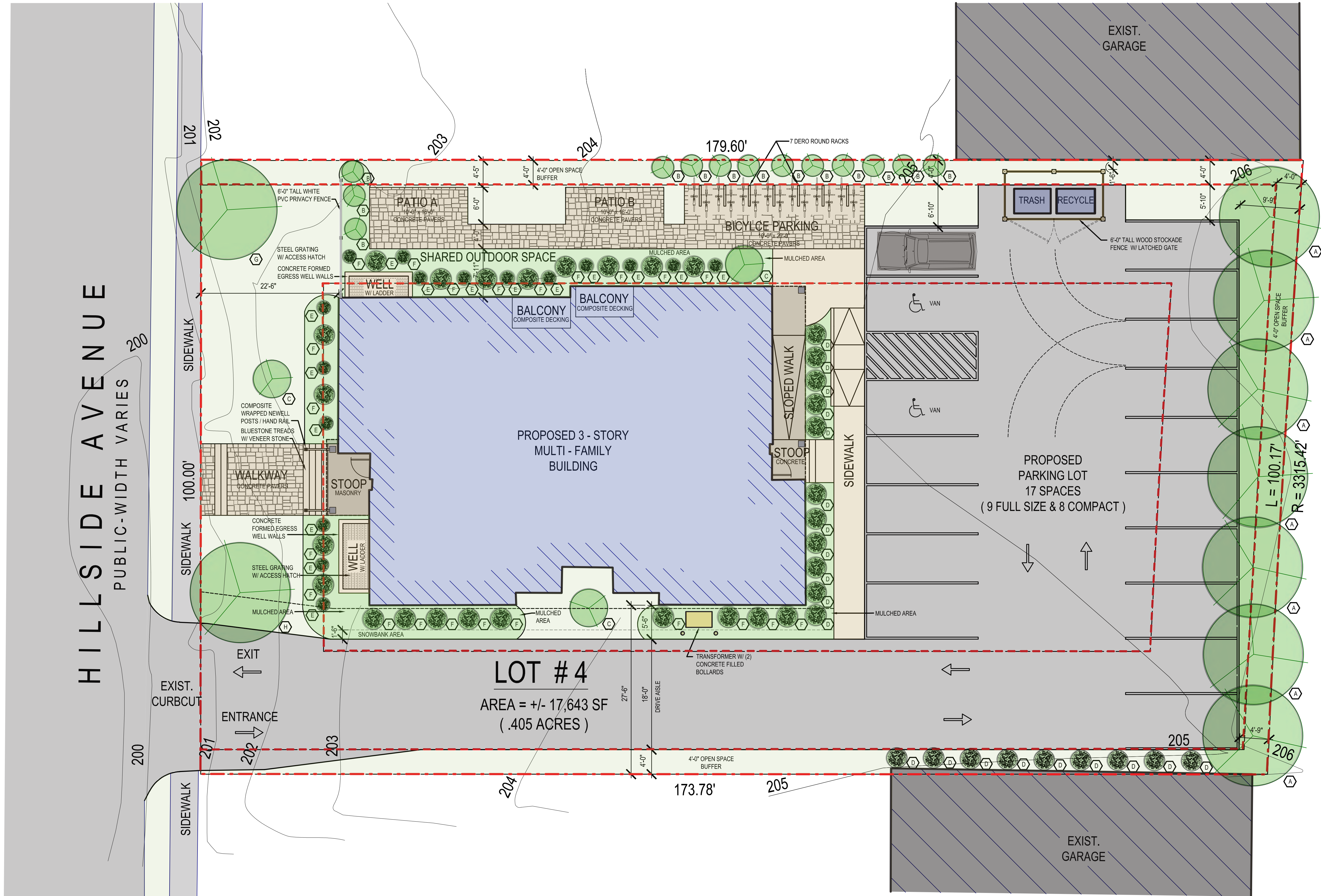
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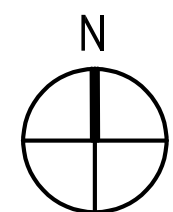
2 OF 11

SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

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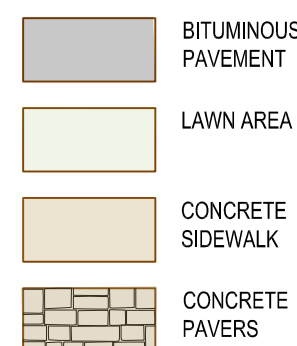


1 LANDSCAPE PLAN
SCALE: 1/8" = 1'-0"



PLANT LEGEND				
TAG	COMMON NAME	SCIENTIFIC NAME	MATURE WIDTH	MATURE HEIGHT
A	GREEN GIANT ARBORVITAE	THUJA STANDISHII X PLICATA	12' - 20'	40' - 60'
B	EMERALD GREEN ARBORVITAE	THUJA OCCIDENTALIS	3' - 4'	10' - 15'
C	MISS KIM LILAC	SYRINGA PUBESCENS SUBSP PATULA	6' - 8'	6' - 8'
D	NewGen INDEPENDENCE BOXWOOD	BUXUS NewGen INDEPENDENCE SB 108	3' - 4'	3' - 4'
E	DOUBLE PLAY GOLD SPIREA	SPIREA JAPONICA	2' - 2'	2' - 2'
F	ENCORE AUTUMN ROYALTY AZALEA	RHODODENDRON 'CONJEC'	3' - 4'	4' - 5'
G	AUTUMN BLAZE RED MAPLE	ACER X FREEMANNI 'JEFFERSRED'	30' - 40'	40' - 50'
H	PIN OAK TREE	QUERCUS PALUSTRIS	20' - 40'	50' - 60'

LEGEND



LANDSCAPE PLAN NOTES:

1. NO MATURE TREES EXIST ON SITE CURRENTLY. ALL PROPOSED PLANTING ON PLAN IS NEW.
2. NO SUBSTITUTIONS ON PLANT VARIETIES ARE ALLOWED WITHOUT WRITTEN APPROVAL FROM ARCHITECT.
3. G.C. RESPONSIBLE FOR ANY AND ALL SOIL AMENDMENTS TO SUPPORT NEW PLANT SPECIES.

242 HILLSIDE AVENUE

NEEDHAM MA 02494

NEEDHAM
ENTERPRISES
NEEDHAM MA 02492

FOR DESIGN INTENT ONLY
NOT FOR CONSTRUCTION

REVISIONS | SUBMISSIONS | DATE

SITE PLAN SUBMISSION 2025 10-27

SCOTT MELCHING ARCHITECT LLC
ARCHITECT
NEEDHAM, MA 02492 | (T) 718,578,3354

PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
LOWER LEVEL PLAN

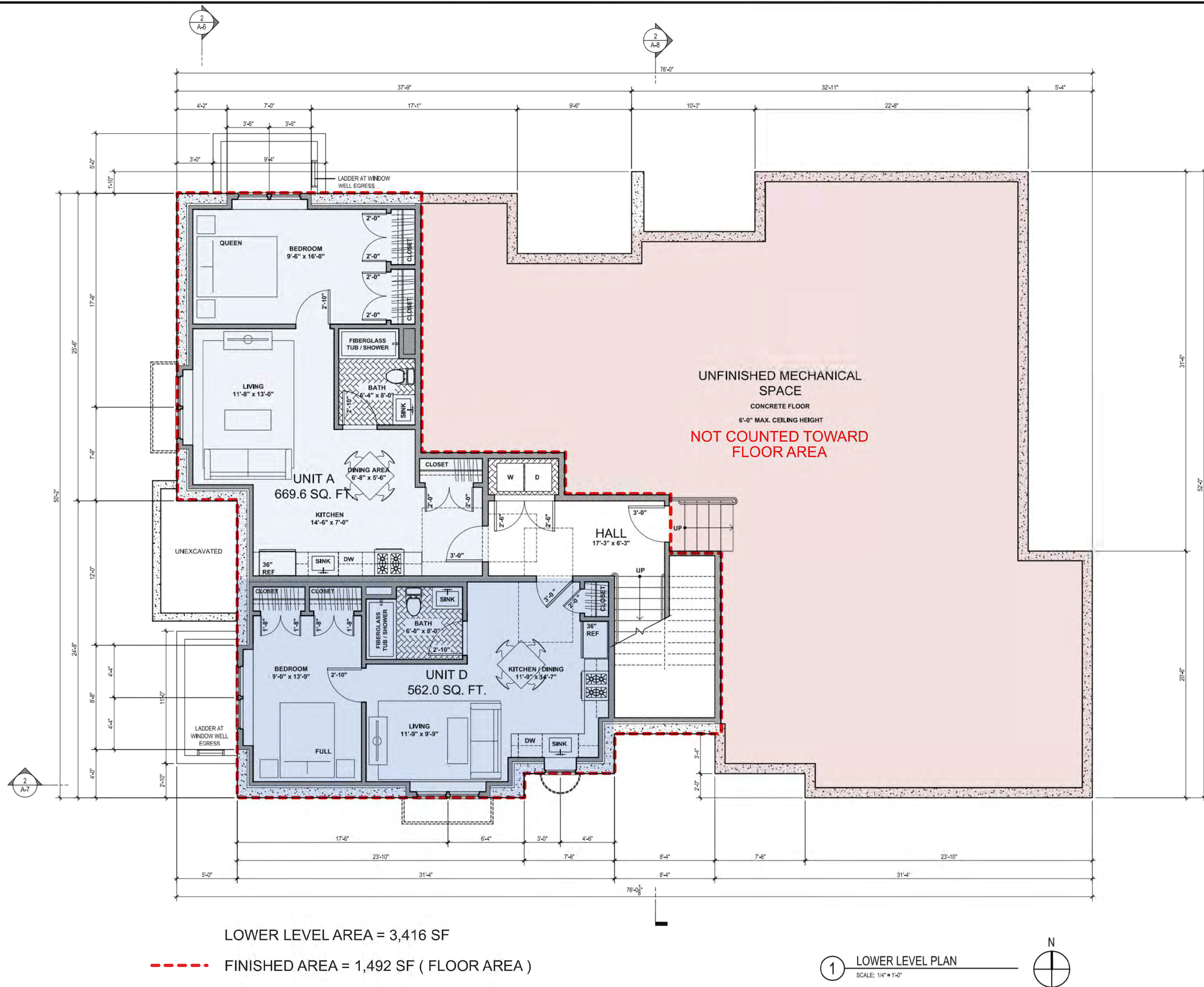
SHEET NUMBER:

A - 1

3 OF 11

SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

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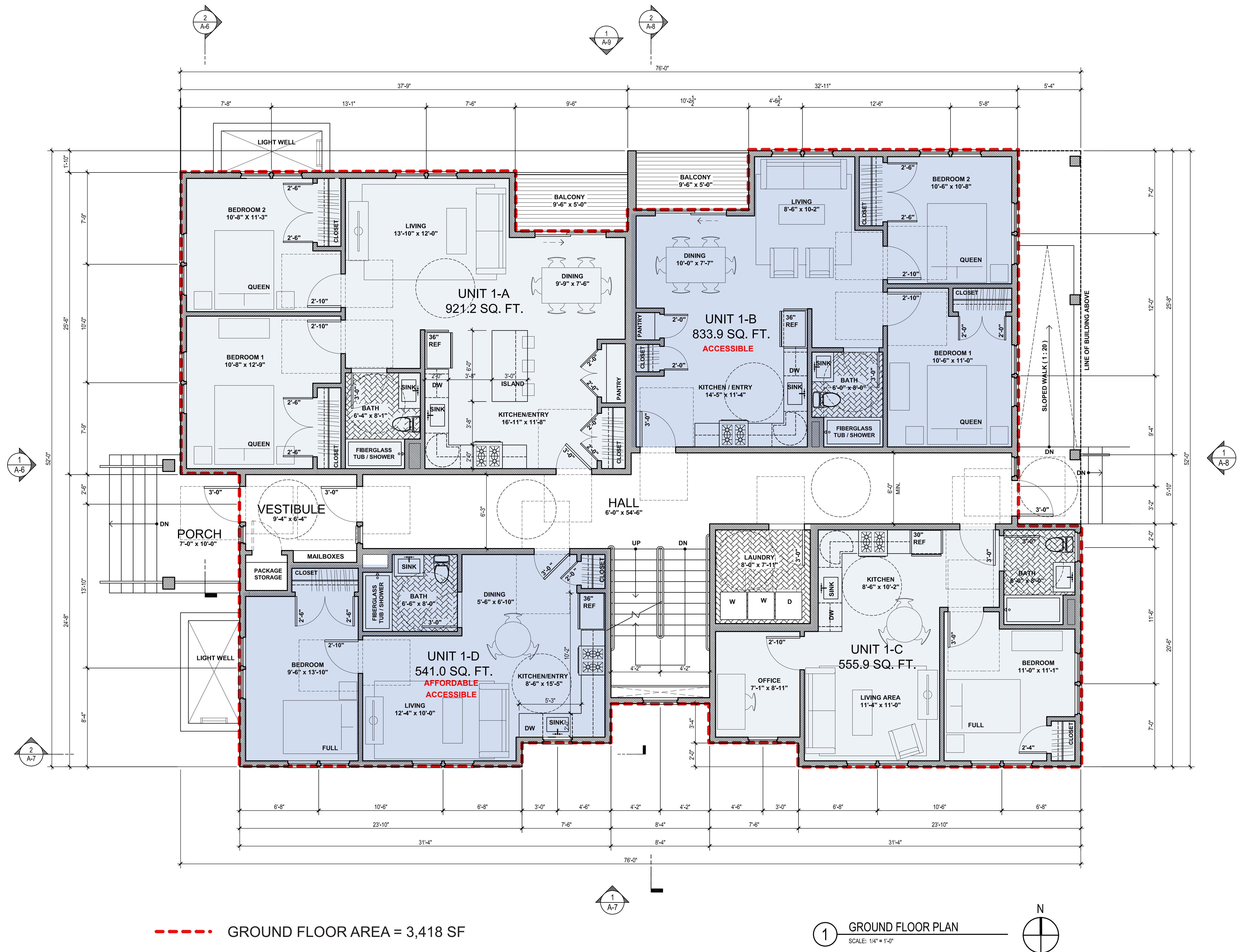
DRAWING TITLE:
GROUND FLOOR PLAN

SHEET NUMBER :

A - 2
4 OF 11

SCALE :
DATE : 2025 10 - 27
ISSUE : SITE PLAN SUBMISSION

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PROJECT:
242 HILLSIDE AVENUE
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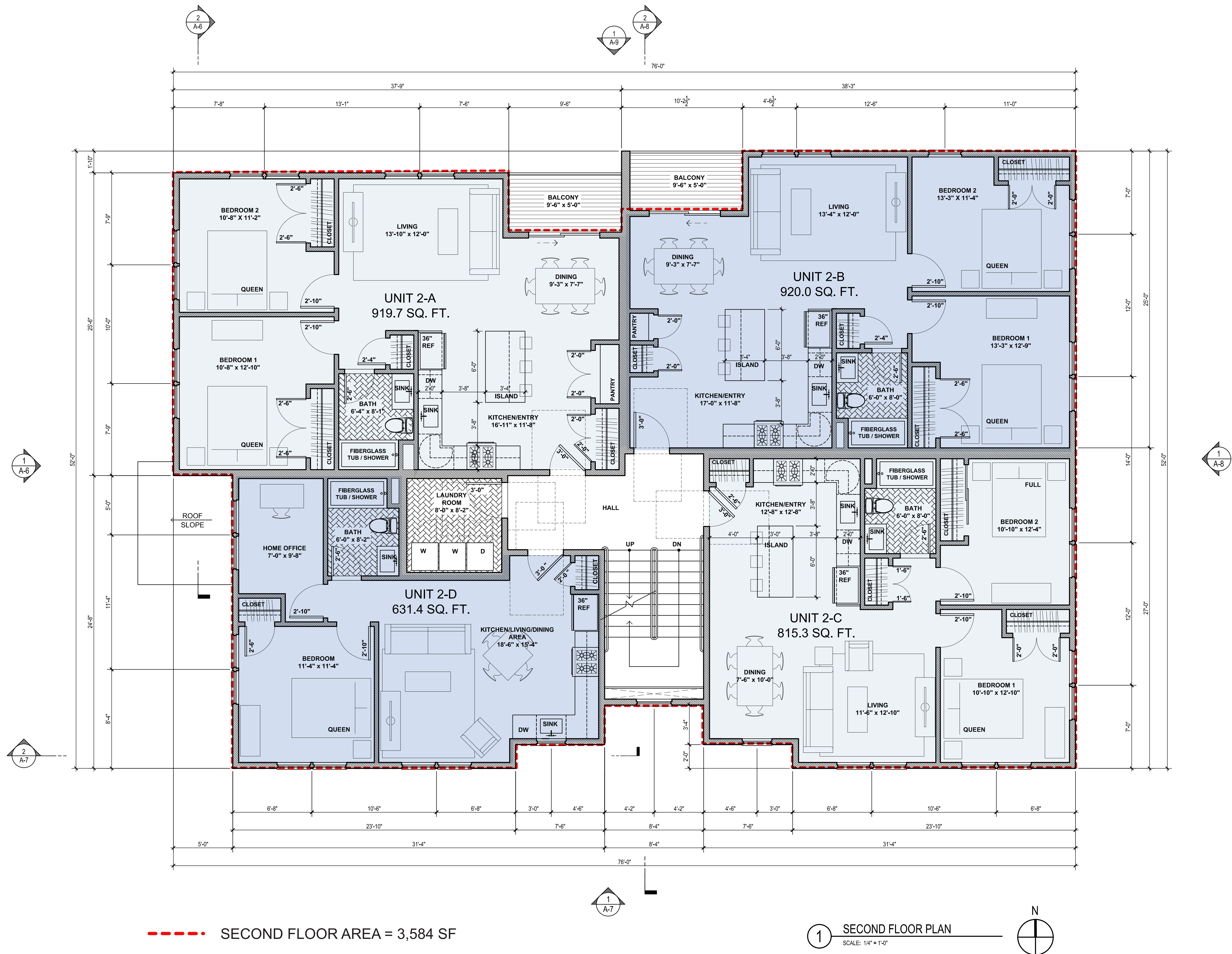
DRAWING TITLE:
SECOND FLOOR PLAN

SHEET NUMBER :

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5 OF 11

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PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
THIRD FLOOR PLAN

SHEET NUMBER :

A - 4

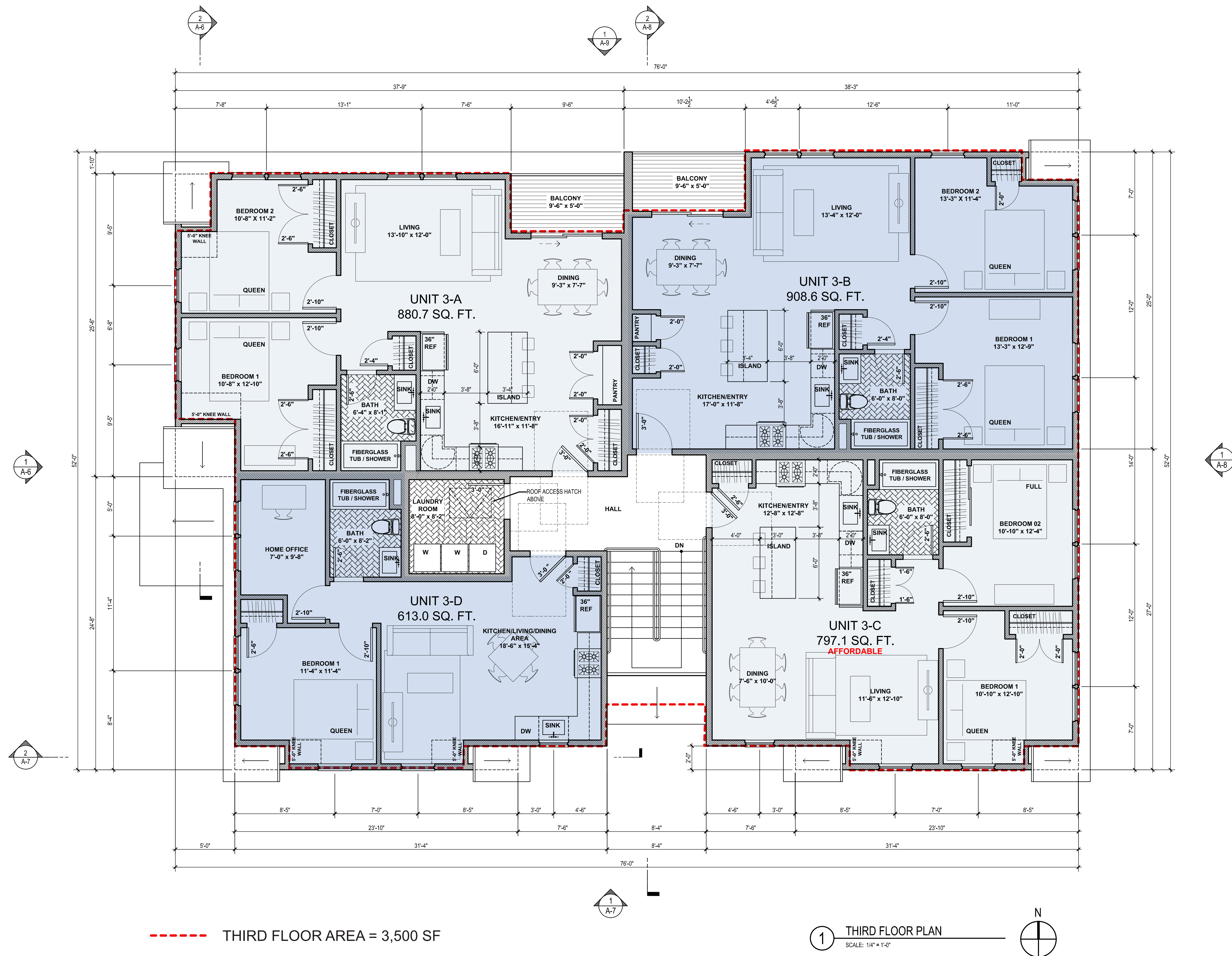
6 OF 11

SCALE :

DATE: 2025 10 - 27

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PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

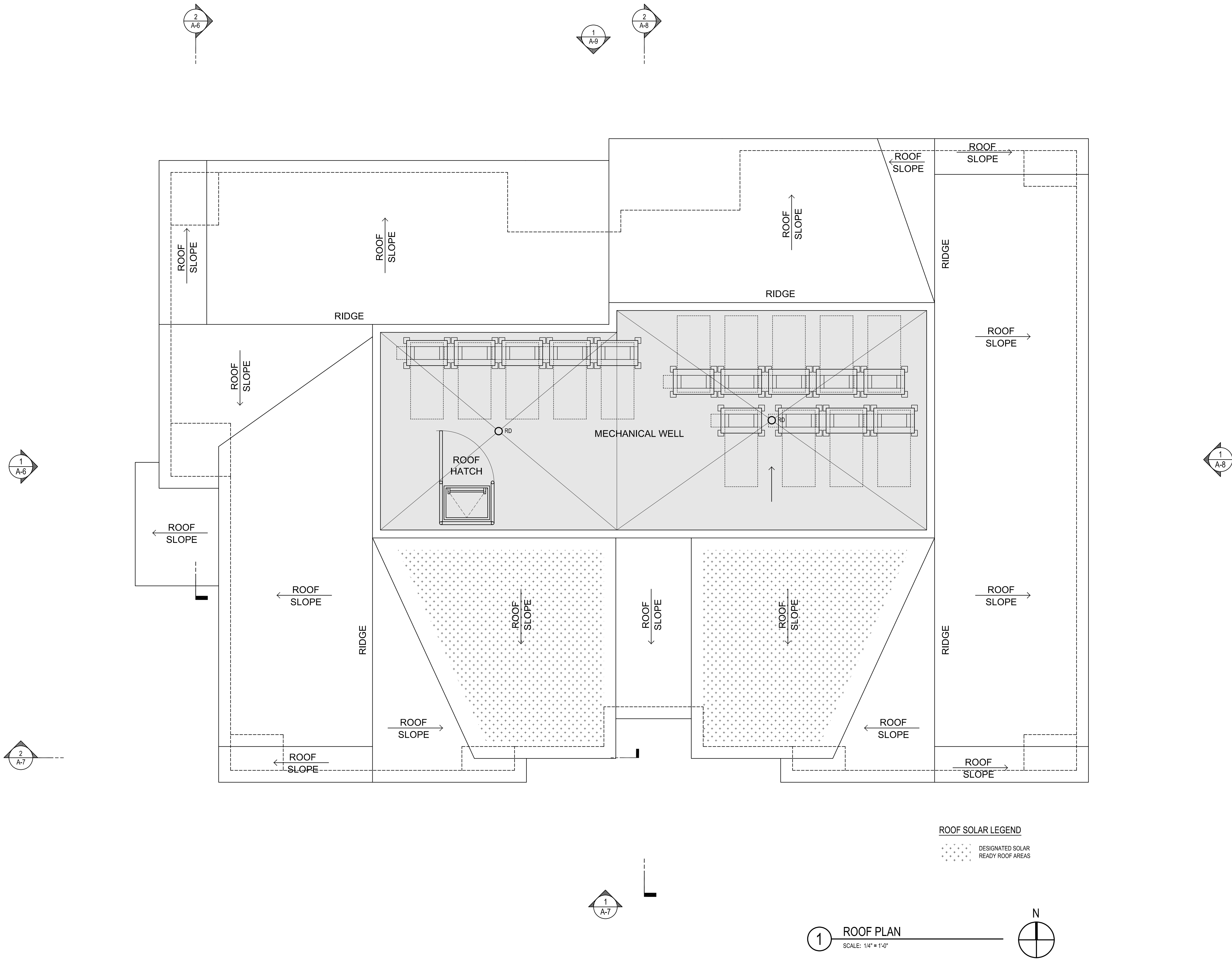
DRAWING TITLE:
ROOF PLAN

SHEET NUMBER :

A - 5
7 OF 11

SCALE :
DATE : 2025 10 - 27
ISSUE : SITE PLAN SUBMISSION

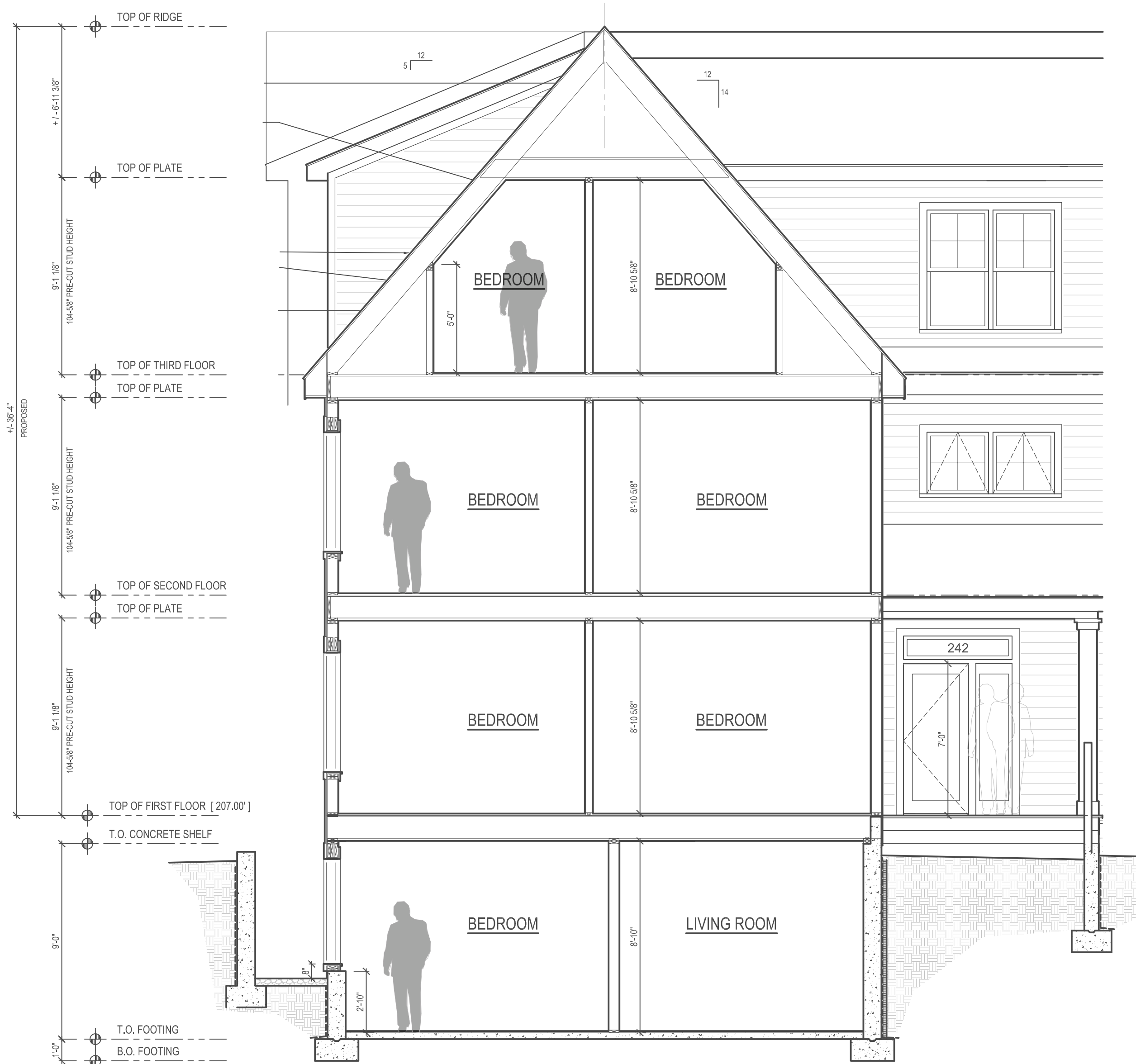
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242 HILLSIDE AVENUE

NEEDHAM MA 02494

NEEDHAM
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2 SECTION AT FRONT FACING GABLE
SCALE: 1/4" = 1'-0"



1 FRONT ELEVATION
SCALE: 1/4" = 1'-0"

FACADE MATERIAL LEGEND

JAMES HARDIE LAP SIDING
6" EXPOSURE
COLOR: BOOTHBAY BLUE
TEXTURE: CEDARMILL

JAMES HARDIE LAP SIDING
6" EXPOSURE
COLOR: COBBLE STONE
TEXTURE: CEDARMILL

COMPOSITE TRIM
COLOR: WHITE

CERTAINTED
ARCHITECTURAL ASPHALT
SHINGLE ROOFING
COLOR: WEATHERED WOOD

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SITE PLAN SUBMISSION | 2025 10-27

PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

SCOTT MELCHING ARCHITECT LLC
ARCHITECT
NEEDHAM, MA 02492 | (T) 718.578.3354

DRAWING TITLE:
FRONT ELEVATION &
BUILDING SECTION

SHEET NUMBER :

A - 6
8 OF 11

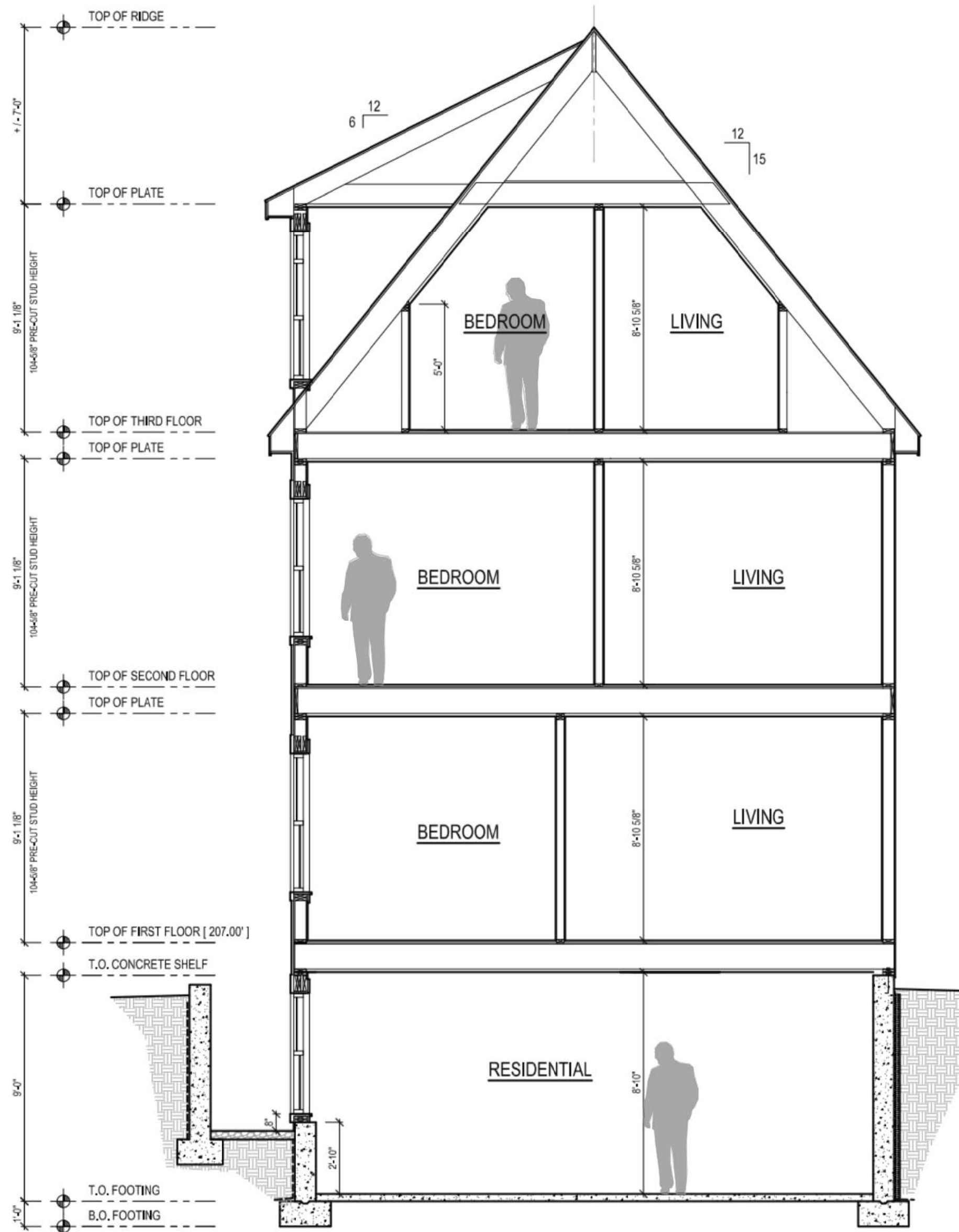
SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

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242 HILLSIDE AVENUE

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2 SECTION THRU SIDE FACING GABLE
SCALE: 1/4" = 1'-0"



1 RIGHT ELEVATION
SCALE: 1/4" = 1'-0"

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ARCHITECT
NEEDHAM, MA 02492 | (T) 718,578,3354

PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
RIGHT ELEVATION &
BUILDING SECTION

SHEET NUMBER:

A - 7
9 OF 11

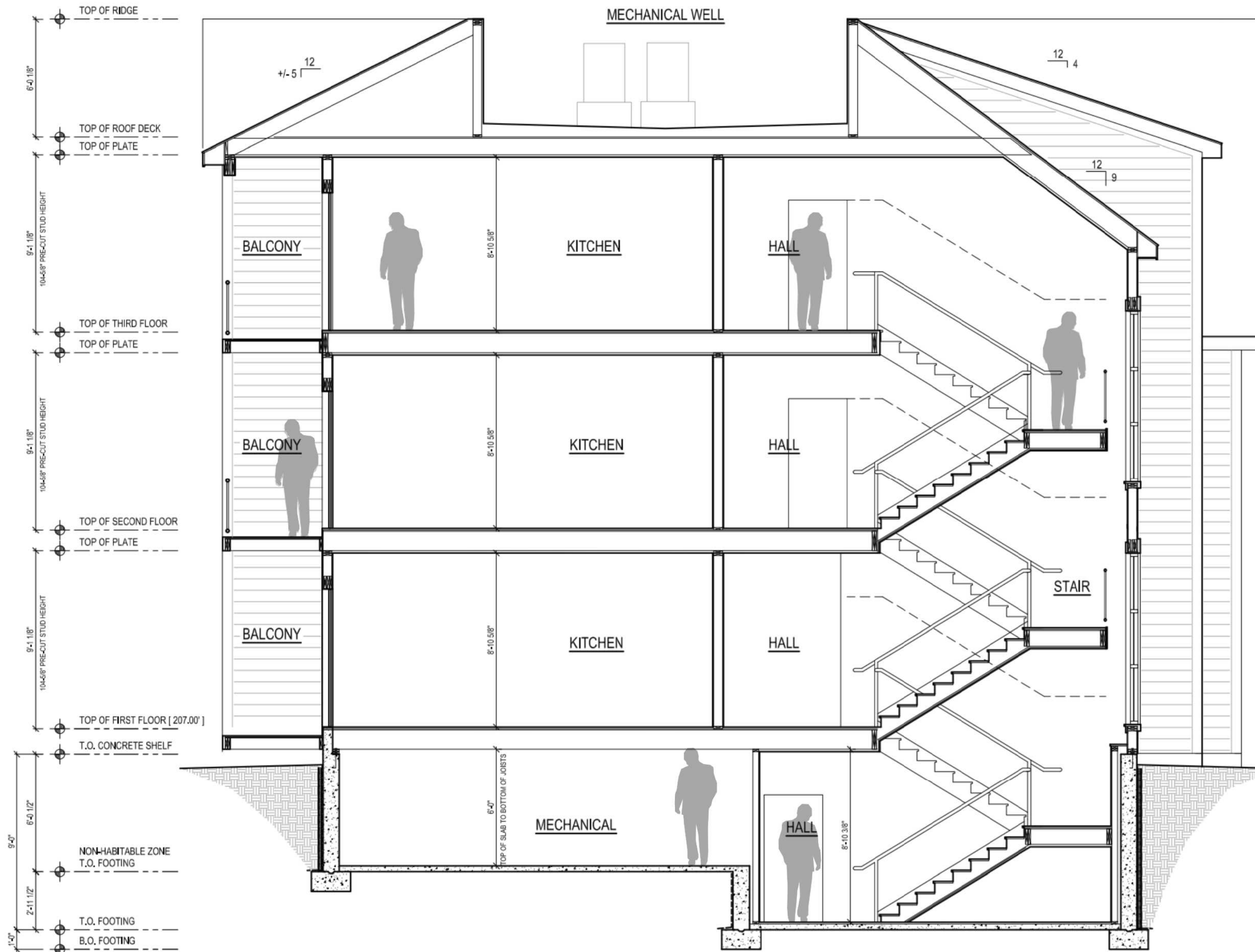
SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

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242 HILLSIDE AVENUE

NEEDHAM MA 02494

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2 SECTION AT STAIR
SCALE: 1/4" = 1'-0"



1 REAR ELEVATION
SCALE: 1/4" = 1'-0"

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SITE PLAN SUBMISSION 2025 10-27

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ARCHITECT
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PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
REAR ELEVATION &
BUILDING SECTION

SHEET NUMBER:

A - 8
10 OF 11

SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

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242
HILLSIDE
AVENUE

NEEDHAM MA 02494

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1 LEFT ELEVATION
SCALE: 1/4" = 1'-0"

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SITE PLAN SUBMISSION | 2025 10-27

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ARCHITECT
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PROJECT:
242 HILLSIDE AVENUE
NEEDHAM | MA | 02494

DRAWING TITLE:
LEFT ELEVATION

SHEET NUMBER :

A - 9
11 OF 11

SCALE:
DATE: 2025 10 - 27
ISSUE: SITE PLAN SUBMISSION

242 HILLSIDE AVENUE
A RESIDENTIAL DEVELOPMENT
IN
NEEDHAM, MA
OCTOBER 14, 2025



John F. Glossa
10/23/2025

OWNER: NEEDHAM ENTERPRISES INC
105 CHESTNUT STREET SUITE 28
NEEDHAM, MA 02492

APPLICANT: NEEDHAM ENTERPRISES INC
105 CHESTNUT STREET SUITE 28
NEEDHAM, MA 02492

ENGINEER: GLOSSA ENGINEERING INC
46 EAST STREET
EAST WALPOLE, MA 02032

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NARRATIVE

The proposal is for a 14 unit multi family residential development to be constructed on a 17,630 s.f. lot of land in Needham, MA.

The property is located on the westerly side of Hillside Avenue between West Street and Hunnewell Street. The property is developed with a two story wood frame house and garage. Much of the rear of the property is used a commercial space for a variety of storage and parking uses. The property slopes essentially from the rear to the front at a slope of approximately 3 percent. The landform appears to be a terrace. Soils at the site were found to be glacial outwash made up of coarse sand and gravel. Soils at the site are classified as Urban soil but all of the abutting soils are classified Merrimac sand and gravel. One drainage watershed was identified at the site. This watershed consists of paved and gravel parking and storage areas, driveways, rooftops, and lawn. The runoff from the watershed runs overland to Hillside Ave.

The proposal is to construct 14 residential units in 1 building. There will be a paved access driveway to access 17 proposed parking stalls to be constructed at the rear of the site, behind the proposed building. Outdoor use patios and walkways will be constructed and the remaining lot area will be professionally landscaped.

The total impervious area in the existing condition is 15,093 s.f. which is less than the proposed impervious area of 12,890 s.f. Therefore, runoff volumes and rates will be reduced in the proposed condition without any mitigation. However, the plan does call for the installation of 3 catch basins, drain manholes, and 2 underground infiltration basins. The mitigation will significantly reduce both the rates and volume of runoff to Hillside Ave. in all of the storms that were modeled being the 2, 10, 25 and 100 year storm events.

Stormwater Runoff Summary					
Subarea	Storm Event				
Pre-development.	1 inch	2-yr	10-yr	25-yr	100-yr
E-1 (1S) (cfs) to Hillside	0.09	1.01	1.84	2.36	3.15
E-1 (1S) (ac-ft.) to Hillside	0.008	0.072	0.133	0.173	0.235
Post-development.					
P-1 (1S) (cfs) to SS1	0.04	0.53	1.00	1.30	1.75
P-1 (1S) (ac-ft.) to SS1	0.004	0.038	0.072	0.094	0.129
P-2 (2S) (cfs) to SS2	0.02	0.26	0.47	0.60	0.80
P-2 (2S) (ac-ft.) to SS2	0.002	0.018	0.034	0.044	0.060
P-3 (3S) (cfs) to Hillside	0.0	0.01	0.09	0.16	0.27
P-3 (3S) (ac-ft.) to Hillside	0.0	0.002	0.008	0.012	0.020
Subsurface System 1					
Inflow (cfs)	0.04	0.53	1.00	1.30	1.75
Inflow (ac-ft.)	0.004	0.038	0.072	0.094	0.129
Infiltrated (cfs)	0.03	0.05	0.05	0.05	0.05
Infiltrated (ac-ft.)	0.004	0.038	0.072	0.079	0.088
Outflow (cfs)	0.0	0.0	0.0	0.32	0.99
Outflow (ac-ft.)	0.0	0.0	0.0	0.015	0.041
Elevation	197.06	200.97	204.98	205.03	205.08
Subsurface System 2					
Inflow (cfs)	0.02	0.26	0.47	0.60	0.80
Inflow (ac-ft.)	0.002	0.018	0.034	0.044	0.060
Infiltrated (cfs)	0.02	0.02	0.02	0.02	0.02
Infiltrated (ac-ft.)	0.002	0.018	0.025	0.028	0.032
Outflow (cfs)	0.0	0.0	0.34	0.58	0.78
Outflow (ac-ft.)	0.0	0.0	0.008	0.016	0.028
Elevation	193.58	198.44	201.00	201.01	201.01
Total to Hillside Avenue					
3R (cfs)	0.0	0.01	0.43	0.73	1.68
3R (ac-ft)	0.0	0.002	0.016	0.043	0.089

CONSTRUCTION PERIOD POLLUTION PLAN

Given the proximity of the Town drain system, care shall be taken to assure that eroded soil will not be deposited into the storm drain system.

The entity for the construction period pollution prevention and erosion and sedimentation control plan is Needham Enterprises Inc, their successors and assigns, 105 Chestnut Street, Needham, MA 02492. Construction period pollution control measures shall include a siltation barrier (compost filled sock). A designated materials stockpile area and a construction staging area have also been depicted on the plans. Construction sequencing shall be as follows:

- 1) Installation of silt barriers and stabilized construction entrance as shown on the plans.
- 2) Demolish existing buildings and remove all deleterious materials from the site.
- 3) Bring the site to subgrade.
- 4) Construct the building foundation and backfill the foundation.
- 5) Construct the building.
- 6) Install the sewer, water, electric and gas underground utilities and backfill all trenches.
- 7) Install the leaching galleys, drain manholes and catch basins.
- 8) Bring the access driveway and parking area to gravel grade and install the binder course of asphalt.
- 9) Install curbing and sidewalks.
- 10) Install plantings and mulch beds. Loam and seed or sod all remaining disturbed areas.
- 11) Install final course of asphalt for parking lot.
- 12) Cleanup and demobilize.

VEGETATION PLANNING

Vegetation shall be installed per the approved plans in accordance with the construction sequencing plan

EROSION AND SEDIMENTATION CONTROLS

The operation and maintenance of the erosion and sedimentation controls shall be the responsibility of the site contractor, who will report to Needham Enterprises Inc their successors and assigns. The erosion and sedimentation controls shall be inspected daily by the site contractor. Repairs as needed shall be made immediately. The inspection of erosion and sedimentation controls shall also be done weekly and after every 1" or more rain event by an independent person trained in erosion control practices at construction sites. This independent person shall file weekly reports with Needham Enterprises Inc, their successors and assigns. These reports shall be made available to the Needham Town Engineer.

**242 HILLSIDE AVENUE
A RESIDENTIAL BUILDING
NEEDHAM, MA**

OPERATION AND MAINTENANCE PLAN

STORM WATER CONTROL AND MITIGATION SYSTEM

The entity responsible for the implementation of the operation and maintenance plan for the storm water management system is:

Needham Enterprises Inc
Their successors and assigns
105 Chestnut Street Suite 28
Needham, MA 02492

The storm water system is shown on an as built plan on file with the with the Needham Town Engineer. The system consists of the following components:

- 1) Drainage catch basins (3)
- 2) Infiltration basins (2)
- 3) Drainage piping
- 4) Drainage manholes (1)
- 5) Rooftop drainage piping

INSPECTIONS

1) Storm water system components shall be inspected every three months during the first year of operation. Inspection reports shall be submitted to the Needham Town Engineer within 30 days of the inspection. These inspections shall be conducted by Needham Enterprises Inc, their successors and assigns.

2) Drain manholes and new drainage piping shall be inspected and cleaned as needed.

3) Catch basins shall be inspected four times per year.

4) The Infiltration basins shall be inspected once per year.

5) Any repairs deemed to be critical shall be made immediately. Any other repairs shall be made within 30 days of the inspection.

6) Any proposed changes to the drainage system shall be approved in writing by the Needham Town Engineer.

7) Needham Enterprises Inc shall have on hand at all times \$1,000 (2025 dollar value) for inspections and emergency repairs.

MAINTENANCE

1) Driveways and parking areas shall be swept two times per year, once in the Spring, and once in the Fall by Needham Enterprises Inc.

2) The catch basin shall be cleaned by Needham Enterprises Inc four times per year, or when the depth of deposits is $\frac{1}{2}$ of the volume of the sump.

3) The Infiltration basins shall be cleaned once per year.

4) Landscaped areas shall be maintained on a routine basis. Dead and diseased trees and shrubs shall be removed immediately and replaced in kind.

5) Needham Enterprises Inc shall have a revolving fund with money on hand at all times to perform their required tasks.

REPLACEMENT

1) Needham Enterprises Inc shall create and maintain a replacement fund for the catch basins, infiltration basins, and drain manholes. The amount of money needs to be \$20,000 (in 2025 value) within 50 years of the start of construction.

LONG TERM POLLUTION PLAN

The use of that property and the responsibility of the owner to implement and carry out a Long Term Pollution Prevention Plan will be subject to this document and shall include the following provisions:

1) Good housekeeping practices shall be implemented at all times.

2) There shall be no outdoor storage of materials or waste products at that site at any time.

3) Routine inspections and maintenance of Storm water best management practices shall be carried out in compliance with the Operation and Maintenance plan.

4) There may be heating oil deliveries to the site. Spill prevention and response plans shall be the responsibility of the delivery companies. Spill prevention and response plans for other hazardous materials shall be the responsibility of those individual handlers.

5) Lawns, gardens and other landscaped areas at the site shall be maintained by the owner at the expense of the owner.

6) There shall be no storage of fertilizers, herbicides, and/or pesticides at the site. The use of fertilizers, herbicides, and pesticides at the site shall be limited to amounts allowed by on going conditions found in the Permit issued by the Needham Planning Board and / or other governing bodies.

7) Pet waste deposited at the site shall be immediately picked up and removed. Pet waste to be disposed of through solid waste containers.

8) There shall be no on site septic systems installed at the site unless allowed by other governing bodies.

9) Solid waste shall not be stored at the site except as allowed by other governing bodies. Solid waste shall be stored in closed containers and removed by a licensed hauler at least once per week. Any solid waste not in closed containers found at that site shall be removed immediately by the owner.

10) Snow shall be deposited in the snow storage areas.

11) Road salt and sand shall be used in accordance with rules, regulations and laws in force at that time. There shall be no storage of sand or salt at the site.

12) There shall be no illicit discharges to the storm water system.

13) The owner shall become familiar with the rules and regulations and restrictions of this document.

14) In case of an emergency, the owner shall notify the following organizations

- 1) Needham Fire Dept.
- 2) Needham Board of Health
- 3) Needham Planning Board
- 4) Needham Building Department
- 5) Needham Dept. Of Public Works and Town Engineer
- 6) Massachusetts DEP

VOLUMETRIC CALCULATIONS

TSS REMOVAL

½ INCH RULE – USE 0.60 INCH TO COMPLY WITH RECHARGE REQUIREMENT

INFILTRATION BASIN #1

6,614 S.F. OF PAVEMENT X .6/12 = 330.7 C.F. REQUIRED

PER PLAN

42 LF OF GALLEYS = 799.3 C.F. OF STORAGE PROVIDED (OK)

DRAWDOWN CALCULATION – HYDROLOGIC GROUP A SOIL

The volume of stored rainfall from the Hydrocad calculation is 1,751 c.f. (includes volume above the galleys)

The bottom area of the infiltration basin is 268.8 s.f.

Using an infiltration rate of 8.27 in/hr = 0.689 ft/hr = 0.689 cf/hr

0.689 cf/hr x 268.8 s.f. = 185.20 cf/hr/infiltration basin bottom

1,751 c.f. / 185.20 cf/hr = 9.45 hrs **OK**

INFILTRATION BASIN #2

1,949 S.F. OF PAVEMENT X .6/12 = 97.54 C.F. REQUIRED

PER PLAN

18 LF OF GALLEYS = 336.6 CF OF STOTAGE PTOVIDED (OK)

DRAWDOWN CALCULATION – HYDROLOGICAL GROUP A SOIL

The volume of stored rainfall from the Hydrocad calculation is 343 c.f. (Includes volume above the galleys)

The bottom area of the infiltration basin is 115.2 s.f.

Using an infiltration rate of 8.27 in/hr = 0.689 ft/hr – 0.689 cf/hr

0.689 x 115.2 = 79.37 cf/hr/infiltration basin bottom

343 c.f. / 79.37 = 4.32 hr **OK**

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 242 Hillside Ave., Needham, MA

B BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Separate Form Needs to
be Completed for Each
Outlet or BMP Train

Total TSS Removal =

85%

Project: 242 Hillside Ave., Needham, MA

Prepared By: John F. Glossa P.E.

Date: 10/10/2025

*Equals remaining load from previous BMP (E)
which enters the BMP

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed

1 From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

An aerial photograph of a residential neighborhood. A large orange rectangle highlights a specific property or area. Within this rectangle, there are several buildings, trees, and parked cars. One building has the number "602" written on it. The map is framed by coordinate labels: latitude (N) at the top and bottom, and longitude (W) on the left and right. A scale bar at the bottom indicates distances from 0 to 30 meters. A note at the bottom left states: "Map Scale: 1:437 if printed on A landscape (11\" x 8.5\") sheet." A warning at the top center reads: "Small map may not be valid at this scale."

An aerial photograph of a residential neighborhood. A large rectangular area is outlined in orange, representing the project site. Within this area, a smaller rectangle is outlined in blue. The address "602" is visible on one of the buildings. The map is framed by coordinate labels: latitude from 42° 17' 41" N to 42° 17' 43" N and longitude from 71° 14' 9" W to 71° 14' 13" W. A scale bar at the bottom indicates distances up to 30 meters. A note at the top left states: "Small map may not be valid at this scale."

An aerial photograph of a residential neighborhood. A large rectangular area is outlined in orange, representing the project site. Within this area, a smaller rectangle is outlined in blue. The address "602" is visible on one of the buildings. The map is framed by coordinate labels: latitude from 42° 17' 41" N to 42° 17' 43" N and longitude from 71° 14' 9" W to 71° 14' 13" W. A scale bar at the bottom indicates distances up to 30 meters. A note at the top left states: "Small map may not be valid at this scale."

[illegible][illegible]

Norfolk and Suffolk Counties, Massachusetts

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 120 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent

Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent

Hydric soil rating: Unranked

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts

Survey Area Data: Version 21, Sep 5, 2025

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land, 0 to 15 percent slopes	0.9	100.0%
Totals for Area of Interest		0.9	100.0%

MAP LEGEND

Area of Interest (AOI)		Area of Interest (AOI)	
Soils		Soil Map Unit Polygons	
		Soil Map Unit Lines	
		Soil Map Unit Points	
Special Point Features		Special Line Features	
Water Features		Water Features	
Blowout		Streams and Canals	
Borrow Pit		Transportation	
Clay Spot		Rails	
Closed Depression		Interstate Highways	
Gravel Pit		US Routes	
Gravelly Spot		Major Roads	
Landfill		Local Roads	
Lava Flow		Background	
Marsh or swamp		Aerial Photography	
Mine or Quarry			
Miscellaneous Water			
Perennial Water			
Rock Outcrop			
Saline Spot			
Sandy Spot			
Severely Eroded Spot			
Sinkhole			
Slide or Slip			
Sodic Spot			

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 21, Sep 5, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

APPENDIX 1

10/9/2025 10:00 AM



EX-1



Routing Diagram for Existing Conditions

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Existing Conditions

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1 inch	Type III 24-hr		Default	24.00	1	1.00	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.32	2
3	10-yr	Type III 24-hr		Default	24.00	1	5.20	2
4	25-yr	Type III 24-hr		Default	24.00	1	6.38	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.19	2

Existing Conditions

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.023	39	>75% Grass cover off-site, Good, HSG A (1S)
0.056	39	>75% Grass cover on-site, Good, HSG A (1S)
0.307	98	Impervious on-site, HSG A (1S)
0.040	98	Roofs, HSG A (1S)
0.426	87	TOTAL AREA

Existing Conditions

Type III 24-hr 1 inch Rainfall=1.00"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-1

Runoff Area=18,540 sf 81.41% Impervious Runoff Depth=0.22"

Tc=6.0 min CN=87 Runoff=0.09 cfs 0.008 af

Total Runoff Area = 0.426 ac Runoff Volume = 0.008 af Average Runoff Depth = 0.22"

18.59% Pervious = 0.079 ac 81.41% Impervious = 0.346 ac

Existing Conditions

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Type III 24-hr 1 inch Rainfall=1.00"

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Summary for Subcatchment 1S: EX-1

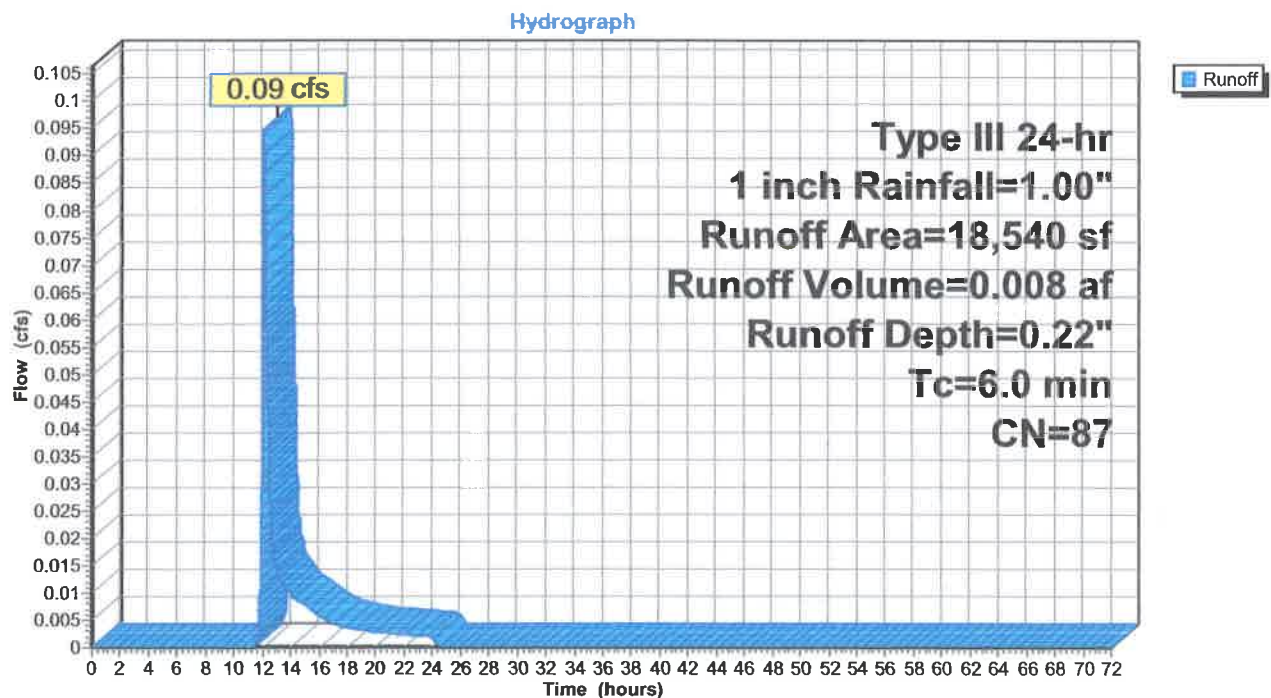
Runoff = 0.09 cfs @ 12.10 hrs, Volume= 0.008 af, Depth= 0.22"
Routed to nonexistent node 8P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

	Area (sf)	CN	Description
*	13,358	98	Impervious on-site, HSG A
*	2,454	39	>75% Grass cover on-site, Good, HSG A
	1,735	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	18,540	87	Weighted Average
	3,447		18.59% Pervious Area
	15,093		81.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: EX-1



Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.32"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-1

Runoff Area=18,540 sf 81.41% Impervious Runoff Depth=2.02"

Tc=6.0 min CN=87 Runoff=1.01 cfs 0.072 af

Total Runoff Area = 0.426 ac Runoff Volume = 0.072 af Average Runoff Depth = 2.02"

18.59% Pervious = 0.079 ac 81.41% Impervious = 0.346 ac

Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.32"

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Summary for Subcatchment 1S: EX-1

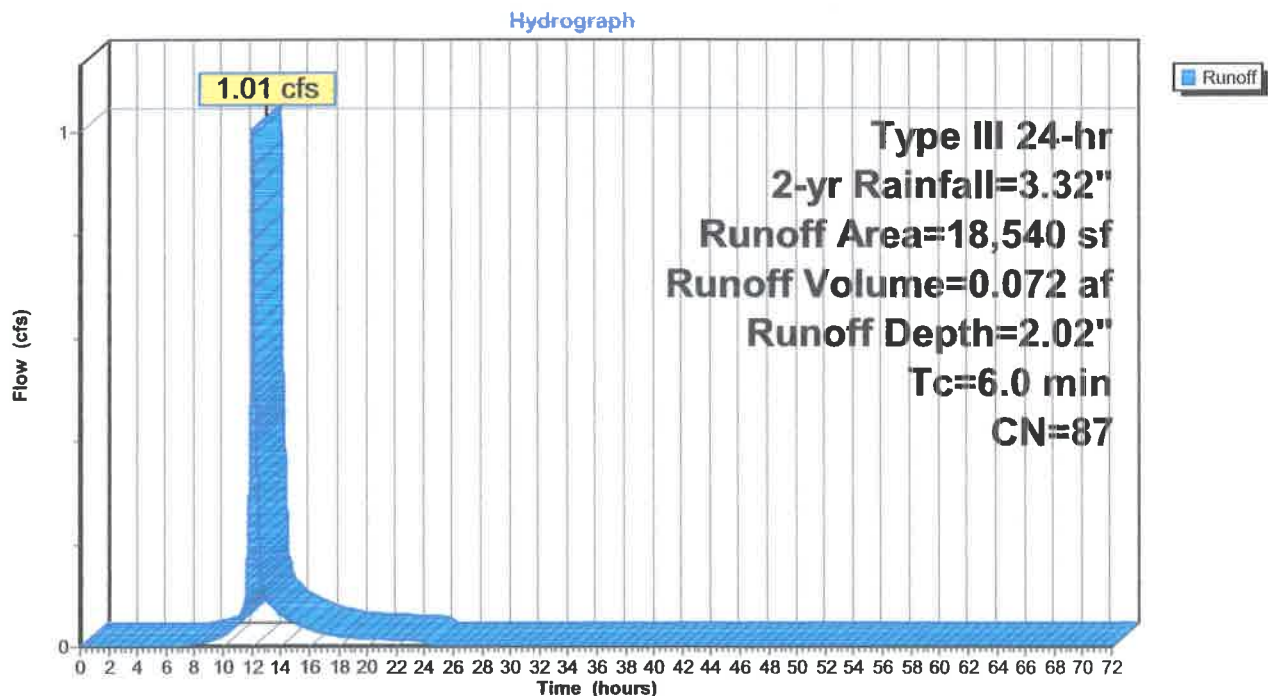
Runoff = 1.01 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 2.02"
Routed to nonexistent node 8P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	13,358	98	Impervious on-site, HSG A
*	2,454	39	>75% Grass cover on-site, Good, HSG A
	1,735	98	Roofs, HSG A
*	993	39	>75% Grass cover off-site, Good, HSG A
	18,540	87	Weighted Average
	3,447		18.59% Pervious Area
	15,093		81.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: EX-1



Existing Conditions

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Type III 24-hr 10-yr Rainfall=5.20"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-1

Runoff Area=18,540 sf 81.41% Impervious Runoff Depth=3.76"

Tc=6.0 min CN=87 Runoff=1.84 cfs 0.133 af

Total Runoff Area = 0.426 ac Runoff Volume = 0.133 af Average Runoff Depth = 3.76"

18.59% Pervious = 0.079 ac 81.41% Impervious = 0.346 ac

Existing Conditions

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Type III 24-hr 10-yr Rainfall=5.20"

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Summary for Subcatchment 1S: EX-1

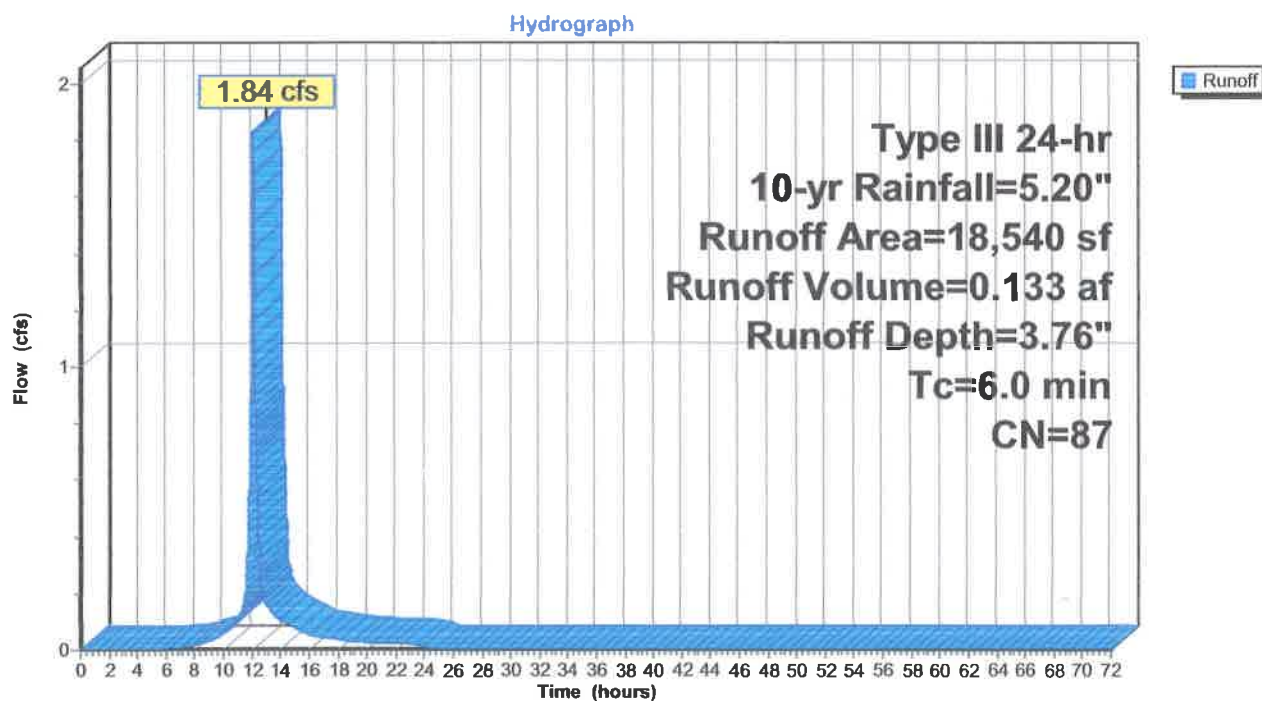
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 0.133 af, Depth= 3.76"
Routed to nonexistent node 8P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
*	13,358	98	Impervious on-site, HSG A
*	2,454	39	>75% Grass cover on-site, Good, HSG A
	1,735	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	18,540	87	Weighted Average
	3,447		18.59% Pervious Area
	15,093		81.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: EX-1



Existing Conditions

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Type III 24-hr 25-yr Rainfall=6.38"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-1

Runoff Area=18,540 sf 81.41% Impervious Runoff Depth=4.88"

Tc=6.0 min CN=87 Runoff=2.36 cfs 0.173 af

Total Runoff Area = 0.426 ac Runoff Volume = 0.173 af Average Runoff Depth = 4.88"

18.59% Pervious = 0.079 ac 81.41% Impervious = 0.346 ac

Existing Conditions

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Type III 24-hr 25-yr Rainfall=6.38"

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Summary for Subcatchment 1S: EX-1

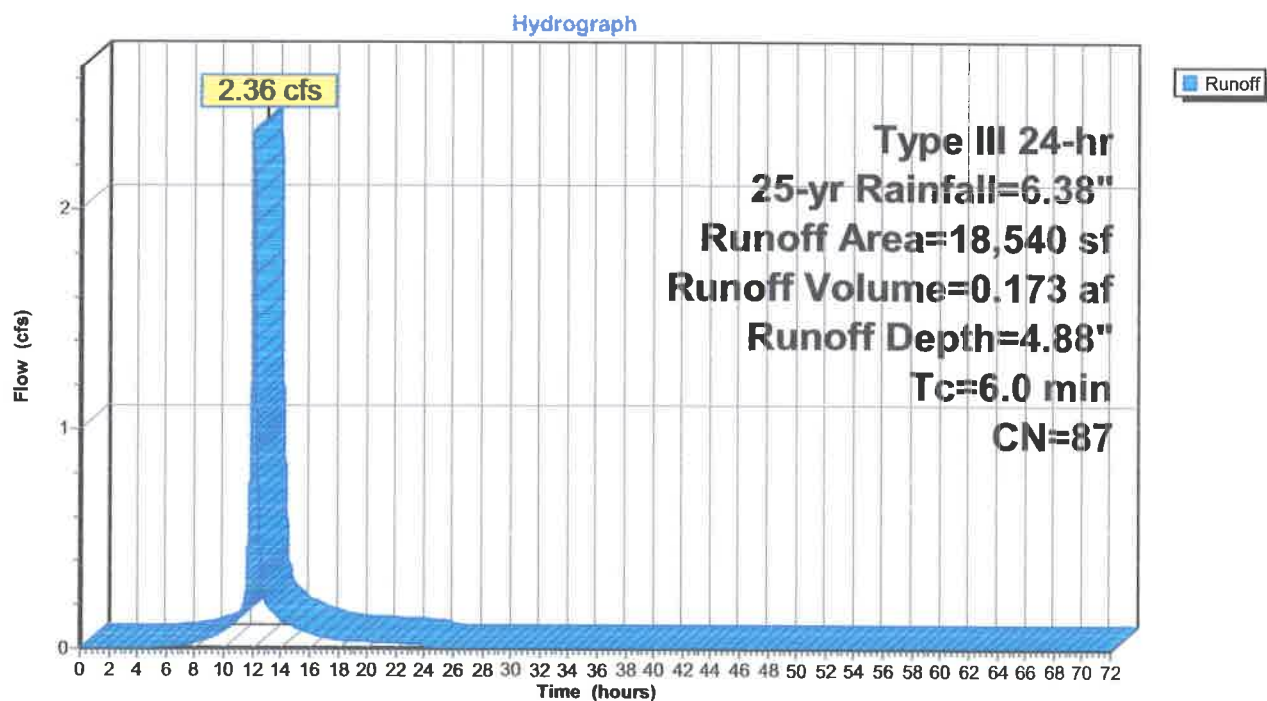
Runoff = 2.36 cfs @ 12.09 hrs, Volume= 0.173 af, Depth= 4.88"
Routed to nonexistent node 8P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.38"

	Area (sf)	CN	Description
*	13,358	98	Impervious on-site, HSG A
*	2,454	39	>75% Grass cover on-site, Good, HSG A
	1,735	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	18,540	87	Weighted Average
	3,447		18.59% Pervious Area
	15,093		81.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: EX-1



Existing Conditions

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Type III 24-hr 100-yr Rainfall=8.19"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-1

Runoff Area=18,540 sf 81.41% Impervious Runoff Depth=6.63"

Tc=6.0 min CN=87 Runoff=3.15 cfs 0.235 af

Total Runoff Area = 0.426 ac Runoff Volume = 0.235 af Average Runoff Depth = 6.63"
18.59% Pervious = 0.079 ac 81.41% Impervious = 0.346 ac

Existing Conditions

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Type III 24-hr 100-yr Rainfall=8.19"

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Summary for Subcatchment 1S: EX-1

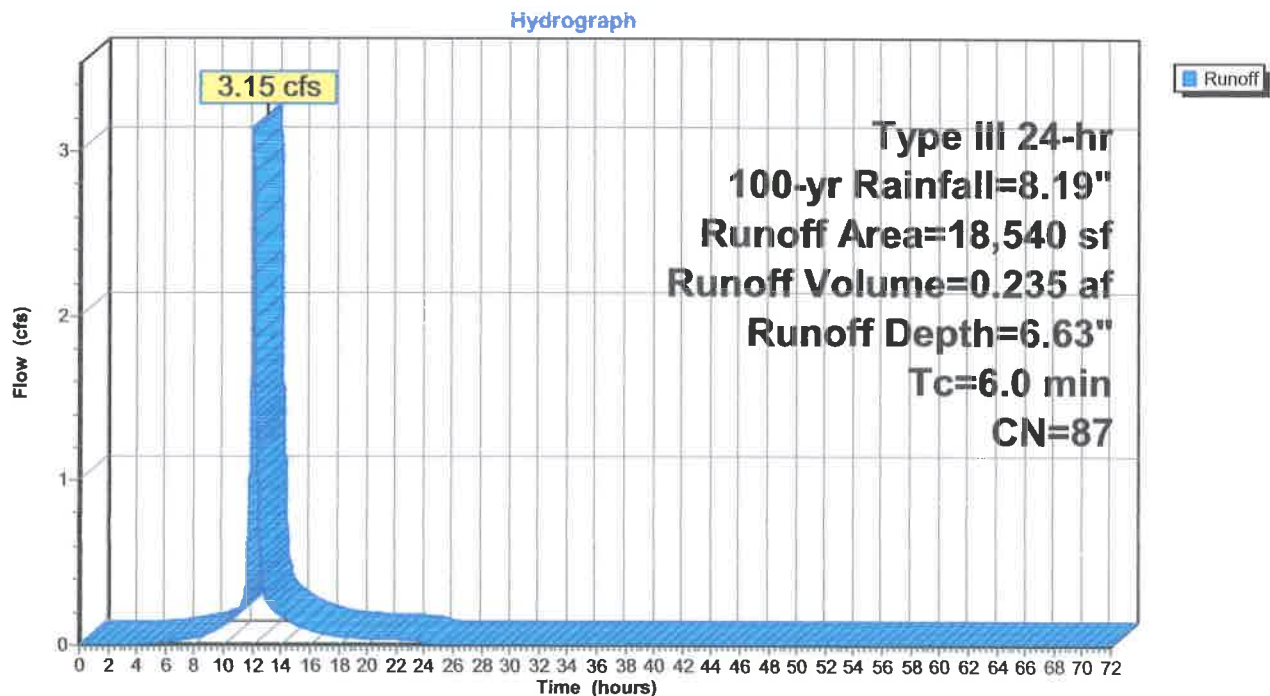
Runoff = 3.15 cfs @ 12.08 hrs, Volume= 0.235 af, Depth= 6.63"
Routed to nonexistent node 8P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.19"

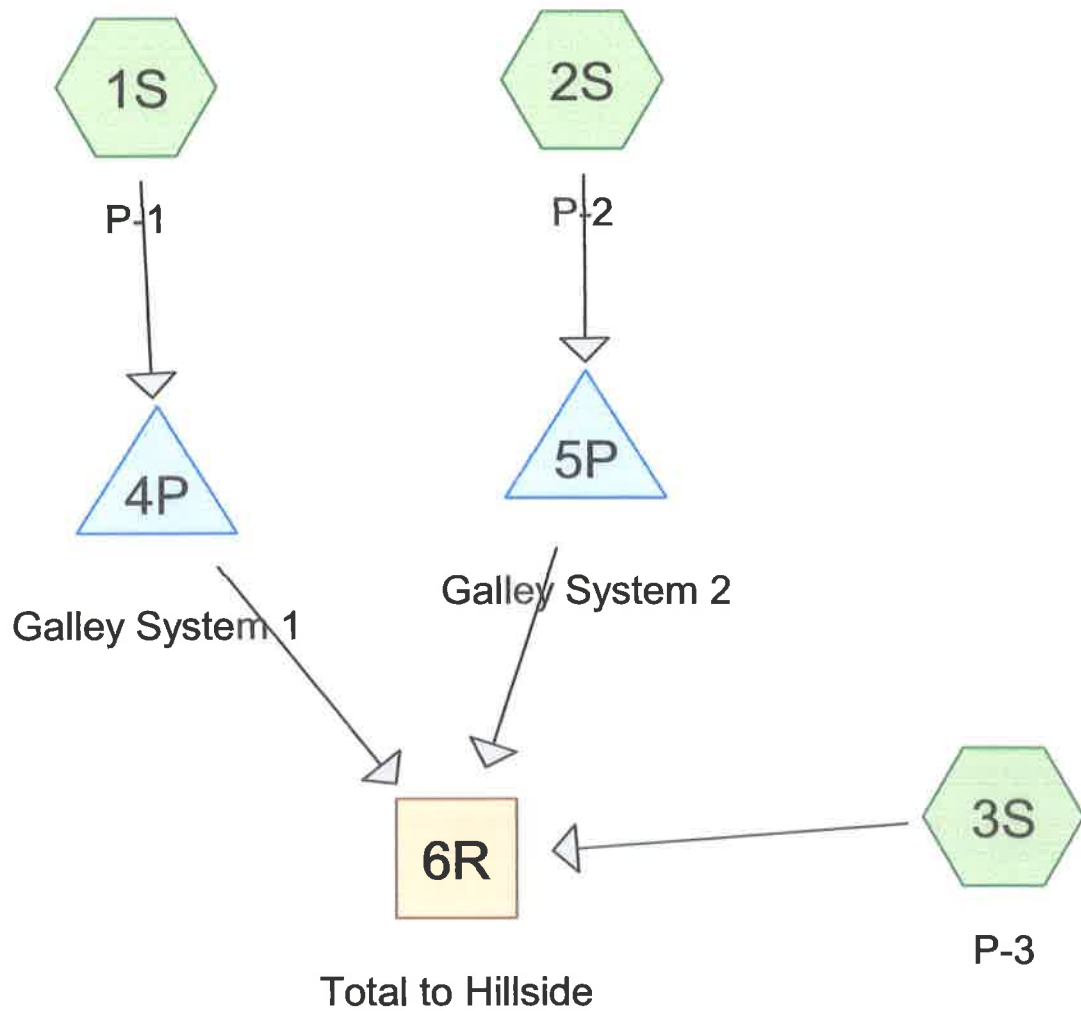
	Area (sf)	CN	Description
*	13,358	98	Impervious on-site, HSG A
*	2,454	39	>75% Grass cover on-site, Good, HSG A
	1,735	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	18,540	87	Weighted Average
	3,447		18.59% Pervious Area
	15,093		81.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: EX-1



APPENDIX 2



Routing Diagram for Proposed Conditions

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Proposed Conditions

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1 inch	Type III 24-hr		Default	24.00	1	1.00	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.32	2
3	10-yr	Type III 24-hr		Default	24.00	1	5.20	2
4	25-yr	Type III 24-hr		Default	24.00	1	6.38	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.19	2

Proposed Conditions*Type III 24-hr 1 inch Rainfall=1.00"*

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: P-1Runoff Area=10,556 sf 77.85% Impervious Runoff Depth=0.17"
Tc=6.0 min CN=85 Runoff=0.04 cfs 0.004 af**Subcatchment 2S: P-2**Runoff Area=4,732 sf 80.71% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=87 Runoff=0.02 cfs 0.002 af**Subcatchment 3S: P-3**Runoff Area=3,426 sf 28.31% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=56 Runoff=0.00 cfs 0.000 af**Reach 6R: Total to Hillside**Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af**Pond 4P: Galley System 1**Peak Elev=197.06' Storage=6 cf Inflow=0.04 cfs 0.004 af
Discarded=0.03 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.004 af**Pond 5P: Galley System 2**Peak Elev=193.58' Storage=4 cf Inflow=0.02 cfs 0.002 af
Discarded=0.02 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.002 af**Total Runoff Area = 0.430 ac Runoff Volume = 0.006 af Average Runoff Depth = 0.15"**
30.50% Pervious = 0.131 ac 69.50% Impervious = 0.299 ac

Proposed Conditions

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Type III 24-hr 1 inch Rainfall=1.00"

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Summary for Subcatchment 1S: P-1

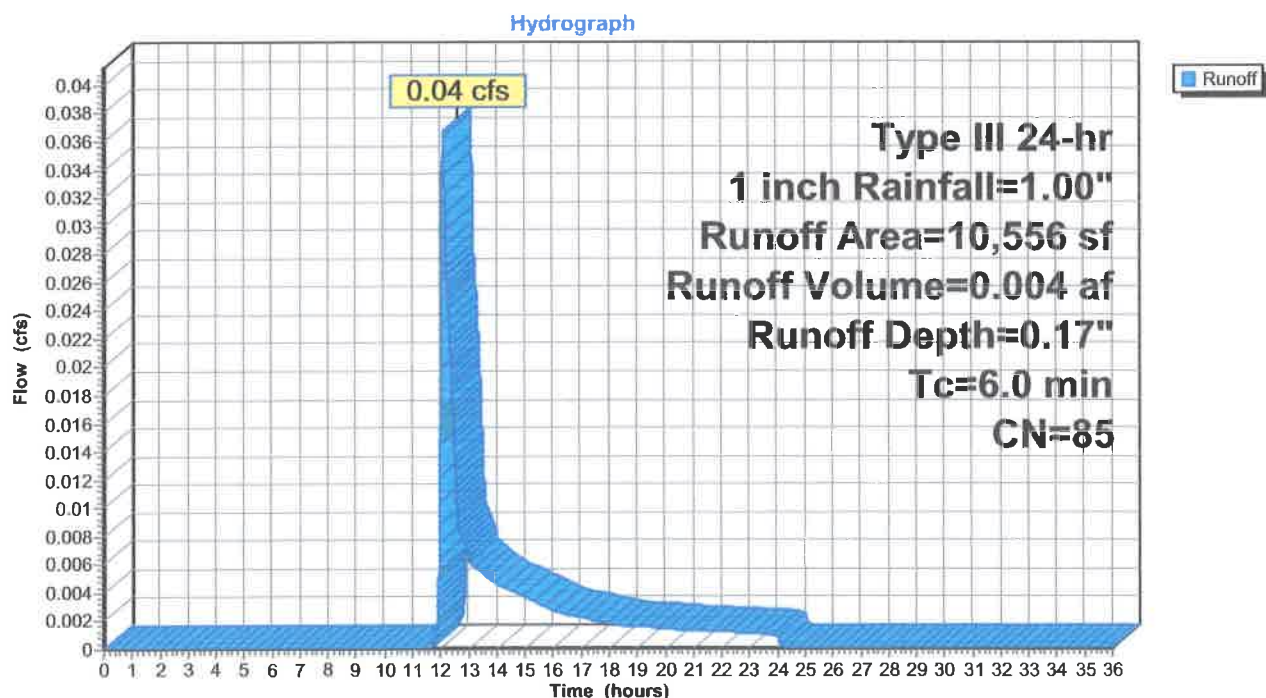
Runoff = 0.04 cfs @ 12.11 hrs, Volume= 0.004 af, Depth= 0.17"
Routed to Pond 4P : Galley System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

	Area (sf)	CN	Description
*	6,614	98	Impervious on-site, HSG A
*	1,345	39	>75% Grass cover on-site, Good, HSG A
	1,604	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	10,556	85	Weighted Average
	2,338		22.15% Pervious Area
	8,218		77.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: P-1



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Type III 24-hr 1 inch Rainfall=1.00"

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Summary for Subcatchment 2S: P-2

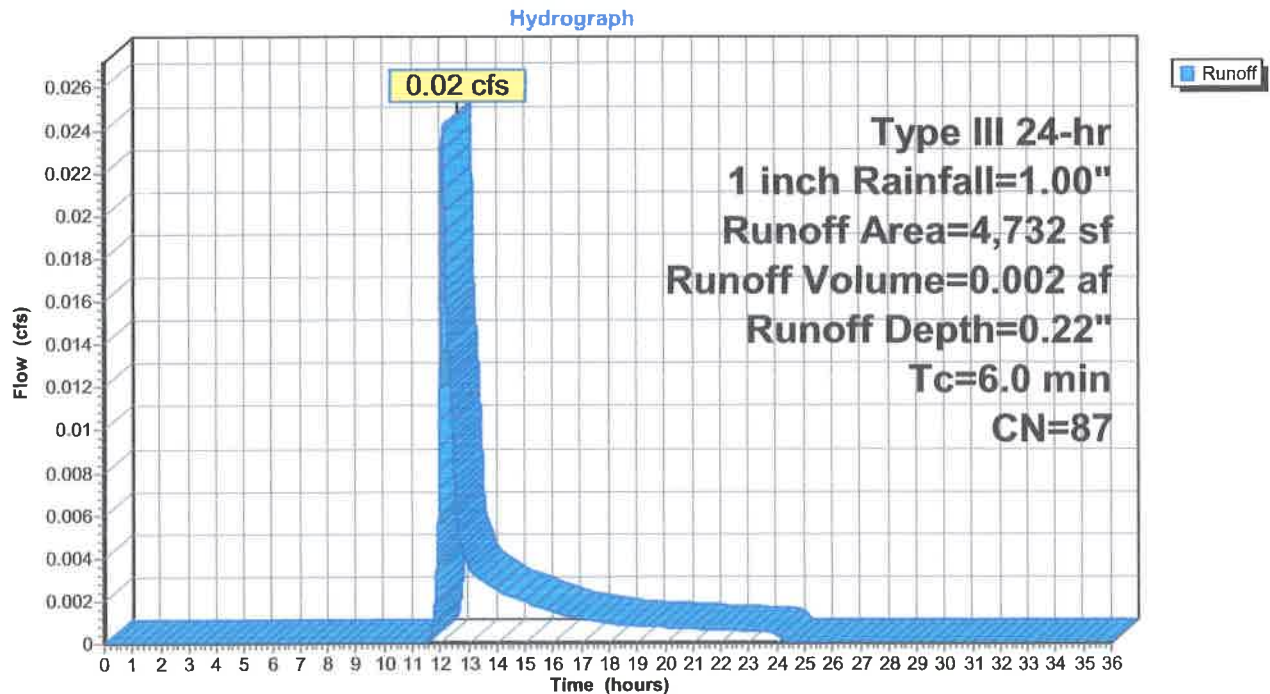
Runoff = 0.02 cfs @ 12.10 hrs, Volume= 0.002 af, Depth= 0.22"
Routed to Pond 5P : Galley System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

	Area (sf)	CN	Description
*	1,949	98	Impervious on-site, HSG A
*	913	39	>75% Grass cover on-site, Good, HSG A
	1,870	98	Roofs, HSG A
	4,732	87	Weighted Average
	913		19.29% Pervious Area
	3,819		80.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: P-2



Proposed Conditions

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Type III 24-hr 1 inch Rainfall=1.00"

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Summary for Subcatchment 3S: P-3

[45] Hint: Runoff=Zero

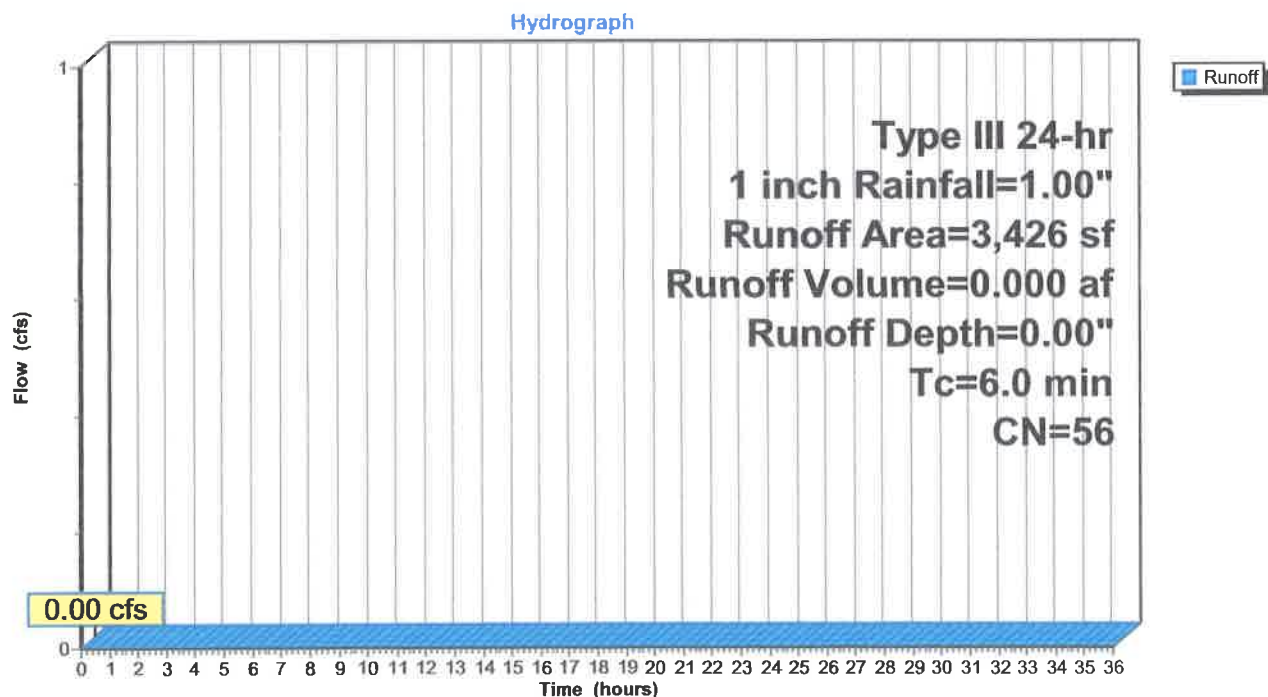
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach 6R : Total to Hillside

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

	Area (sf)	CN	Description
*	117	98	window wells
*	2,456	39	>75% Grass cover on-site, Good, HSG A
*	853	98	patio - walkway
	3,426	56	Weighted Average
	2,456		71.69% Pervious Area
	970		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 3S: P-3



Proposed Conditions

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Type III 24-hr 1 inch Rainfall=1.00"

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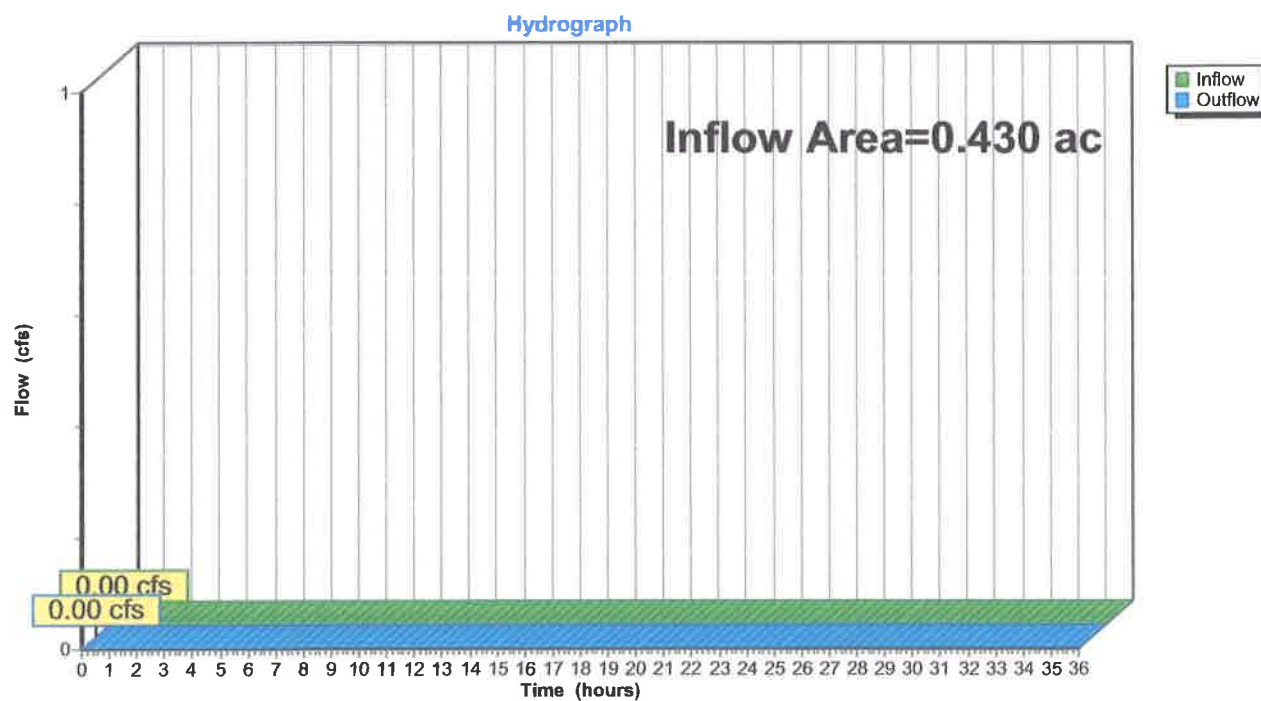
Summary for Reach 6R: Total to Hillside

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 69.50% Impervious, Inflow Depth = 0.00" for 1 inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Total to Hillside



Proposed Conditions

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Type III 24-hr 1 inch Rainfall=1.00"

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Summary for Pond 4P: Galley System 1

Inflow Area = 0.242 ac, 77.85% Impervious, Inflow Depth = 0.17" for 1 inch event
 Inflow = 0.04 cfs @ 12.11 hrs, Volume= 0.004 af
 Outflow = 0.03 cfs @ 12.16 hrs, Volume= 0.004 af, Atten= 13%, Lag= 3.1 min
 Discarded = 0.03 cfs @ 12.16 hrs, Volume= 0.004 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 197.06' @ 12.16 hrs Surf.Area= 269 sf Storage= 6 cf

Plug-Flow detention time= 3.2 min calculated for 0.004 af (100% of inflow)
 Center-of-Mass det. time= 3.2 min (903.5 - 900.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	197.00'	356 cf	6.40'W x 42.00'L x 5.50'H Field A 1,478 cf Overall - 589 cf Embedded = 890 cf x 40.0% Voids
#2A	198.00'	443 cf	Concrete Galley 4x4x4 x 10 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	202.50'	4,507 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		5,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.50	3	0	0
204.40	3	6	6
205.00	2,500	751	757
206.00	5,000	3,750	4,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	197.00'	0.05 cfs Exfiltration when above 197.00' Phase-In= 0.01'
#2	Device 3	204.40'	2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows C= 0.600 Limited to weir flow at low heads
#3	Primary	205.00'	18.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.05 cfs @ 12.16 hrs HW=197.06' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.00' (Free Discharge)

↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

↑2=Orifice/Grate (Controls 0.00 cfs)

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Type III 24-hr 1 inch Rainfall=1.00"

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Pond 4P: Galley System 1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

10 Chambers x 44.3 cf = 443.4 cf Chamber Storage

10 Chambers x 58.9 cf = 588.8 cf Displacement

1,478.4 cf Field - 588.8 cf Chambers = 889.6 cf Stone x 40.0% Voids = 355.9 cf Stone Storage

Chamber Storage + Stone Storage = 799.3 cf = 0.018 af

Overall Storage Efficiency = 54.1%

Overall System Size = 42.00' x 6.40' x 5.50'

10 Chambers

54.8 cy Field

32.9 cy Stone



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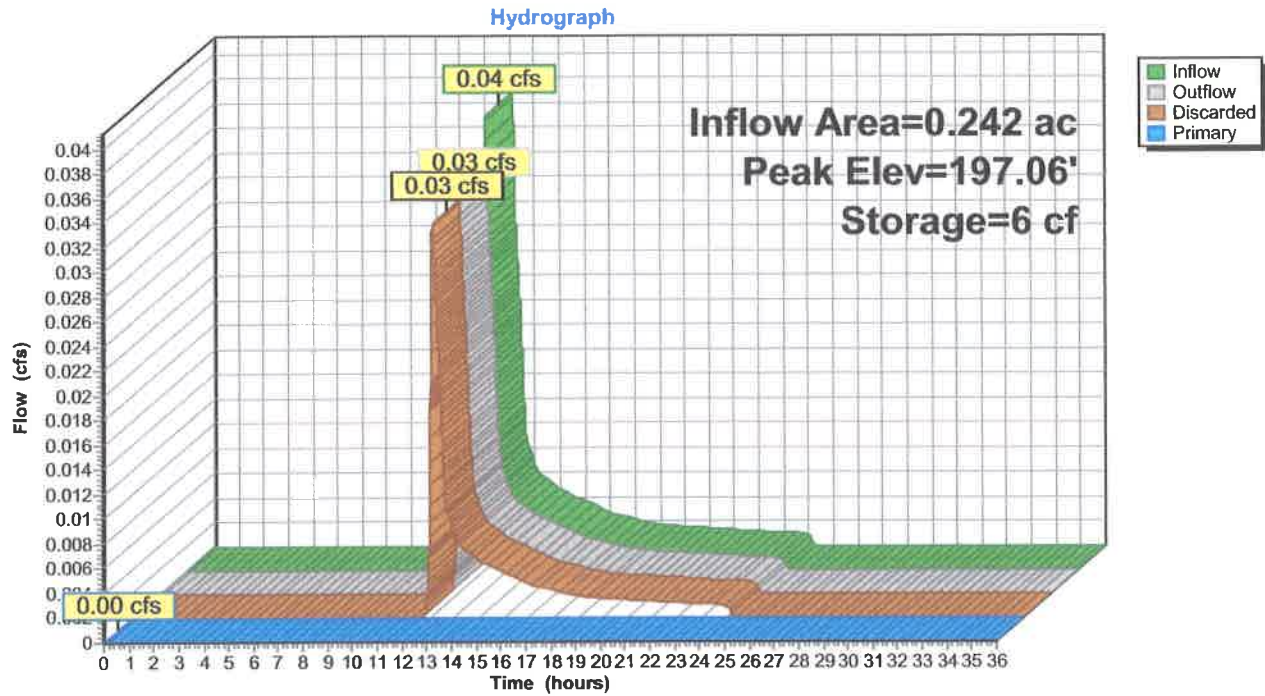
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Pond 4P: Galley System 1



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Summary for Pond 5P: Galley System 2

Inflow Area = 0.109 ac, 80.71% Impervious, Inflow Depth = 0.22" for 1 inch event
Inflow = 0.02 cfs @ 12.10 hrs, Volume= 0.002 af
Outflow = 0.02 cfs @ 12.15 hrs, Volume= 0.002 af, Atten= 11%, Lag= 2.7 min
Discarded = 0.02 cfs @ 12.15 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 193.58' @ 12.15 hrs Surf.Area= 115 sf Storage= 4 cf

Plug-Flow detention time= 3.0 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (887.4 - 884.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	159 cf	6.40'W x 18.00'L x 5.50'H Field A 634 cf Overall - 236 cf Embedded = 398 cf x 40.0% Voids
#2A	194.50'	177 cf	Concrete Galley 4x4x4 x 4 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	199.00'	508 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		844 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.00	3	0	0
201.00	3	6	6
202.00	1,000	502	508

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	201.00'	2.0" x 2.0" Horiz. 2 CBs X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.15 hrs HW=193.58' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=193.50' (Free Discharge)
↑2=2 CBs (Controls 0.00 cfs)

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Type III 24-hr 1 inch Rainfall=1.00"

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Pond 5P: Galley System 2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

4 Chambers x 44.3 cf = 177.4 cf Chamber Storage

4 Chambers x 58.9 cf = 235.5 cf Displacement

633.6 cf Field - 235.5 cf Chambers = 398.1 cf Stone x 40.0% Voids = 159.2 cf Stone Storage

Chamber Storage + Stone Storage = 336.6 cf = 0.008 af

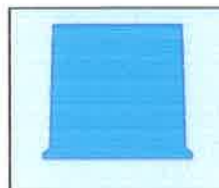
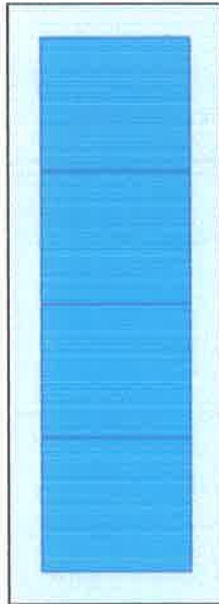
Overall Storage Efficiency = 53.1%

Overall System Size = 18.00' x 6.40' x 5.50'

4 Chambers

23.5 cy Field

14.7 cy Stone



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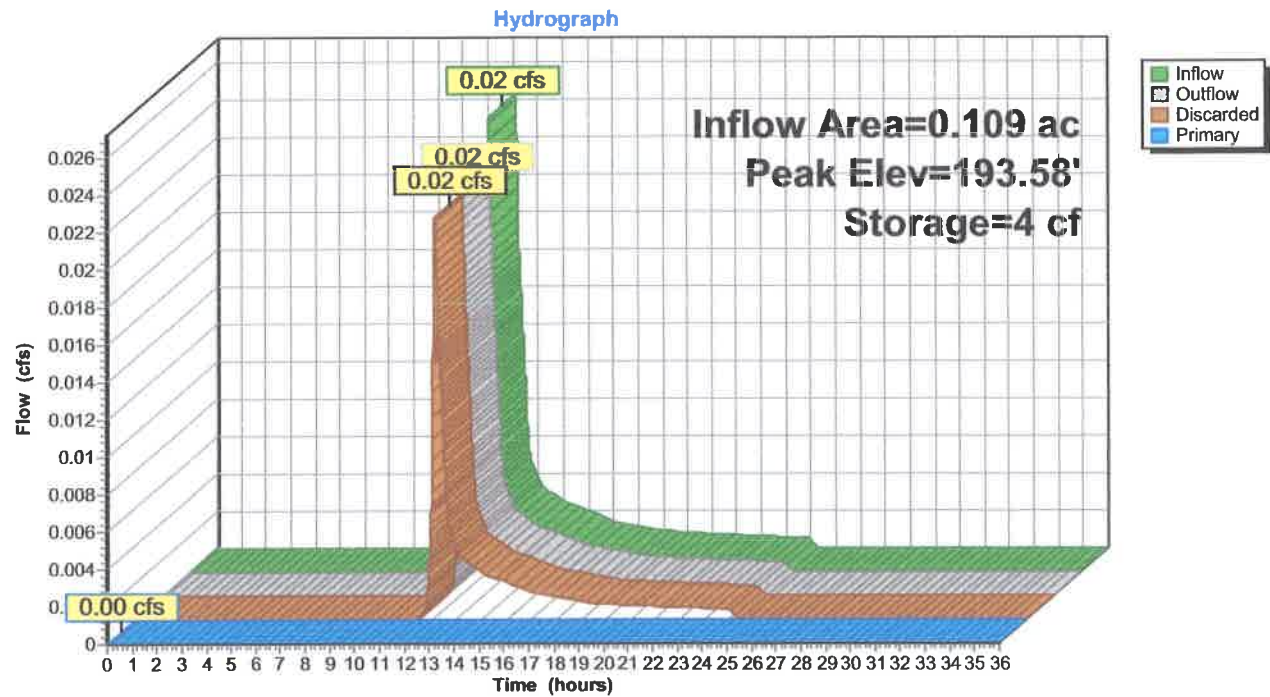
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Pond 5P: Galley System 2



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Type III 24-hr 2-yr Rainfall=3.32"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: P-1Runoff Area=10,556 sf 77.85% Impervious Runoff Depth=1.86"
Tc=6.0 min CN=85 Runoff=0.53 cfs 0.038 af**Subcatchment 2S: P-2**Runoff Area=4,732 sf 80.71% Impervious Runoff Depth=2.02"
Tc=6.0 min CN=87 Runoff=0.26 cfs 0.018 af**Subcatchment 3S: P-3**Runoff Area=3,426 sf 28.31% Impervious Runoff Depth=0.32"
Tc=6.0 min CN=56 Runoff=0.01 cfs 0.002 af**Reach 6R: Total to Hillside**Inflow=0.01 cfs 0.002 af
Outflow=0.01 cfs 0.002 af**Pond 4P: Galley System 1**Peak Elev=200.97' Storage=620 cf Inflow=0.53 cfs 0.038 af
Discarded=0.05 cfs 0.038 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.038 af**Pond 5P: Galley System 2**Peak Elev=198.44' Storage=312 cf Inflow=0.26 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af**Total Runoff Area = 0.430 ac Runoff Volume = 0.058 af Average Runoff Depth = 1.62"**
30.50% Pervious = 0.131 ac 69.50% Impervious = 0.299 ac

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Type III 24-hr 2-yr Rainfall=3.32"

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Summary for Subcatchment 1S: P-1

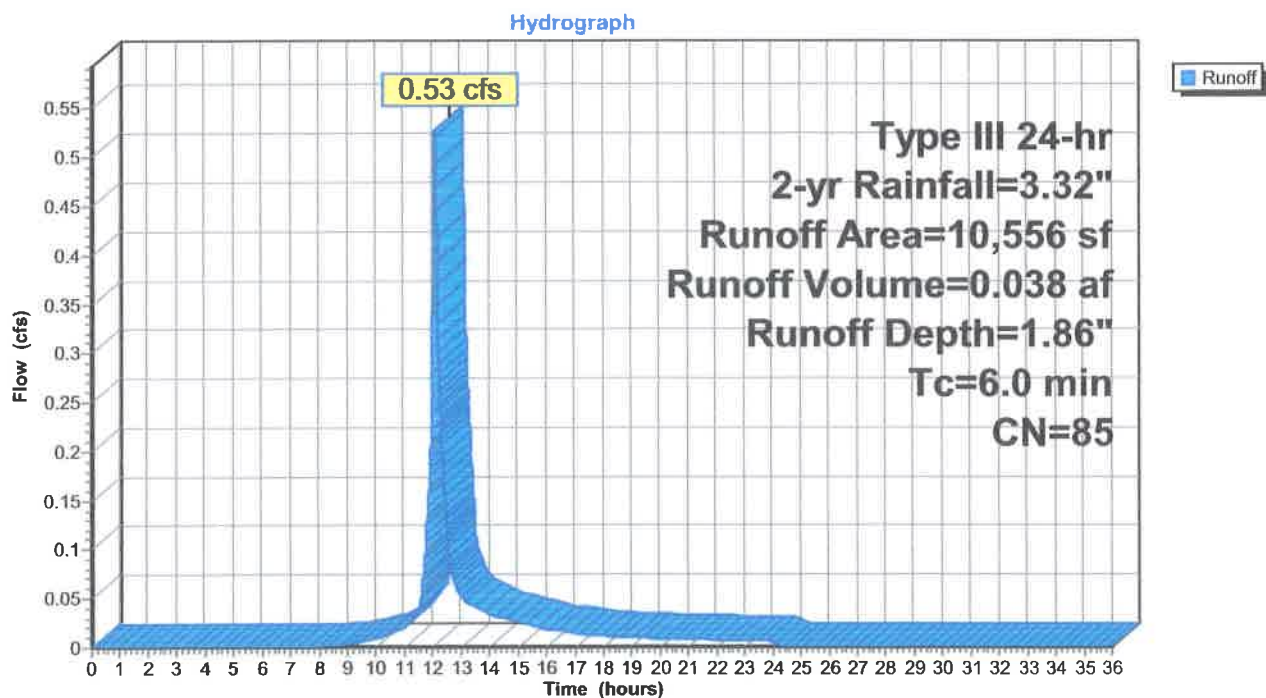
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 1.86"
Routed to Pond 4P : Galley System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	6,614	98	Impervious on-site, HSG A
*	1,345	39	>75% Grass cover on-site, Good, HSG A
	1,604	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	10,556	85	Weighted Average
	2,338		22.15% Pervious Area
	8,218		77.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: P-1



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Summary for Subcatchment 2S: P-2

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 2.02"
Routed to Pond 5P : Galley System 2

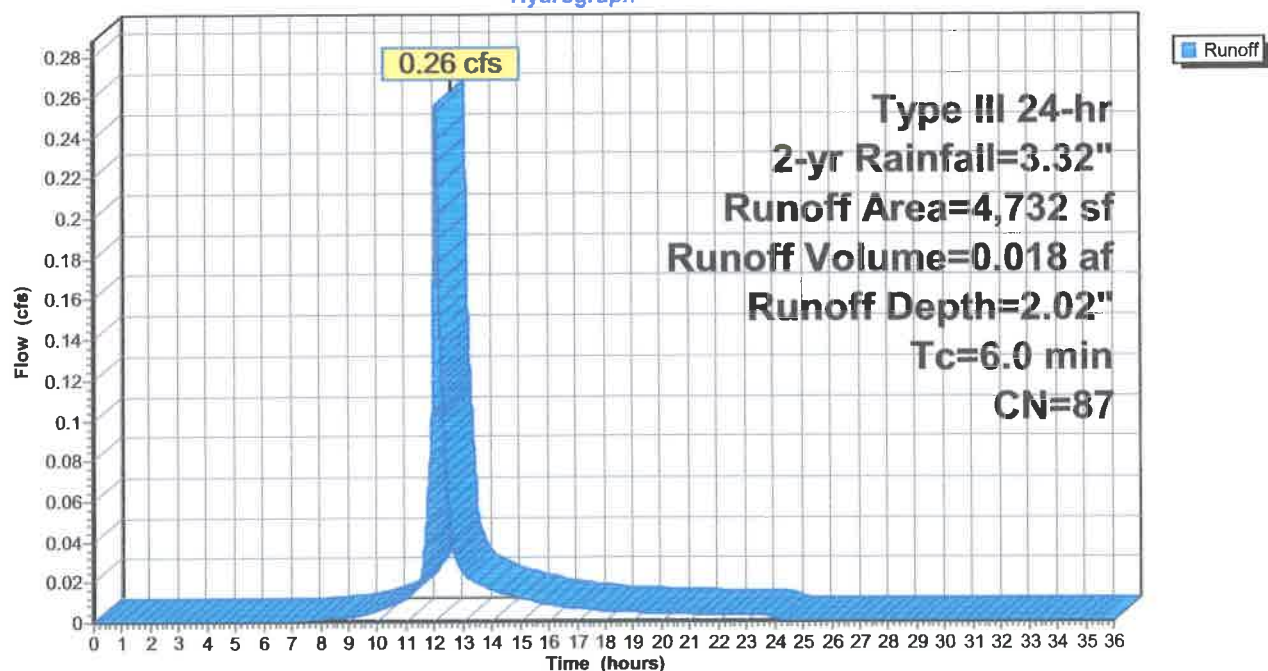
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	1,949	98	Impervious on-site, HSG A
*	913	39	>75% Grass cover on-site, Good, HSG A
	1,870	98	Roofs, HSG A
	4,732	87	Weighted Average
	913		19.29% Pervious Area
	3,819		80.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: P-2

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.32"

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Summary for Subcatchment 3S: P-3

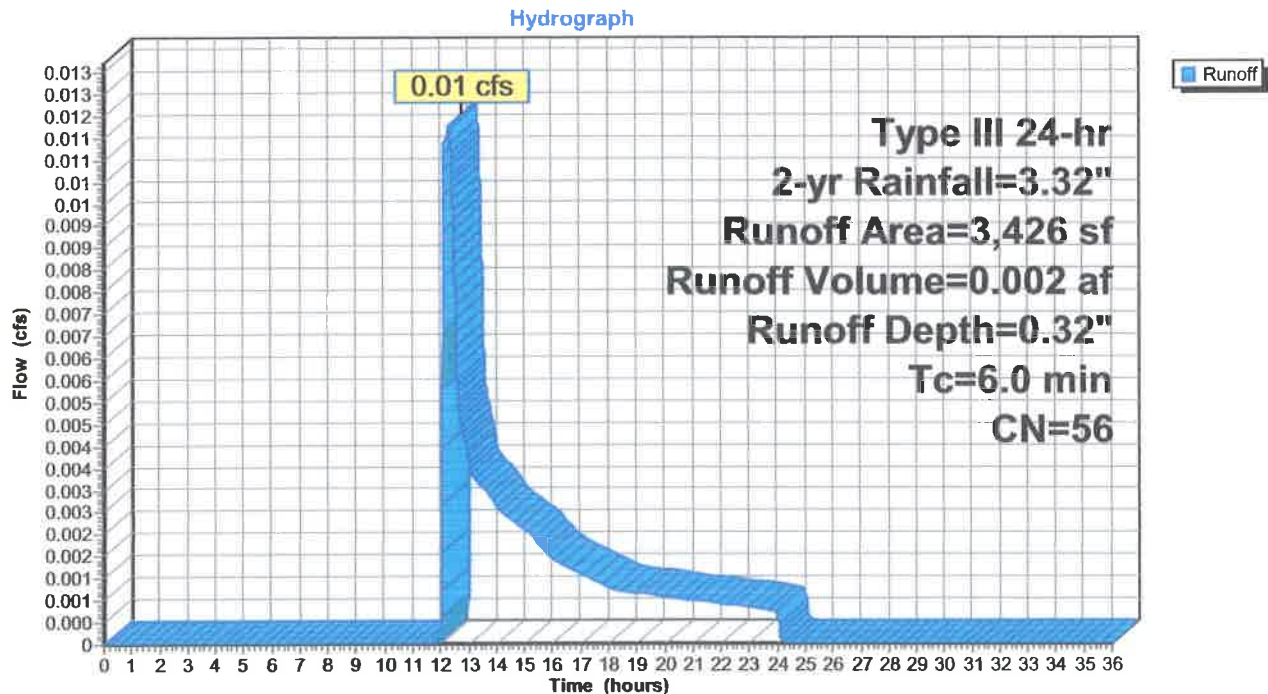
Runoff = 0.01 cfs @ 12.28 hrs, Volume= 0.002 af, Depth= 0.32"
Routed to Reach 6R : Total to Hillside

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.32"

	Area (sf)	CN	Description
*	117	98	window wells
*	2,456	39	>75% Grass cover on-site, Good, HSG A
*	853	98	patio - walkway
	3,426	56	Weighted Average
	2,456		71.69% Pervious Area
	970		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 3S: P-3



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Type III 24-hr 2-yr Rainfall=3.32"

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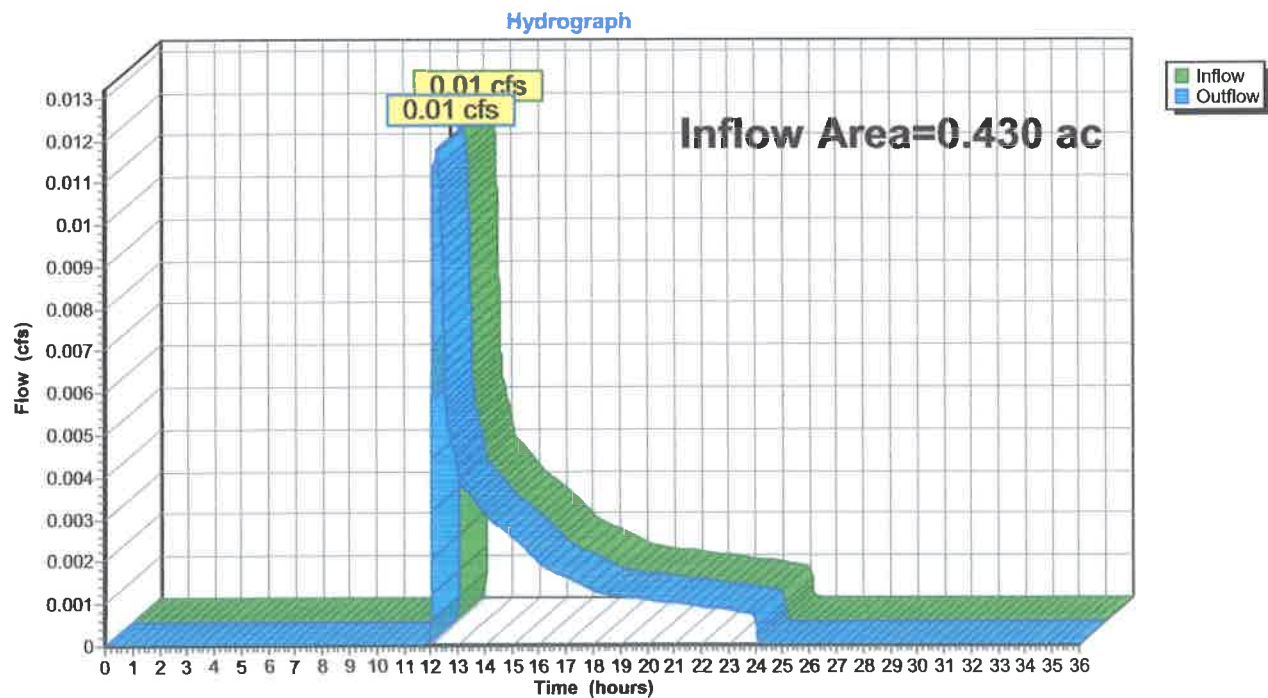
Summary for Reach 6R: Total to Hillside

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 69.50% Impervious, Inflow Depth = 0.06" for 2-yr event
Inflow = 0.01 cfs @ 12.28 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 12.28 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Total to Hillside



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Type III 24-hr 2-yr Rainfall=3.32"

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Summary for Pond 4P: Galley System 1

Inflow Area = 0.242 ac, 77.85% Impervious, Inflow Depth = 1.86" for 2-yr event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.05 cfs @ 11.64 hrs, Volume= 0.038 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 11.64 hrs, Volume= 0.038 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 200.97' @ 13.04 hrs Surf.Area= 269 sf Storage= 620 cf

Plug-Flow detention time= 104.5 min calculated for 0.038 af (100% of inflow)
 Center-of-Mass det. time= 104.5 min (928.9 - 824.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	197.00'	356 cf	6.40'W x 42.00'L x 5.50'H Field A 1,478 cf Overall - 589 cf Embedded = 890 cf x 40.0% Voids
#2A	198.00'	443 cf	Concrete Galley 4x4x4 x 10 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	202.50'	4,507 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		5,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.50	3	0	0
204.40	3	6	6
205.00	2,500	751	757
206.00	5,000	3,750	4,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	197.00'	0.05 cfs Exfiltration when above 197.00' Phase-In= 0.01'
#2	Device 3	204.40'	2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows C= 0.600 Limited to weir flow at low heads
#3	Primary	205.00'	18.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.05 cfs @ 11.64 hrs HW=197.09' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.00' (Free Discharge)
 ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.32"

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Pond 4P: Galley System 1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

10 Chambers x 44.3 cf = 443.4 cf Chamber Storage

10 Chambers x 58.9 cf = 588.8 cf Displacement

1,478.4 cf Field - 588.8 cf Chambers = 889.6 cf Stone x 40.0% Voids = 355.9 cf Stone Storage

Chamber Storage + Stone Storage = 799.3 cf = 0.018 af

Overall Storage Efficiency = 54.1%

Overall System Size = 42.00' x 6.40' x 5.50'

10 Chambers

54.8 cy Field

32.9 cy Stone



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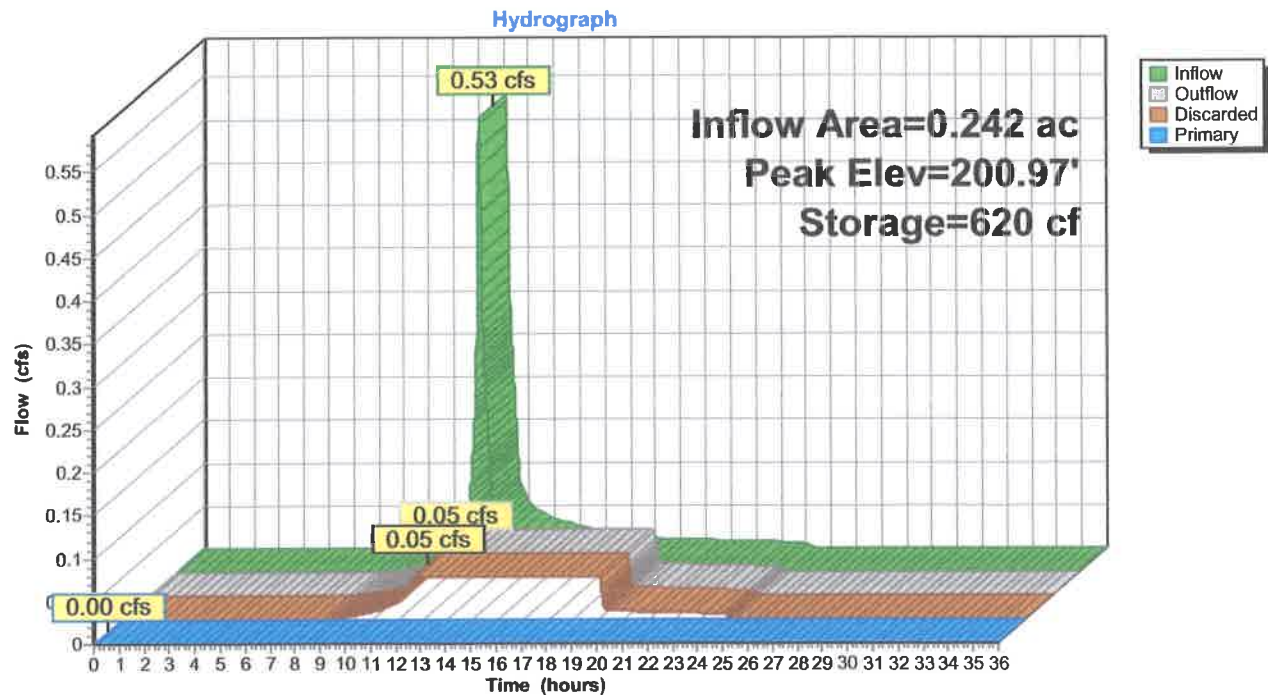
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Pond 4P: Galley System 1



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Summary for Pond 5P: Galley System 2

Inflow Area = 0.109 ac, 80.71% Impervious, Inflow Depth = 2.02" for 2-yr event
 Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.018 af
 Outflow = 0.02 cfs @ 11.59 hrs, Volume= 0.018 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.59 hrs, Volume= 0.018 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 198.44' @ 13.13 hrs Surf.Area= 115 sf Storage= 312 cf

Plug-Flow detention time= 120.4 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 120.4 min (937.7 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	159 cf	6.40'W x 18.00'L x 5.50'H Field A 634 cf Overall - 236 cf Embedded = 398 cf x 40.0% Voids
#2A	194.50'	177 cf	Concrete Galley 4x4x4 x 4 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	199.00'	508 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		844 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.00	3	0	0
201.00	3	6	6
202.00	1,000	502	508

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	201.00'	2.0" x 2.0" Horiz. 2 CBs X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 11.59 hrs HW=193.59' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=193.50' (Free Discharge)
 ↑2=2 CBs (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.32"

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Pond 5P: Galley System 2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

4 Chambers x 44.3 cf = 177.4 cf Chamber Storage

4 Chambers x 58.9 cf = 235.5 cf Displacement

633.6 cf Field - 235.5 cf Chambers = 398.1 cf Stone x 40.0% Voids = 159.2 cf Stone Storage

Chamber Storage + Stone Storage = 336.6 cf = 0.008 af

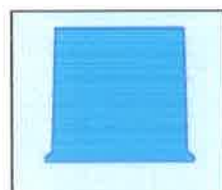
Overall Storage Efficiency = 53.1%

Overall System Size = 18.00' x 6.40' x 5.50'

4 Chambers

23.5 cy Field

14.7 cy Stone



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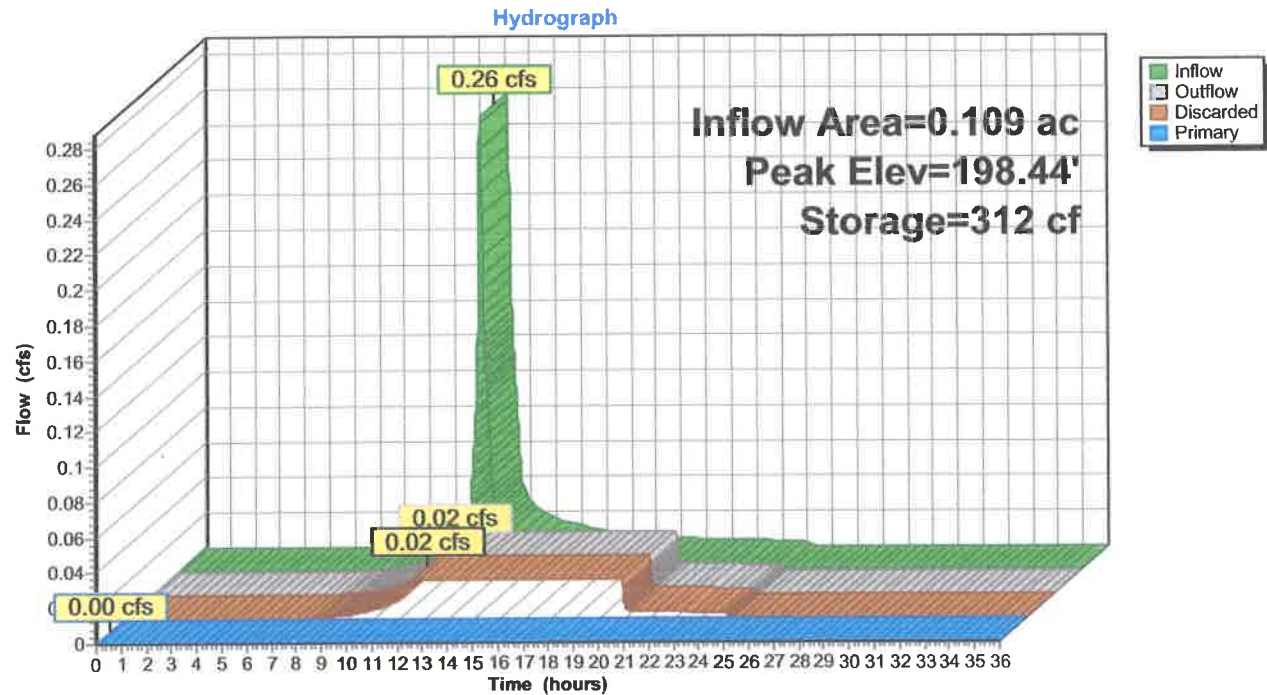
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Pond 5P: Galley System 2



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Type III 24-hr 10-yr Rainfall=5.20"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: P-1Runoff Area=10,556 sf 77.85% Impervious Runoff Depth=3.55"
Tc=6.0 min CN=85 Runoff=1.00 cfs 0.072 af**Subcatchment 2S: P-2**Runoff Area=4,732 sf 80.71% Impervious Runoff Depth=3.76"
Tc=6.0 min CN=87 Runoff=0.47 cfs 0.034 af**Subcatchment 3S: P-3**Runoff Area=3,426 sf 28.31% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=56 Runoff=0.09 cfs 0.008 af**Reach 6R: Total to Hillside**Inflow=0.43 cfs 0.016 af
Outflow=0.43 cfs 0.016 af**Pond 4P: Galley System 1**Peak Elev=204.98' Storage=1,516 cf Inflow=1.00 cfs 0.072 af
Discarded=0.05 cfs 0.072 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.072 af**Pond 5P: Galley System 2**Peak Elev=201.00' Storage=343 cf Inflow=0.47 cfs 0.034 af
Discarded=0.02 cfs 0.025 af Primary=0.34 cfs 0.008 af Outflow=0.37 cfs 0.034 af**Total Runoff Area = 0.430 ac Runoff Volume = 0.113 af Average Runoff Depth = 3.16"**
30.50% Pervious = 0.131 ac 69.50% Impervious = 0.299 ac

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Type III 24-hr 10-yr Rainfall=5.20"

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Summary for Subcatchment 1S: P-1

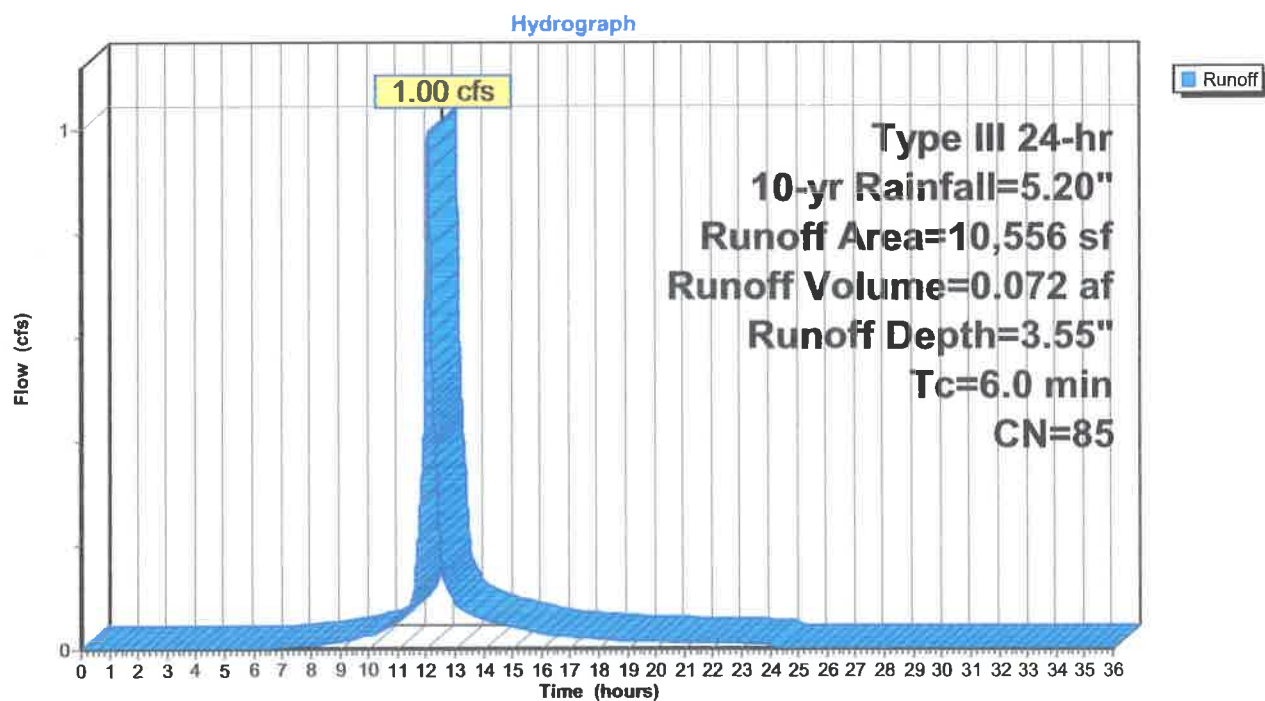
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 3.55"
Routed to Pond 4P : Galley System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
*	6,614	98	Impervious on-site, HSG A
*	1,345	39	>75% Grass cover on-site, Good, HSG A
	1,604	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	10,556	85	Weighted Average
	2,338		22.15% Pervious Area
	8,218		77.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: P-1



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Summary for Subcatchment 2S: P-2

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.034 af, Depth= 3.76"
Routed to Pond 5P : Galley System 2

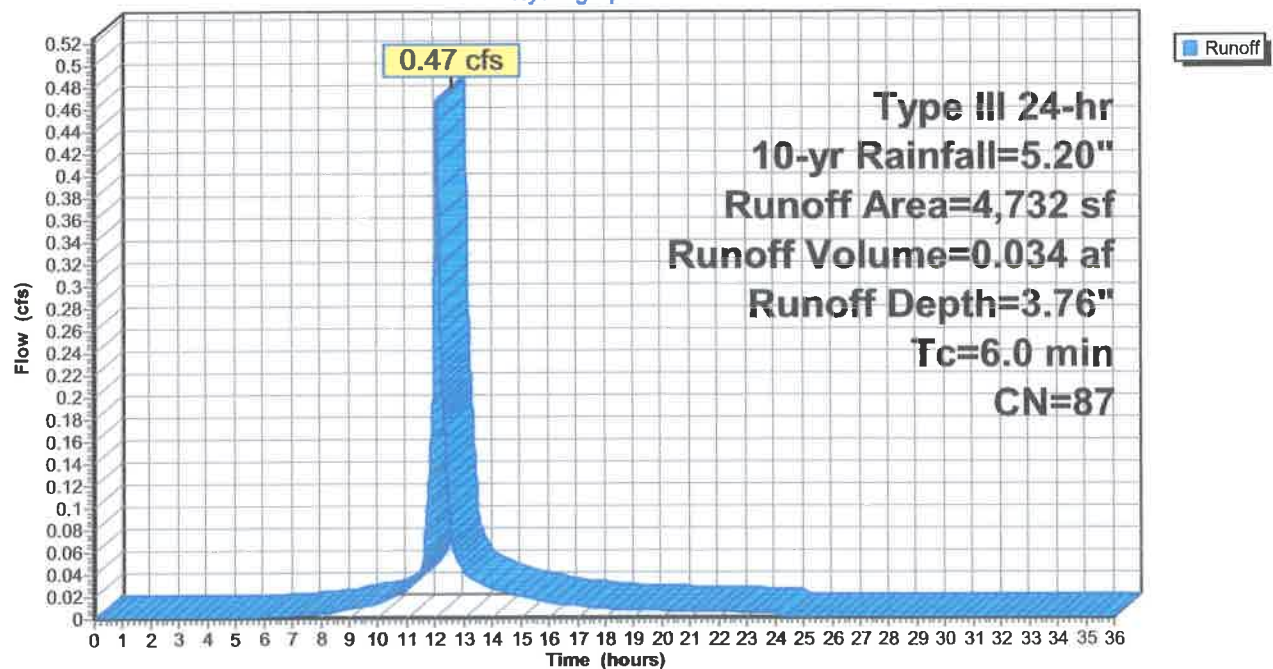
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
*	1,949	98	Impervious on-site, HSG A
*	913	39	>75% Grass cover on-site, Good, HSG A
	1,870	98	Roofs, HSG A
	4,732	87	Weighted Average
	913		19.29% Pervious Area
	3,819		80.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: P-2

Hydrograph



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Type III 24-hr 10-yr Rainfall=5.20"

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Summary for Subcatchment 3S: P-3

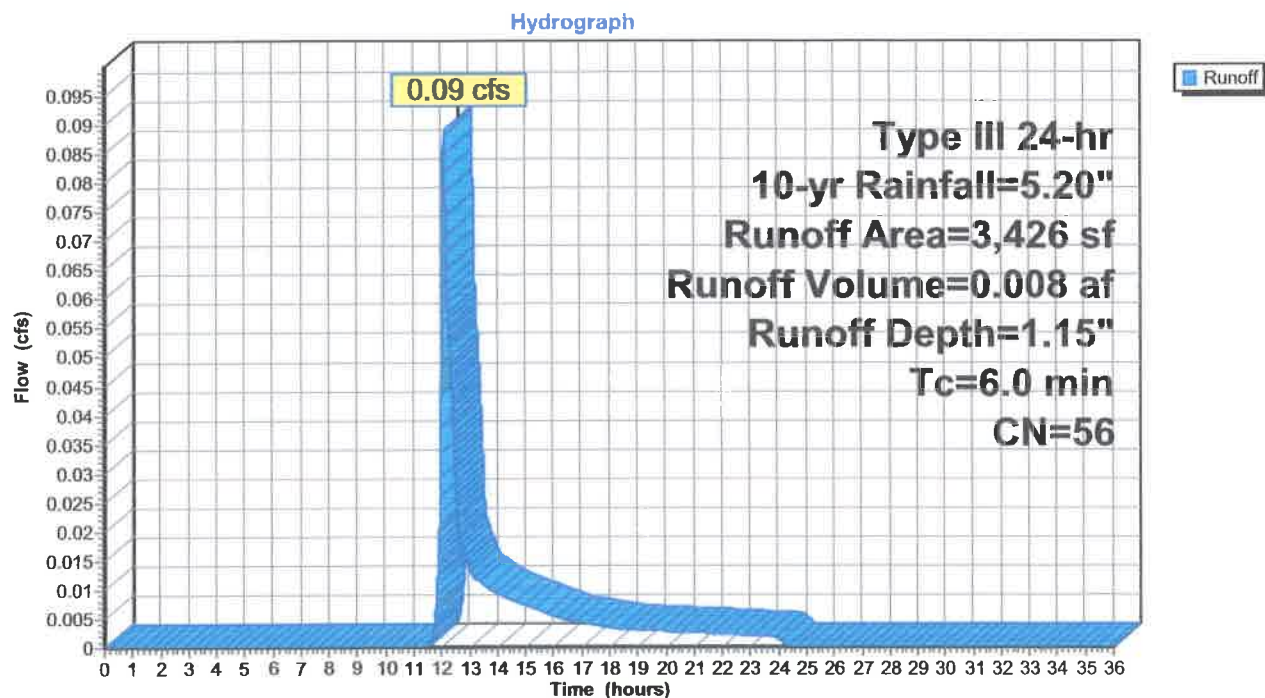
Runoff = 0.09 cfs @ 12.10 hrs, Volume= 0.008 af, Depth= 1.15"
Routed to Reach 6R : Total to Hillside

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

	Area (sf)	CN	Description
*	117	98	window wells
*	2,456	39	>75% Grass cover on-site, Good, HSG A
*	853	98	patio - walkway
	3,426	56	Weighted Average
	2,456		71.69% Pervious Area
	970		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 3S: P-3



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Type III 24-hr 10-yr Rainfall=5.20"

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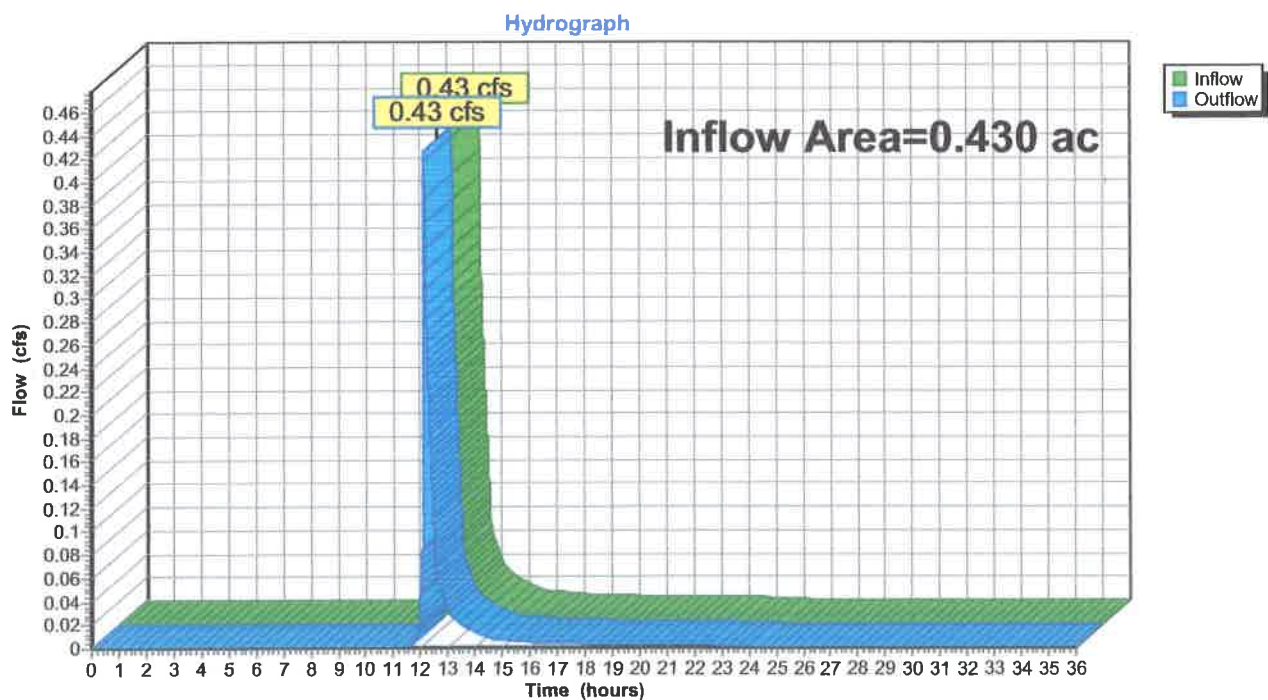
Summary for Reach 6R: Total to Hillside

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 69.50% Impervious, Inflow Depth = 0.45" for 10-yr event
Inflow = 0.43 cfs @ 12.14 hrs, Volume= 0.016 af
Outflow = 0.43 cfs @ 12.14 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Total to Hillside



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Summary for Pond 4P: Galley System 1

Inflow Area = 0.242 ac, 77.85% Impervious, Inflow Depth = 3.55" for 10-yr event
Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.072 af
Outflow = 0.05 cfs @ 11.03 hrs, Volume= 0.072 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.03 hrs, Volume= 0.072 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 204.98' @ 14.58 hrs Surf.Area= 2,701 sf Storage= 1,516 cf

Plug-Flow detention time= 284.3 min calculated for 0.072 af (100% of inflow)
Center-of-Mass det. time= 284.2 min (1,090.3 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	197.00'	356 cf	6.40'W x 42.00'L x 5.50'H Field A 1,478 cf Overall - 589 cf Embedded = 890 cf x 40.0% Voids
#2A	198.00'	443 cf	Concrete Galley 4x4x4 x 10 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	202.50'	4,507 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		5,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.50	3	0	0
204.40	3	6	6
205.00	2,500	751	757
206.00	5,000	3,750	4,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	197.00'	0.05 cfs Exfiltration when above 197.00' Phase-In= 0.01'
#2	Device 3	204.40'	2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows C= 0.600 Limited to weir flow at low heads
#3	Primary	205.00'	18.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.05 cfs @ 11.03 hrs HW=197.09' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=197.00' (Free Discharge)

↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

↑ **2=Orifice/Grate** (Controls 0.00 cfs)

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Type III 24-hr 10-yr Rainfall=5.20"

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Pond 4P: Galley System 1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

10 Chambers x 44.3 cf = 443.4 cf Chamber Storage

10 Chambers x 58.9 cf = 588.8 cf Displacement

1,478.4 cf Field - 588.8 cf Chambers = 889.6 cf Stone x 40.0% Voids = 355.9 cf Stone Storage

Chamber Storage + Stone Storage = 799.3 cf = 0.018 af

Overall Storage Efficiency = 54.1%

Overall System Size = 42.00' x 6.40' x 5.50'

10 Chambers

54.8 cy Field

32.9 cy Stone



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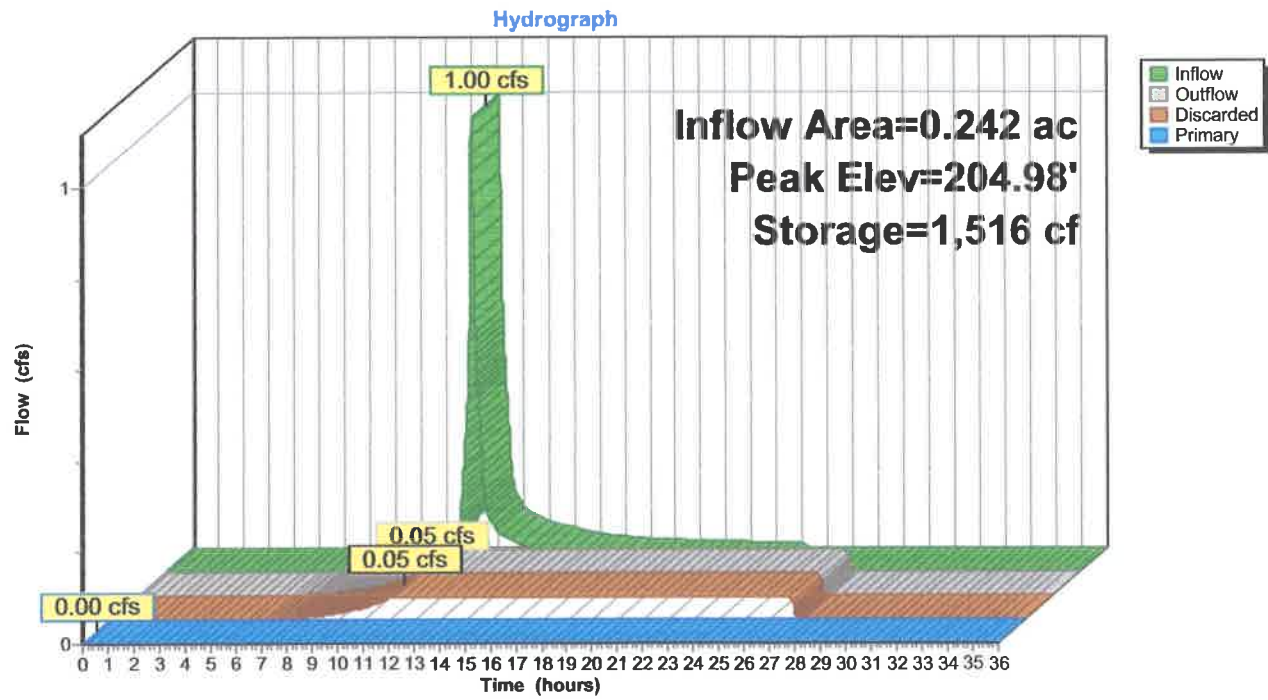
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Pond 4P: Galley System 1



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Summary for Pond 5P: Galley System 2

Inflow Area = 0.109 ac, 80.71% Impervious, Inflow Depth = 3.76" for 10-yr event
 Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.034 af
 Outflow = 0.37 cfs @ 12.14 hrs, Volume= 0.034 af, Atten= 22%, Lag= 3.1 min
 Discarded = 0.02 cfs @ 12.14 hrs, Volume= 0.025 af
 Primary = 0.34 cfs @ 12.14 hrs, Volume= 0.008 af
 Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 201.00' @ 12.14 hrs Surf.Area= 123 sf Storage= 343 cf

Plug-Flow detention time= 112.9 min calculated for 0.034 af (99% of inflow)
 Center-of-Mass det. time= 106.0 min (905.8 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	159 cf	6.40'W x 18.00'L x 5.50'H Field A 634 cf Overall - 236 cf Embedded = 398 cf x 40.0% Voids
#2A	194.50'	177 cf	Concrete Galley 4x4x4 x 4 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	199.00'	508 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		844 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.00	3	0	0
201.00	3	6	6
202.00	1,000	502	508

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	201.00'	2.0" x 2.0" Horiz. 2 CBs X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.14 hrs HW=201.00' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.10 cfs @ 12.14 hrs HW=201.00' (Free Discharge)
 ↑ **2=2 CBs** (Weir Controls 0.10 cfs @ 0.22 fps)

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Pond 5P: Galley System 2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

4 Chambers x 44.3 cf = 177.4 cf Chamber Storage

4 Chambers x 58.9 cf = 235.5 cf Displacement

633.6 cf Field - 235.5 cf Chambers = 398.1 cf Stone x 40.0% Voids = 159.2 cf Stone Storage

Chamber Storage + Stone Storage = 336.6 cf = 0.008 af

Overall Storage Efficiency = 53.1%

Overall System Size = 18.00' x 6.40' x 5.50'

4 Chambers

23.5 cy Field

14.7 cy Stone



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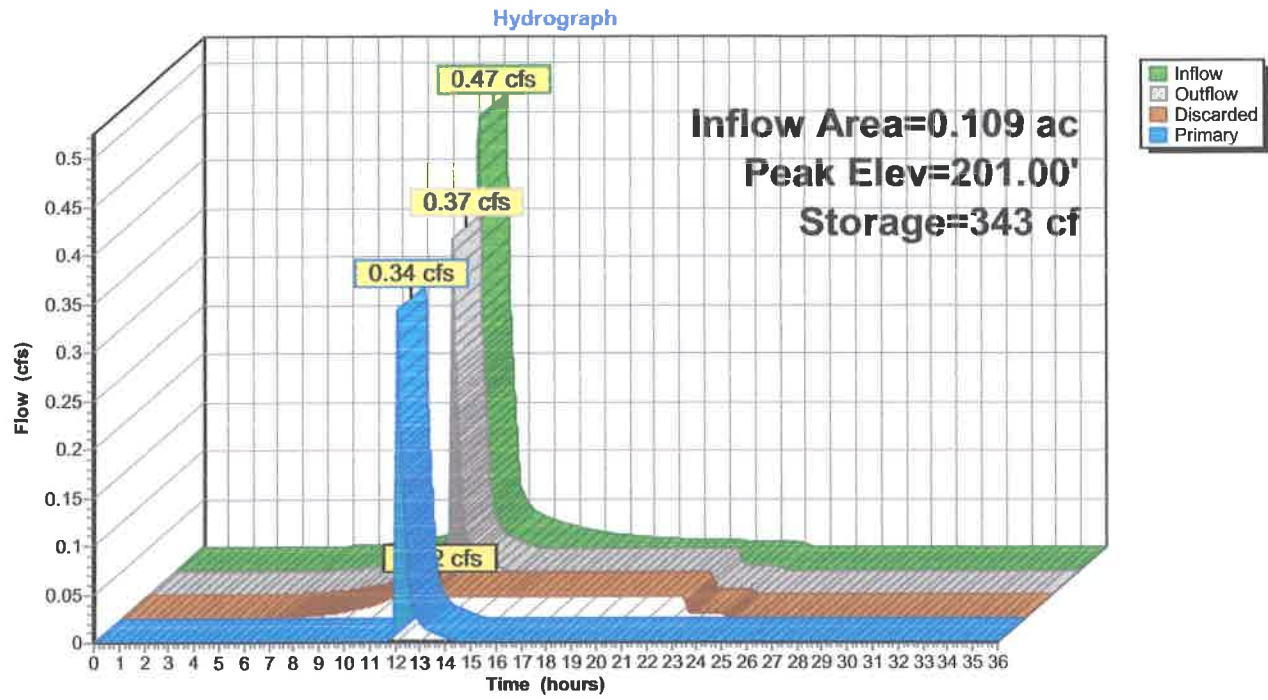
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Pond 5P: Galley System 2



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Type III 24-hr 25-yr Rainfall=6.38"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: P-1

Runoff Area=10,556 sf 77.85% Impervious Runoff Depth=4.66"

Tc=6.0 min CN=85 Runoff=1.30 cfs 0.094 af

Subcatchment 2S: P-2

Runoff Area=4,732 sf 80.71% Impervious Runoff Depth=4.88"

Tc=6.0 min CN=87 Runoff=0.60 cfs 0.044 af

Subcatchment 3S: P-3

Runoff Area=3,426 sf 28.31% Impervious Runoff Depth=1.83"

Tc=6.0 min CN=56 Runoff=0.16 cfs 0.012 af

Reach 6R: Total to Hillside

Inflow=0.73 cfs 0.043 af

Outflow=0.73 cfs 0.043 af

Pond 4P: Galley System 1

Peak Elev=205.03' Storage=1,630 cf Inflow=1.30 cfs 0.094 af

Discarded=0.05 cfs 0.079 af Primary=0.32 cfs 0.015 af Outflow=0.37 cfs 0.094 af

Pond 5P: Galley System 2

Peak Elev=201.01' Storage=343 cf Inflow=0.60 cfs 0.044 af

Discarded=0.02 cfs 0.028 af Primary=0.58 cfs 0.016 af Outflow=0.60 cfs 0.044 af

Total Runoff Area = 0.430 ac Runoff Volume = 0.150 af Average Runoff Depth = 4.20"

30.50% Pervious = 0.131 ac 69.50% Impervious = 0.299 ac

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Summary for Subcatchment 1S: P-1

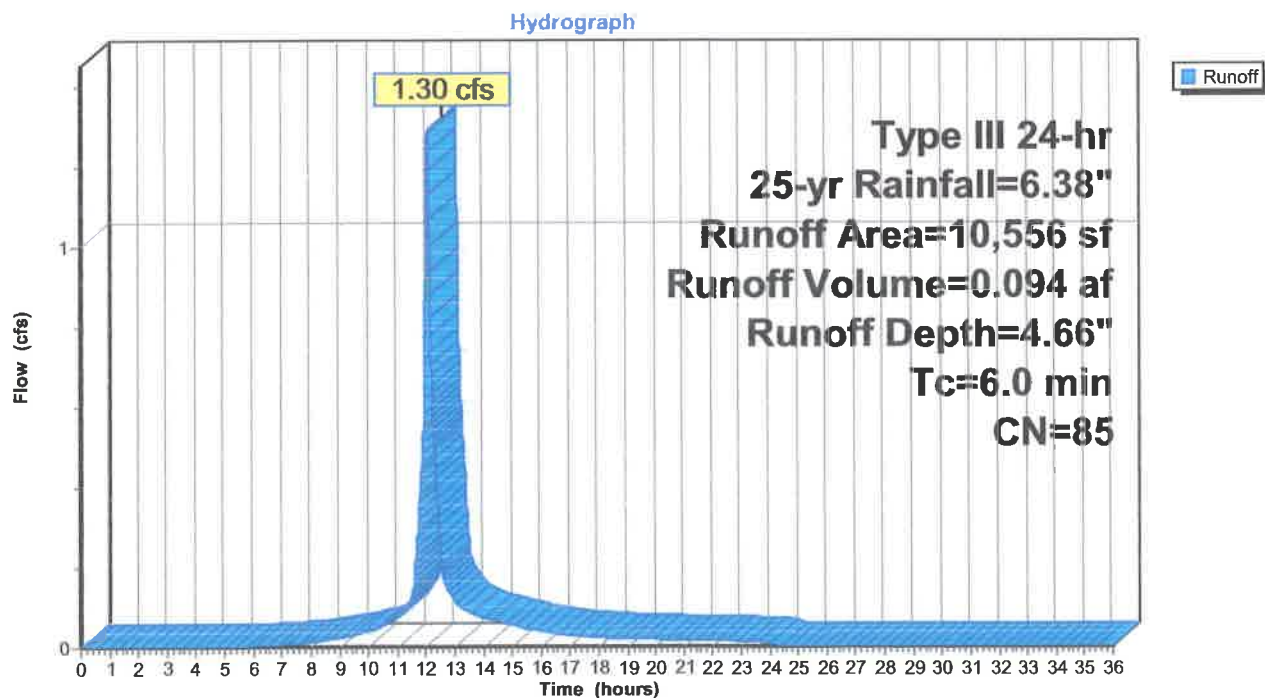
Runoff = 1.30 cfs @ 12.09 hrs, Volume= 0.094 af, Depth= 4.66"
Routed to Pond 4P : Galley System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.38"

	Area (sf)	CN	Description
*	6,614	98	Impervious on-site, HSG A
*	1,345	39	>75% Grass cover on-site, Good, HSG A
	1,604	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	10,556	85	Weighted Average
	2,338		22.15% Pervious Area
	8,218		77.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: P-1



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Summary for Subcatchment 2S: P-2

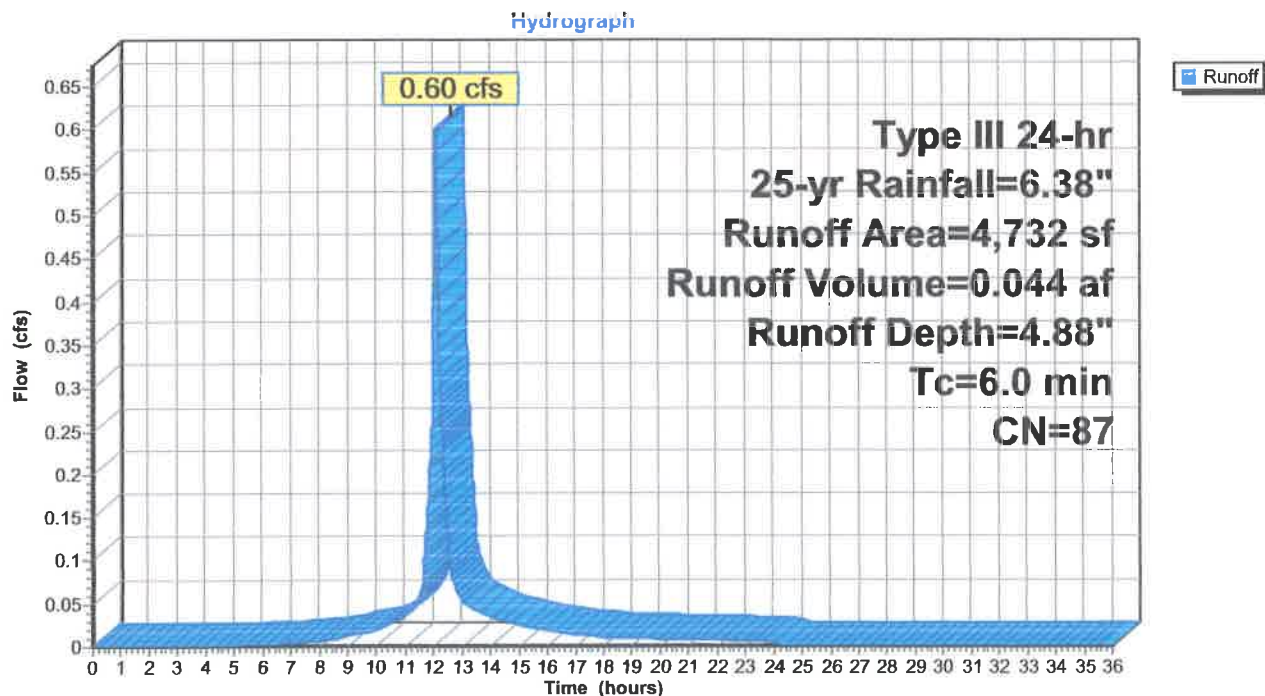
Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 4.88"
Routed to Pond 5P : Galley System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.38"

	Area (sf)	CN	Description
*	1,949	98	Impervious on-site, HSG A
*	913	39	>75% Grass cover on-site, Good, HSG A
	1,870	98	Roofs, HSG A
	4,732	87	Weighted Average
	913		19.29% Pervious Area
	3,819		80.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: P-2



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Summary for Subcatchment 3S: P-3

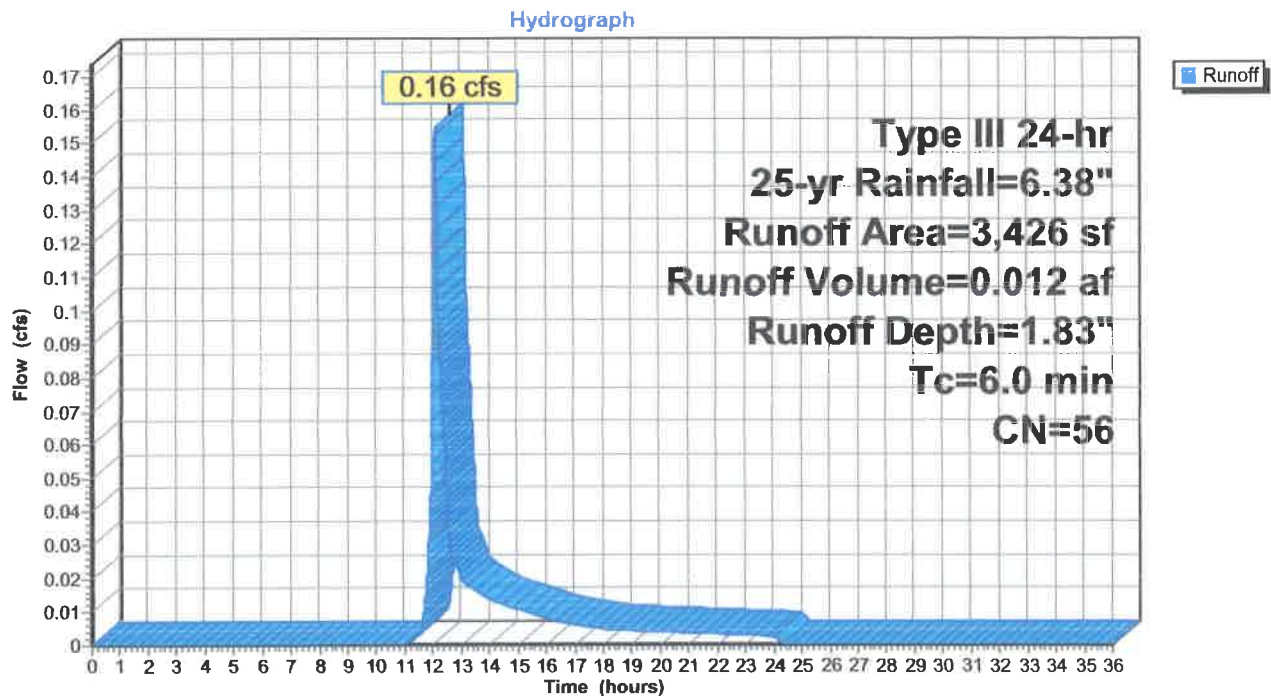
Runoff = 0.16 cfs @ 12.10 hrs, Volume= 0.012 af, Depth= 1.83"
Routed to Reach 6R : Total to Hillside

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.38"

	Area (sf)	CN	Description
*	117	98	window wells
*	2,456	39	>75% Grass cover on-site, Good, HSG A
*	853	98	patio - walkway
	3,426	56	Weighted Average
	2,456		71.69% Pervious Area
	970		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 3S: P-3



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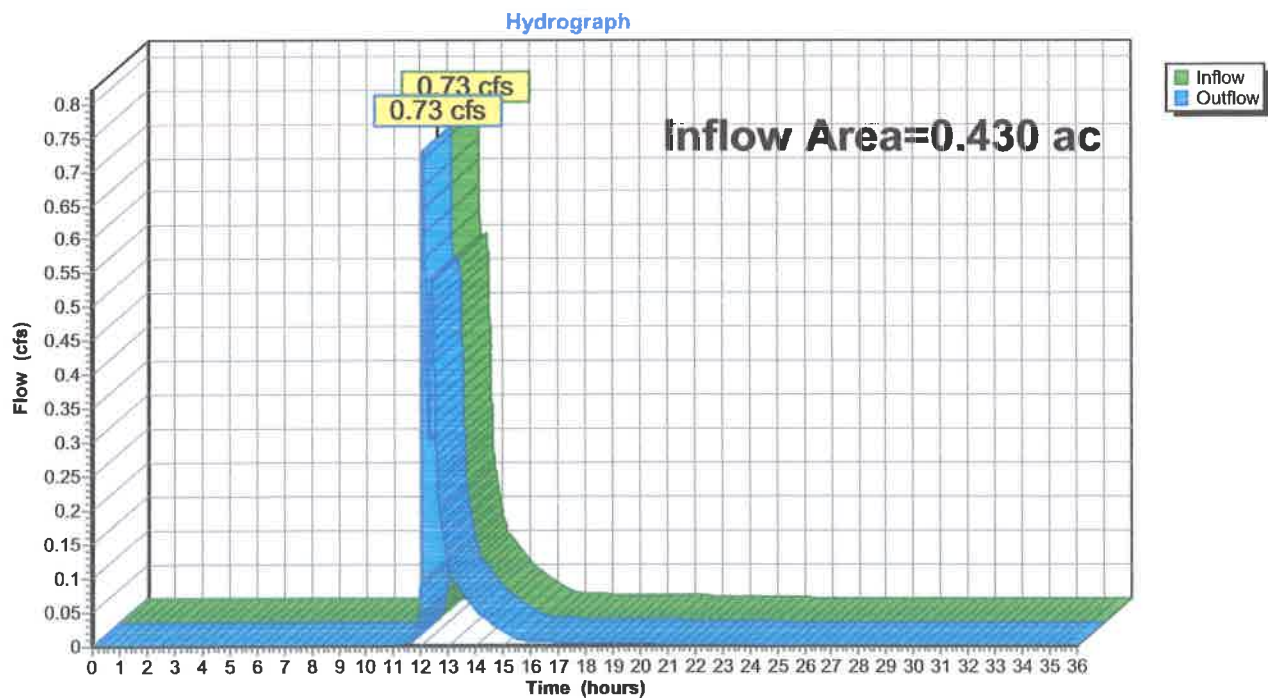
Summary for Reach 6R: Total to Hillside

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 69.50% Impervious, Inflow Depth = 1.20" for 25-yr event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 0.043 af
Outflow = 0.73 cfs @ 12.09 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Total to Hillside



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Type III 24-hr 25-yr Rainfall=6.38"

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Summary for Pond 4P: Galley System 1

Inflow Area = 0.242 ac, 77.85% Impervious, Inflow Depth = 4.66" for 25-yr event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 0.094 af
Outflow = 0.37 cfs @ 12.43 hrs, Volume= 0.094 af, Atten= 71%, Lag= 20.4 min
Discarded = 0.05 cfs @ 10.43 hrs, Volume= 0.079 af
Primary = 0.32 cfs @ 12.43 hrs, Volume= 0.015 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 205.03' @ 12.43 hrs Surf.Area= 2,842 sf Storage= 1,630 cf

Plug-Flow detention time= 252.8 min calculated for 0.094 af (100% of inflow)
Center-of-Mass det. time= 252.8 min (1,051.2 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	197.00'	356 cf	6.40'W x 42.00'L x 5.50'H Field A 1,478 cf Overall - 589 cf Embedded = 890 cf x 40.0% Voids
#2A	198.00'	443 cf	Concrete Galley 4x4x4 x 10 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	202.50'	4,507 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		5,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.50	3	0	0
204.40	3	6	6
205.00	2,500	751	757
206.00	5,000	3,750	4,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	197.00'	0.05 cfs Exfiltration when above 197.00' Phase-In= 0.01'
#2	Device 3	204.40'	2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows C= 0.600 Limited to weir flow at low heads
#3	Primary	205.00'	18.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.05 cfs @ 10.43 hrs HW=197.09' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.21 cfs @ 12.43 hrs HW=205.03' (Free Discharge)
↑3=Broad-Crested Rectangular Weir (Weir Controls 0.21 cfs @ 0.41 fps)
↑2=Orifice/Grate (Passes 0.21 cfs of 0.82 cfs potential flow)

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Type III 24-hr 25-yr Rainfall=6.38"

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Pond 4P: Galley System 1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

10 Chambers x 44.3 cf = 443.4 cf Chamber Storage

10 Chambers x 58.9 cf = 588.8 cf Displacement

1,478.4 cf Field - 588.8 cf Chambers = 889.6 cf Stone x 40.0% Voids = 355.9 cf Stone Storage

Chamber Storage + Stone Storage = 799.3 cf = 0.018 af

Overall Storage Efficiency = 54.1%

Overall System Size = 42.00' x 6.40' x 5.50'

10 Chambers

54.8 cy Field

32.9 cy Stone



Proposed Conditions

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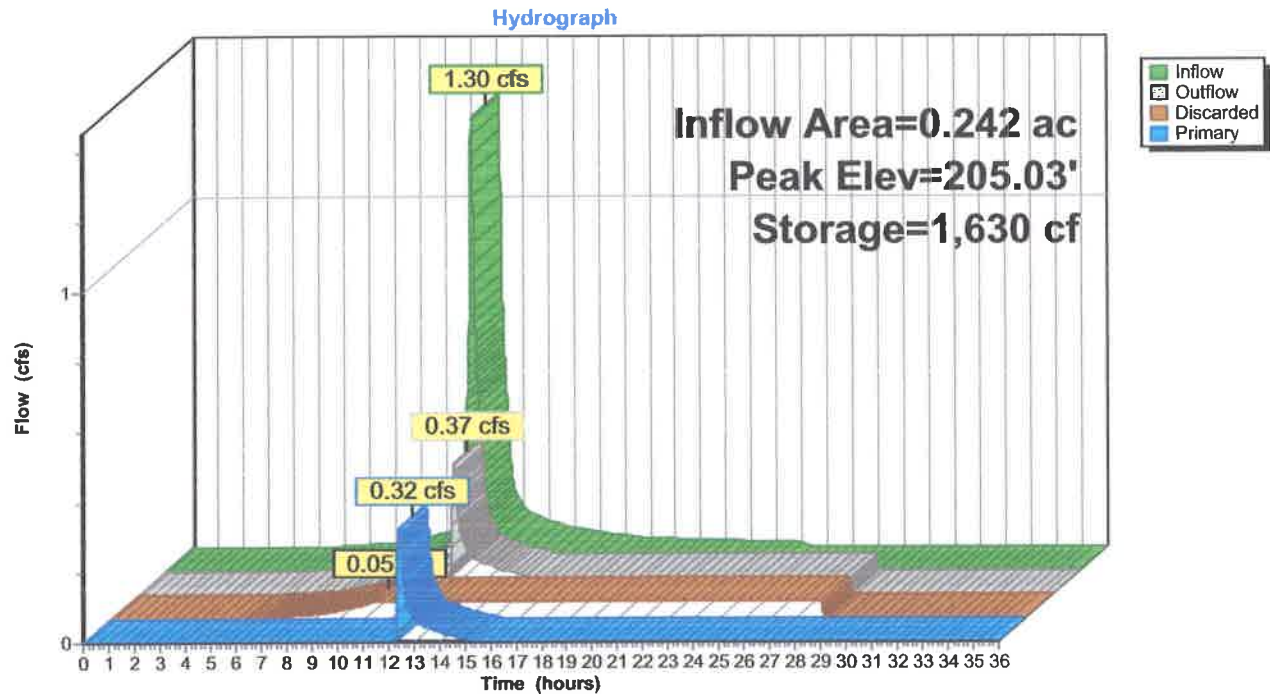
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Type III 24-hr 25-yr Rainfall=6.38"

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Pond 4P: Galley System 1



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Type III 24-hr 25-yr Rainfall=6.38"

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Summary for Pond 5P: Galley System 2

Inflow Area = 0.109 ac, 80.71% Impervious, Inflow Depth = 4.88" for 25-yr event
Inflow = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af
Outflow = 0.60 cfs @ 12.08 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.02 cfs @ 12.08 hrs, Volume= 0.028 af
Primary = 0.58 cfs @ 12.08 hrs, Volume= 0.016 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 201.01' @ 12.08 hrs Surf.Area= 126 sf Storage= 343 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 91.1 min (883.6 - 792.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	159 cf	6.40'W x 18.00'L x 5.50'H Field A 634 cf Overall - 236 cf Embedded = 398 cf x 40.0% Voids
#2A	194.50'	177 cf	Concrete Galley 4x4x4 x 4 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	199.00'	508 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		844 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.00	3	0	0
201.00	3	6	6
202.00	1,000	502	508

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	201.00'	2.0" x 2.0" Horiz. 2 CBs X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.08 hrs HW=201.01' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.21 cfs @ 12.08 hrs HW=201.01' (Free Discharge)
↑2=2 CBs (Weir Controls 0.21 cfs @ 0.29 fps)

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Type III 24-hr 25-yr Rainfall=6.38"

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Pond 5P: Galley System 2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

4 Chambers x 44.3 cf = 177.4 cf Chamber Storage

4 Chambers x 58.9 cf = 235.5 cf Displacement

633.6 cf Field - 235.5 cf Chambers = 398.1 cf Stone x 40.0% Voids = 159.2 cf Stone Storage

Chamber Storage + Stone Storage = 336.6 cf = 0.008 af

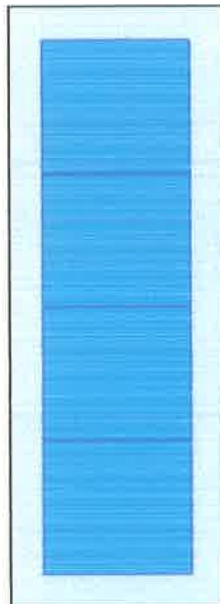
Overall Storage Efficiency = 53.1%

Overall System Size = 18.00' x 6.40' x 5.50'

4 Chambers

23.5 cy Field

14.7 cy Stone



Proposed Conditions

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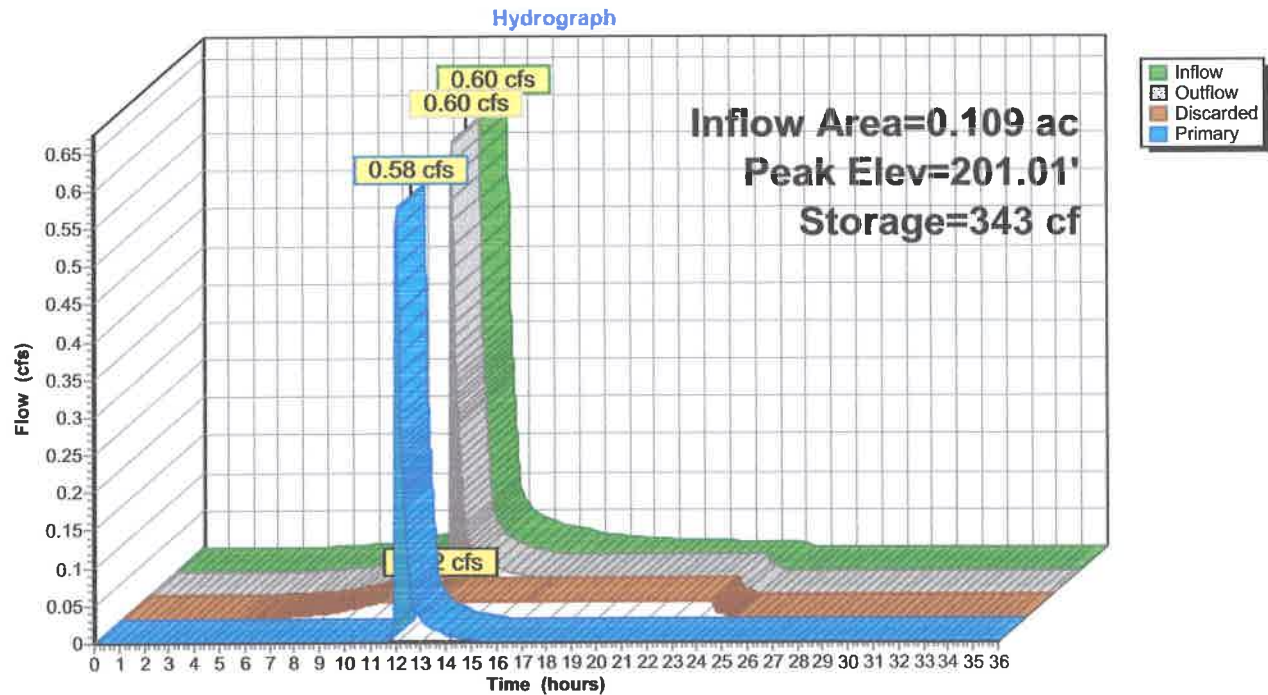
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Pond 5P: Galley System 2



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Type III 24-hr 100-yr Rainfall=8.19"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: P-1Runoff Area=10,556 sf 77.85% Impervious Runoff Depth=6.40"
Tc=6.0 min CN=85 Runoff=1.75 cfs 0.129 af**Subcatchment 2S: P-2**Runoff Area=4,732 sf 80.71% Impervious Runoff Depth=6.63"
Tc=6.0 min CN=87 Runoff=0.80 cfs 0.060 af**Subcatchment 3S: P-3**Runoff Area=3,426 sf 28.31% Impervious Runoff Depth=3.03"
Tc=6.0 min CN=56 Runoff=0.27 cfs 0.020 af**Reach 6R: Total to Hillside**Inflow=1.68 cfs 0.089 af
Outflow=1.68 cfs 0.089 af**Pond 4P: Galley System 1**Peak Elev=205.08' Storage=1,751 cf Inflow=1.75 cfs 0.129 af
Discarded=0.05 cfs 0.088 af Primary=0.99 cfs 0.041 af Outflow=1.04 cfs 0.129 af**Pond 5P: Galley System 2**Peak Elev=201.01' Storage=343 cf Inflow=0.80 cfs 0.060 af
Discarded=0.02 cfs 0.032 af Primary=0.78 cfs 0.028 af Outflow=0.80 cfs 0.060 af**Total Runoff Area = 0.430 ac Runoff Volume = 0.209 af Average Runoff Depth = 5.84"**
30.50% Pervious = 0.131 ac 69.50% Impervious = 0.299 ac

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Summary for Subcatchment 1S: P-1

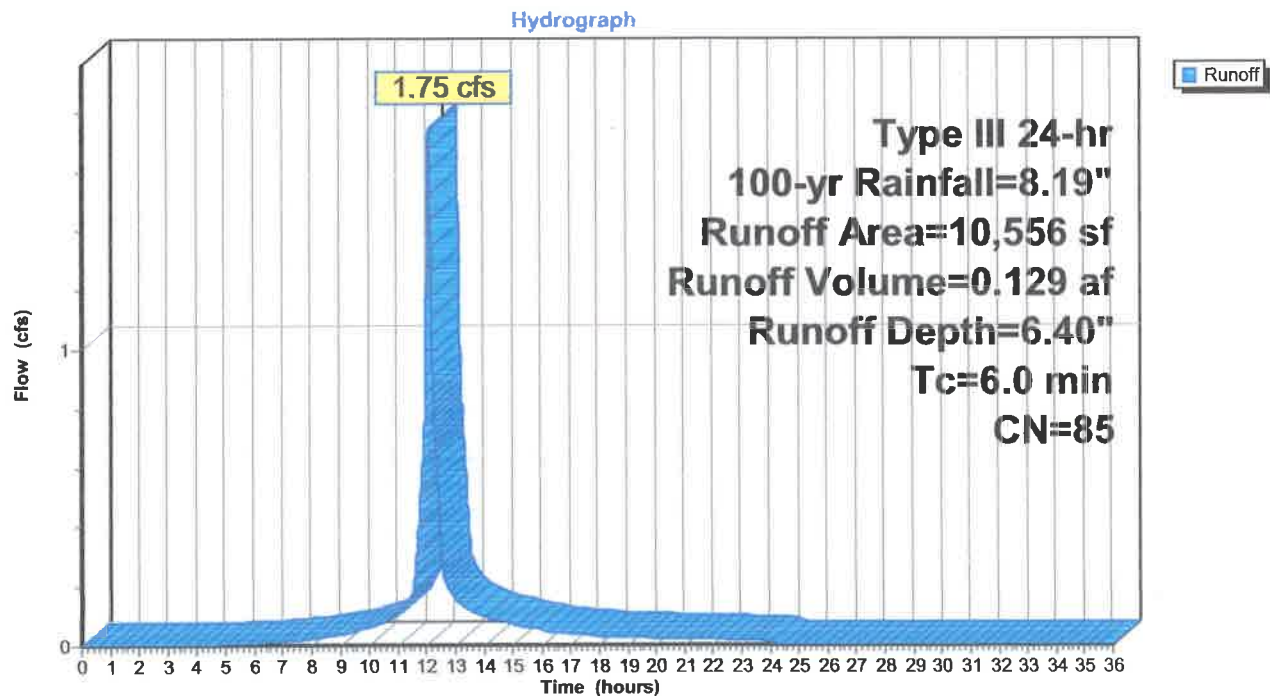
Runoff = 1.75 cfs @ 12.08 hrs, Volume= 0.129 af, Depth= 6.40"
Routed to Pond 4P : Galley System 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.19"

	Area (sf)	CN	Description
*	6,614	98	Impervious on-site, HSG A
*	1,345	39	>75% Grass cover on-site, Good, HSG A
	1,604	98	Roofs, HSG A
*	993	39	>75% Grass cover off-ste, Good, HSG A
	10,556	85	Weighted Average
	2,338		22.15% Pervious Area
	8,218		77.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1S: P-1



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Summary for Subcatchment 2S: P-2

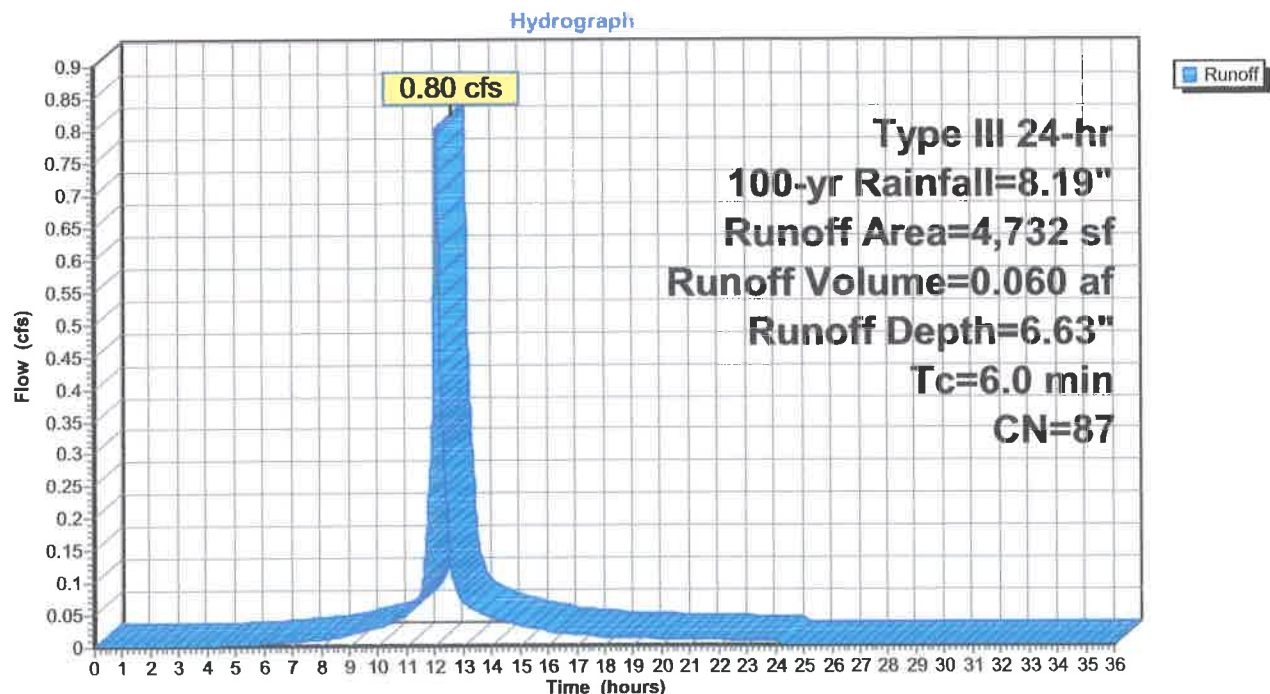
Runoff = 0.80 cfs @ 12.08 hrs, Volume= 0.060 af, Depth= 6.63"
Routed to Pond 5P : Galley System 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.19"

	Area (sf)	CN	Description
*	1,949	98	Impervious on-site, HSG A
*	913	39	>75% Grass cover on-site, Good, HSG A
	1,870	98	Roofs, HSG A
	4,732	87	Weighted Average
	913		19.29% Pervious Area
	3,819		80.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 2S: P-2



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Type III 24-hr 100-yr Rainfall=8.19"

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Summary for Subcatchment 3S: P-3

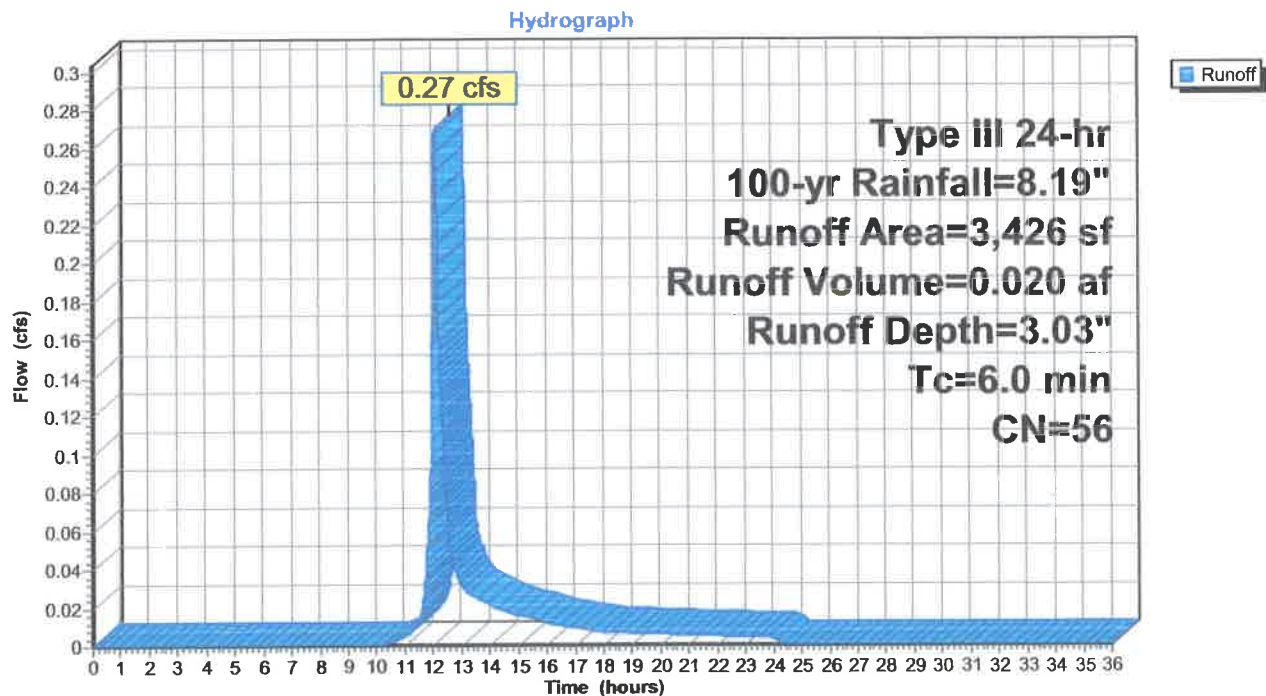
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.020 af, Depth= 3.03"
Routed to Reach 6R : Total to Hillside

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.19"

	Area (sf)	CN	Description
*	117	98	window wells
*	2,456	39	>75% Grass cover on-site, Good, HSG A
*	853	98	patio - walkway
	3,426	56	Weighted Average
	2,456		71.69% Pervious Area
	970		28.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 3S: P-3



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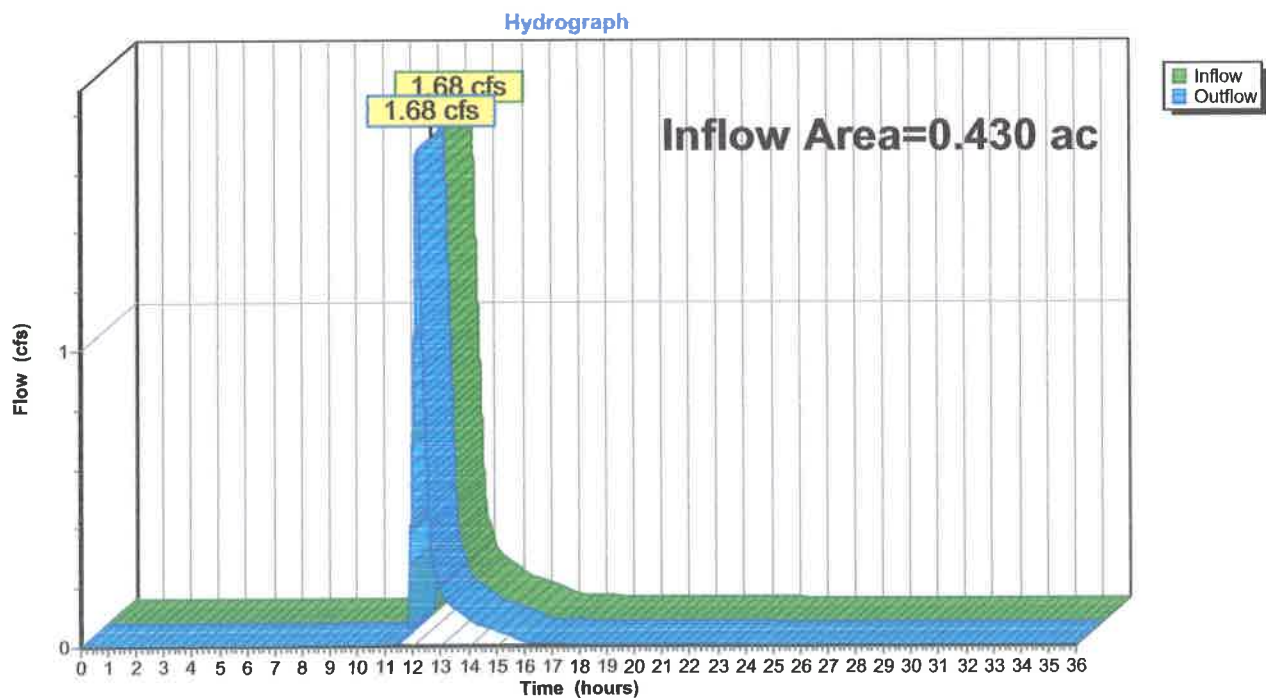
Summary for Reach 6R: Total to Hillside

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 69.50% Impervious, Inflow Depth = 2.50" for 100-yr event
Inflow = 1.68 cfs @ 12.16 hrs, Volume= 0.089 af
Outflow = 1.68 cfs @ 12.16 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Reach 6R: Total to Hillside



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Summary for Pond 4P: Galley System 1

Inflow Area = 0.242 ac, 77.85% Impervious, Inflow Depth = 6.40" for 100-yr event
Inflow = 1.75 cfs @ 12.08 hrs, Volume= 0.129 af
Outflow = 1.04 cfs @ 12.19 hrs, Volume= 0.129 af, Atten= 40%, Lag= 6.4 min
Discarded = 0.05 cfs @ 9.59 hrs, Volume= 0.088 af
Primary = 0.99 cfs @ 12.19 hrs, Volume= 0.041 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 205.08' @ 12.19 hrs Surf.Area= 2,957 sf Storage= 1,751 cf

Plug-Flow detention time= 209.1 min calculated for 0.129 af (100% of inflow)
Center-of-Mass det. time= 209.2 min (998.8 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	197.00'	356 cf	6.40'W x 42.00'L x 5.50'H Field A 1,478 cf Overall - 589 cf Embedded = 890 cf x 40.0% Voids
#2A	198.00'	443 cf	Concrete Galley 4x4x4 x 10 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	202.50'	4,507 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		5,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.50	3	0	0
204.40	3	6	6
205.00	2,500	751	757
206.00	5,000	3,750	4,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	197.00'	0.05 cfs Exfiltration when above 197.00' Phase-In= 0.01'
#2	Device 3	204.40'	2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns X 6 rows C= 0.600 Limited to weir flow at low heads
#3	Primary	205.00'	18.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.05 cfs @ 9.59 hrs HW=197.09' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.88 cfs @ 12.19 hrs HW=205.08' (Free Discharge)
↑3=Broad-Crested Rectangular Weir (Weir Controls 0.88 cfs @ 0.65 fps)
↑2=Orifice/Grate (Passes 0.88 cfs of 1.32 cfs potential flow)

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Type III 24-hr 100-yr Rainfall=8.19"

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Pond 4P: Galley System 1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

10 Chambers/Row x 4.00' Long = 40.00' Row Length +12.0" End Stone x 2 = 42.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

10 Chambers x 44.3 cf = 443.4 cf Chamber Storage

10 Chambers x 58.9 cf = 588.8 cf Displacement

1,478.4 cf Field - 588.8 cf Chambers = 889.6 cf Stone x 40.0% Voids = 355.9 cf Stone Storage

Chamber Storage + Stone Storage = 799.3 cf = 0.018 af

Overall Storage Efficiency = 54.1%

Overall System Size = 42.00' x 6.40' x 5.50'

10 Chambers

54.8 cy Field

32.9 cy Stone



Proposed Conditions

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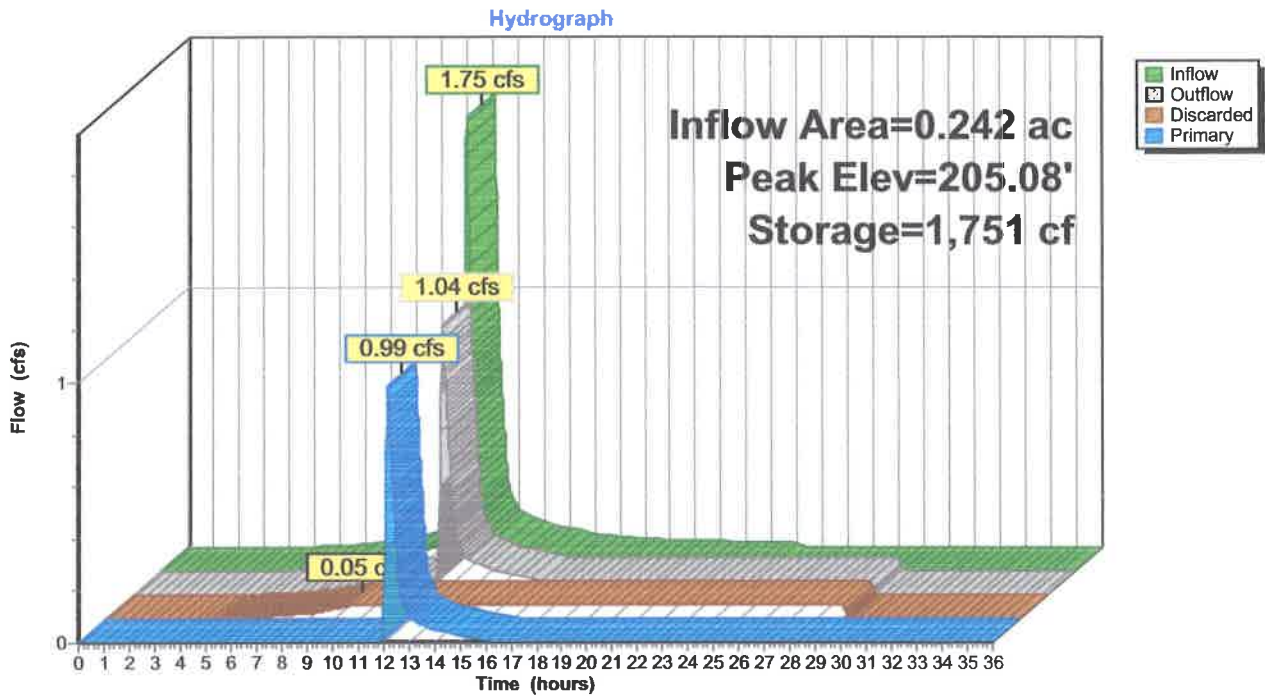
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Pond 4P: Galley System 1



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Summary for Pond 5P: Galley System 2

Inflow Area = 0.109 ac, 80.71% Impervious, Inflow Depth = 6.63" for 100-yr event
Inflow = 0.80 cfs @ 12.08 hrs, Volume= 0.060 af
Outflow = 0.80 cfs @ 12.08 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.02 cfs @ 12.08 hrs, Volume= 0.032 af
Primary = 0.78 cfs @ 12.08 hrs, Volume= 0.028 af
Routed to Reach 6R : Total to Hillside

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 201.01' @ 12.08 hrs Surf.Area= 128 sf Storage= 343 cf

Plug-Flow detention time= 77.4 min calculated for 0.060 af (100% of inflow)
Center-of-Mass det. time= 80.1 min (864.4 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	193.50'	159 cf	6.40'W x 18.00'L x 5.50'H Field A 634 cf Overall - 236 cf Embedded = 398 cf x 40.0% Voids
#2A	194.50'	177 cf	Concrete Galley 4x4x4 x 4 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf
#3	199.00'	508 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		844 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
199.00	3	0	0
201.00	3	6	6
202.00	1,000	502	508

Device	Routing	Invert	Outlet Devices
#1	Discarded	193.50'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	201.00'	2.0" x 2.0" Horiz. 2 CBs X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.08 hrs HW=201.01' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.33 cfs @ 12.08 hrs HW=201.01' (Free Discharge)
↑ **2=2 CBs** (Weir Controls 0.33 cfs @ 0.33 fps)

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Pond 5P: Galley System 2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4 (Concrete Galley, UCPI 4x4x4 Galley or equivalent)

Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf

Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf

4 Chambers/Row x 4.00' Long = 16.00' Row Length +12.0" End Stone x 2 = 18.00' Base Length

1 Rows x 52.8" Wide + 12.0" Side Stone x 2 = 6.40' Base Width

12.0" Stone Base + 48.0" Chamber Height + 6.0" Stone Cover = 5.50' Field Height

4 Chambers x 44.3 cf = 177.4 cf Chamber Storage

4 Chambers x 58.9 cf = 235.5 cf Displacement

633.6 cf Field - 235.5 cf Chambers = 398.1 cf Stone x 40.0% Voids = 159.2 cf Stone Storage

Chamber Storage + Stone Storage = 336.6 cf = 0.008 af

Overall Storage Efficiency = 53.1%

Overall System Size = 18.00' x 6.40' x 5.50'

4 Chambers

23.5 cy Field

14.7 cy Stone



Proposed Conditions

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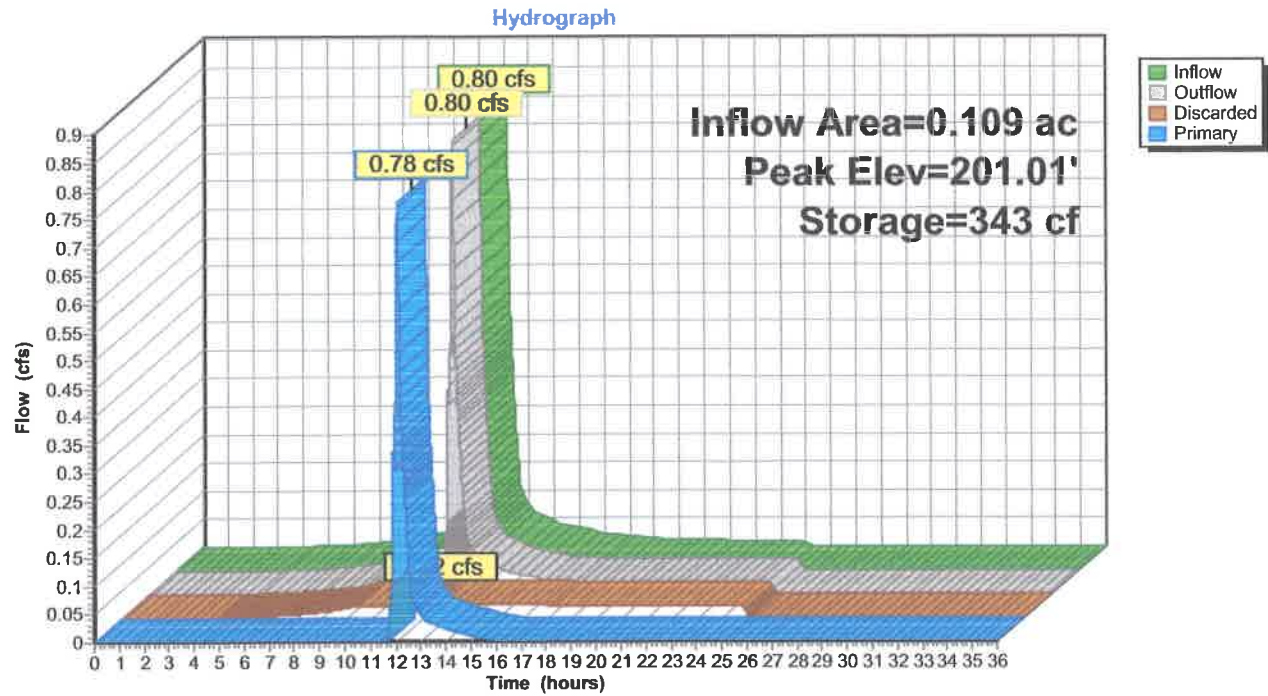
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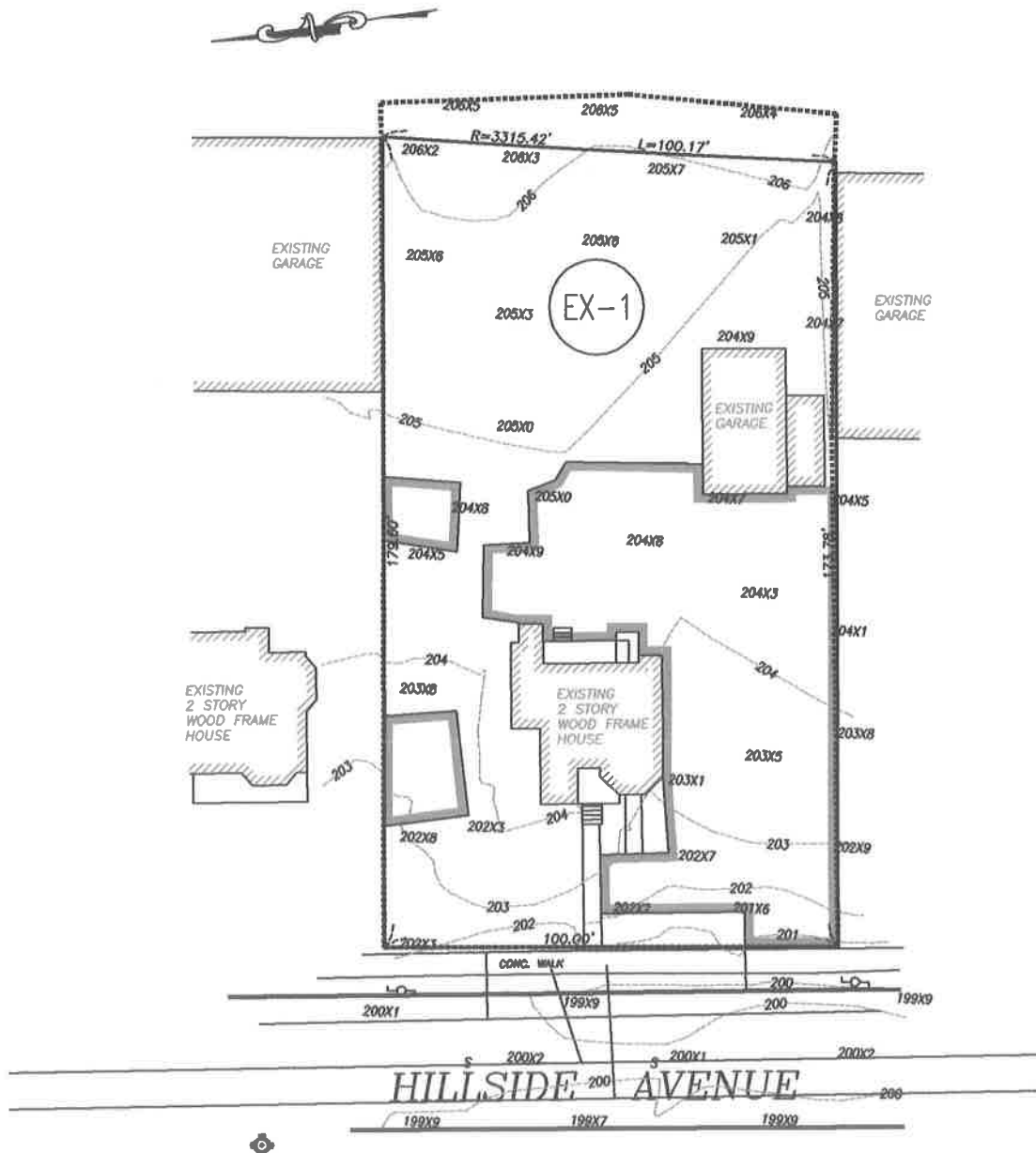
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Pond 5P: Galley System 2



APPENDIX 3



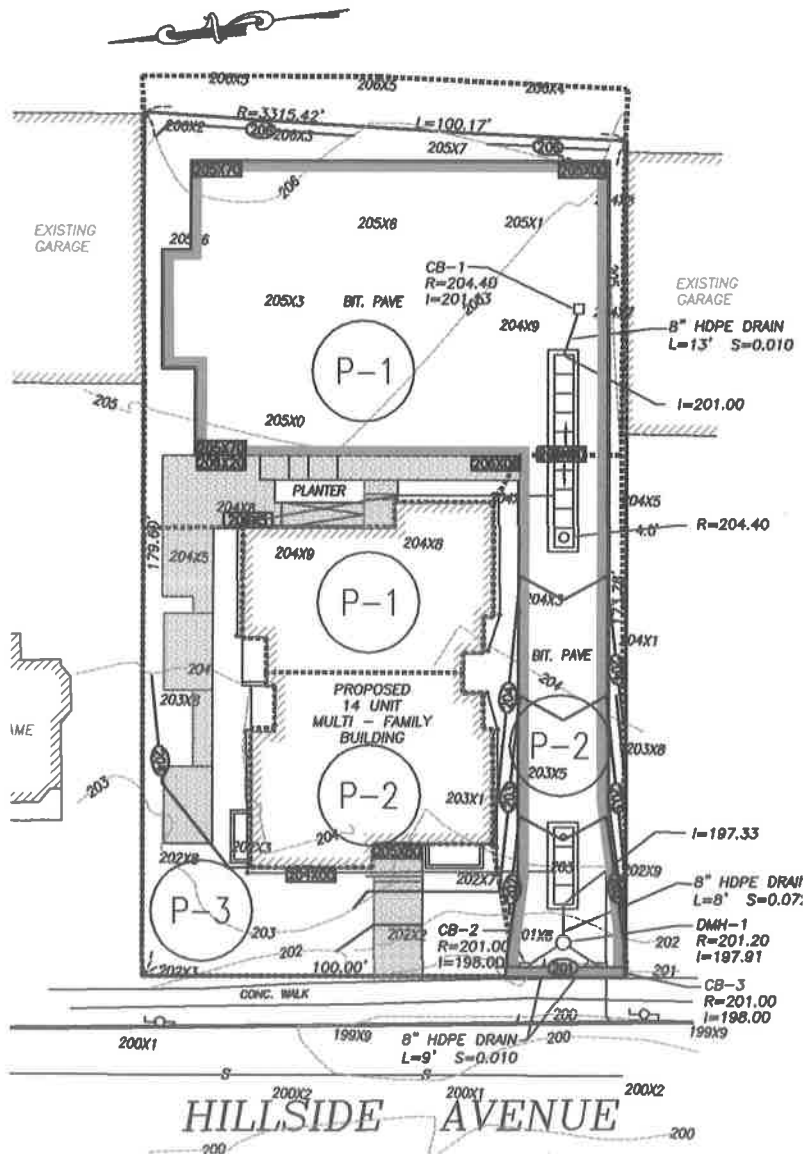
EX-1

TOTAL AREA = 18,540 S.F.
 IMPERVIOUS=13,358 SF
 ROOF=1,735 SF
 LAWN=2,454 SF
 OFF SITE=993 S.F.

242 HILLSIDE AVENUE
 PRE-DEVELOPMENT
 WATERSHED
 PLAN OF LAND
 IN
 NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
 GLOSSA ENGINEERING INC.
 46 EAST STREET
 EAST WALPOLE, MA 02032
 508-668-4401





P-1

TOTAL AREA=10,566 S.F.
IMPERVIOUS=6,614 SF
ROOF=1,604 SF
LAWN=1,345 SF
OFF SITE=993 S.F.

P-2

TOTAL AREA=4,732 S.F.
DRIVEWAY=1,949 SF
ROOF=1,870 SF
LAWN=913 SF

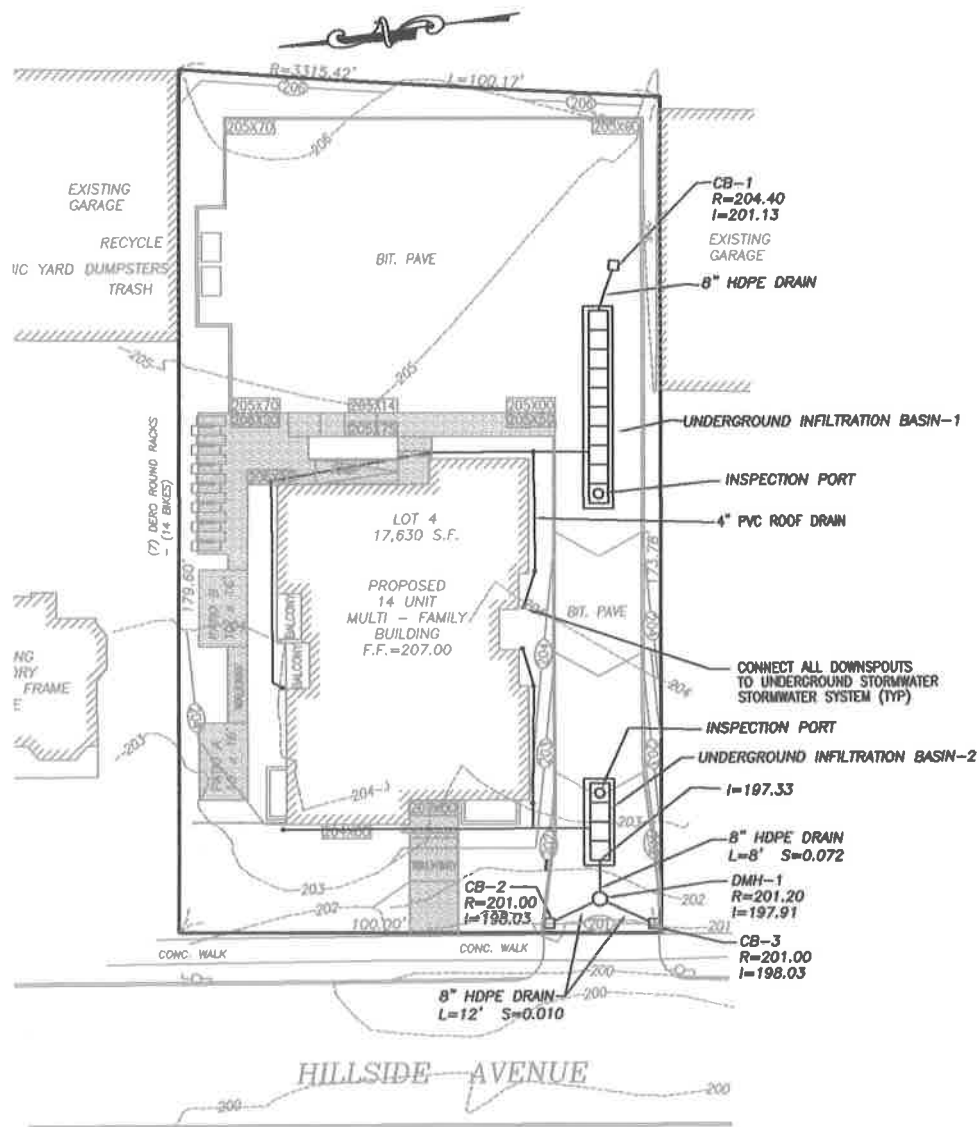
P-3

TOTAL AREA=3,426 S.F.
LAWN=2,456 SF
WINDOW WELLS=117 SF
PATIO & WALK=853 SF

242 HILLSIDE AVENUE
POST-DEVELOPMENT
WATERSHED
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401





242 HILLSIDE AVENUE
DRAINAGE FACILITIES
PLAN OF LAND
IN
NEEDHAM MA

SCALE: 1"=20' OCTOBER 14, 2025
GLOSSA ENGINEERING INC.
46 EAST STREET
EAST WALPOLE, MA 02032
508-668-4401

