



GREEN INTERNATIONAL AFFILIATES, INC.

100 AMES POND DRIVE, SUITE 200 TEWKSBURY, MA 01876

T: (978) 923-0400 | WWW.GREENINTL.COM

Open comments
Defer to the Board
Condition of Approval

PROJECT NAME KING COMMONS PEER REVIEW
DATE 10/27/2023
UPDATED: 2/24/2024, 3/7/2024
PROJECT NO. 22015.1806

Peer Review Comment Form

NO.	SHEET NO.	SECTION	GREEN'S COMMENT	Applicant's RESPONSE	CONFIRMED BY	DATE
APPLICATION						
1		Form 1 application/Site Plan Checklist	Form 1 application and Site Plan Checklist are not included in the latest review materials. It appears that it was included in an older submission from 2022. We defer to the board if this needs to be resubmitted with the latest plans.	No response necessary.		
SITE PLAN						
2	General Comment		There were no Master plan renderings in the latest submission. The latest proposed plans of the roadway do not match layout of the previously submitted renderings. Updated renderings should be provided to better understand the anticipated future development. Please provide.	Updated renderings have been provided as a reference plan.	SP	3/6/2024
3	General Comment	§249-32.A.(1)(a)(ii)	There are no existing conditions plans in the plan set. Please provide existing condition plans. Please show existing utilities within Great Road and King Street.	The Existing Conditions Plan has been provided as a reference plan. Existing utilities within Great Road and King Street have been added on the Roadway Plan & Profile Sheets (C-13 to C-20).	JT	3/7/2024
4	General Comment		Confirm all bends are real bend for the water lines. Please provide callouts for all proposed water line bends.	All bends are real manufactured bends for the water lines. Callouts are provided on all Roadway Plan & Profile Sheets (C-13 to C-20).	SP	3/6/2024
5	General Comment	§249-32.D.(2)&(3)	Label existing and proposed surface in the profiles and show different linetypes for clarity (for example, show existing ground surface as thin line and proposed ground surface as bold). Freeze the line with deflection triangle for clarity. Please revise.	Different linetypes are used for existing surface (dashed) and proposed surface (solid). The lines with deflection triangles have been frozen.	SDS	3/4/2024
6	General Comment		Label existing street names in C sheets for clarity. Please revise.	The existing street names (Great Road, King Street, and Auman Street) have been labeled in the C Sheets.	SDS	3/4/2024
7	General Comment		The plans do not callout what is being removed. Consider providing a demolition plan to clarify what is being removed and what is being retained from the existing site.	A Demolition Plan (Sheets C-4 to C-7) has been added to the plan set.	SP	3/6/2024
8	General Comment		There are many stubs for future water connections but there are no callouts for caps. Please revise to include callouts for caps. Will stubs be filled with water or will they be empty and closed at the valve?	Water line caps have been called out for stubs for future water connections. Stubs will be empty and closed at the valve. A note has been added to Sheet C-2.	SP	3/6/2024
9	C-4	§38-16.C.3	A delineation and number of square feet of the land to be disturbed should be added to the plans. Please revise.	A total of 431,300 SF will be disturbed. This value is stated in the notes on Sheet C-4.	SDS	3/4/2024
10	C-4	§38-16.C.7	Location of material stockpile areas should be added to the plans. Please revise.	Material stockpile areas have been added to the Demolition Plan (Sheets C-4 to C-7).	SDS	3/4/2024
11	C-5-C-8		A typical dimension should be added for each road to confirm the aisle width on each of the layout plan sheets. Please revise.	Dimensions have been added for each road, aisle, and bike lane. A 20-ft. clear width is provided on all streets, and lanes are typically 11 ft. wide unless otherwise noted.	SDS	3/4/2024
12	C-5	§173-32.B.	The plans show the provided parking spaces but it does not show the required parking area requirements. This should be added to the plans to confirm adequate parking is provided. Please revise.	No parking is required for the roadway. Adequate parking for future development and all associated uses will be provided on each individual parcel.	SDS	3/4/2024
13	C-5	ADA/MAAB	C-5 mentions that ADA parking spaces will be determined upon further site development. The layout plans currently do not specify any ADA parking spaces. Please clarify where ADA parking will be located for future development and explain why there are no ADA parking spaces currently proposed.	Six (6) ADA parking spaces, two of which are van accessible, have been included on site in conformance with all ADA requirements. The locations of ADA parking may be adjusted pending future development to ensure accessible spaces are located closest to building entries.	SDS	3/4/2024
14	C-5	§249-43 E.(4)	Please provide a callout to indicate the first tree to be placed 25' min from intersection.	Callouts have been provided and all proposed trees are located a minimum of 25 ft. from the intersection.	SDS	3/4/2024



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15	C-5		Taper to develop turn lane should be 1/2L per MUTCD L=WS at a 20 mph speed and 11' shift, taper should be 110'. Please confirm this is provided.	Per MUTCD, the equation $L=(WS^2)/60$ was used. The design speed used was 25 mph and a lane width of 11 ft. This gave an L value of 115 ft. and a taper length of 57 ft.	SDS	3/4/2024
16	C-5 - C-8	§249-73	Please confirm the curb at intersections extends an additional 3' beyond the end of the radius.	Callouts have been provided which indicate to terminate curbing a minimum of 3 ft. beyond the end of the radius.	SDS	3/4/2024
17	C-5 - C-8		There is no sidewalk detail for wheelchair ramp with grass strip. Please add MassDOT Standard Detail E107.6.9 or a detail similar to it.	A sidewalk detail for wheelchair ramp with grass strip has been added to Sheet C-33.	SDS	3/4/2024
17a			Consider revising the wheelchair ramp type a and the wheelchair ramp details to show/reference to a 5.0' min sidewalk instead of 4.0' since the design can accommodate a 5.0' sidewalk everywhere.			
18	C-5 - C-8	§249-73	Median curb should be sloped edging per Town requirements. Please revise.	All median curb has been revised to sloped granite edging.	SDS	3/4/2024
19	C-5 - C-8		Provide detail for median pedestrian refuge locations, this is not covered by the current wheelchair ramp details provided. Please revise.	Pedestrian refuge locations are a minimum of 6 ft. by 6 ft. Typical dimensions are called out at some median refuge locations and a detail (Median Cut-Through) is provided on Sheet C-30.	SDS	3/4/2024
20	C-5 - C-8		Horizontal alignment information such as curve radii, points of curvature and tangency, and tangent bearings should be added to the plans for layout purposes. Please revise.	Horizontal alignment information including curve radii, points of curvature, tangency, and tangent bearings have been added to the Layout Plan (Sheets C-9 to C-12) and Roadway Plan & Profile (Sheets C-13 to C-20).	SDS	3/4/2024
21	C-6	§249-43 E.(1)	Provide low maintenance ground cover in the center of the roundabout circle. Please revise.	Low maintenance ground cover (creeping juniper) is proposed in the center of the roundabout circle.	SP	3/6/2024
22	C-7	NCHRP 672 Exhibit 6-9	A roundabout this size should accommodate an SU-30, at a minimum a Town of Littleton fire truck should be able to make a full u turn within the roundabout. Consider providing a drivable concrete apron for large vehicles to utilize. Please provide and confirm turning movements of a fire truck and an SU-30.	An SU-30 can make a complete turn in the roundabouts. Truck turning details have been provided on Sheet C-38. A truck apron has been provided at the Main Road and South Road #1 roundabout intersection.	SDS	3/4/2024
22a			The SU-30 truck turning around on north road roundabout appears to encroach over the curb, verify a vehicle this size can be accommodated, consider revising the outside curbing in this area to be curved to allow for this movement to be completed, also please confirm the Town of Littleton fire truck is an equivalent size to an SU-30. The detail provided for Brick Turn Apron on C-30 refers a detail for flush granite curb but this detail does not look to be in this set, consider using vertical granite edging around the apron instead.			
23	C-7		Consider widening out the southeast curb radii to be larger than 7', this may be a difficult right turn for larger vehicles.	The southeast curb located at the roundabout has been revised to include a compound curb radius with radii of 52 ft. and 29 ft. (Sheet C-11).	SDS	3/4/2024
24	C-7 & C-8		For ramps at the driveway intersections within King Street, Wheelchair Ramp Type A detail does not cover this situation appropriately, provide MassDOT Standard Detail E107.6.4 for these locations. Please revise.	MassDOT Standard Detail E107.6.4 has been added to Sheet C-33.	SDS	3/4/2024
25	C-8	§249-43 B. (1)	Minimum centerline radius is 95' per MassDOT PDDG for non-superelevated roads with +2.0% cross slopes. Please revise centerline at the curves on this sheet to meet this minimum.	The centerline radii complies with the required minimum of 95 ft.	SDS	3/4/2024
26	C-9	§249-43 B.(2)	Town requires a maximum vertical slope of 5% for collector streets. Given the roadway typical section provided is intended to meet the Town requirements for a collector roadway, should the profile also meet these standards?	The roadway has been revised to an 8% maximum slope. This roadway will be a private road with public access and therefore is not subject to the Town requirement. 8% maximum roadway slope is within general engineering practice standards.	SDS	3/4/2024
27	C-9		Profile grade at beginning of profile should match existing ground in order to match into the Great Road edge of pavement. Please revise.	The profile grade at the beginning of the profile has been revised to match the existing ground elevation at Great Road.	SDS	3/4/2024



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28	C-9	§249-81 D.	Sidewalks shall have a minimum longitudinal slope of 4.5%, based on the profile the longitudinal slope will be 10% max at the beginning of the project. Please clarify.	The sidewalk slope from the site entrance at Great Road has been revised to not exceed 4.5%.	SDS	3/4/2024
28a			Consider a meandering sidewalk alignment that stays close to the bike path at the beginning near Great Road if possible. The current configuration may result in pedestrians cutting across the grass area instead of using the sidewalk.			
29	C-9 - C-16		Horizontal alignments are difficult to see and read on this sheet. Consider also showing them on the Layout Plans. Also, provide station equations at intersecting alignments to aid in the vertical profile layout. Please revise.	Horizontal alignments have been added to the Layout Plan (Sheets C-9 to C-12). Station equations at intersecting alignments and labels on profile have been provided to aid in the vertical profile layout.	SDS	3/4/2024
30	C-9 & C-16	§249-43 D.(14)	Town requires a minimum tangent length of 40 feet prior to an intersection after/before a vertical curve. Please revise the profile at these tie in locations on Great Road and King Street to provide this distance.	A 40-ft. minimum tangent length is provided prior to a vertical curve at the Great Road and King Street site entrances. The vertical curve shown at the entrance to the site on Great Road represents a short, smooth tie-in, not a significant vertical curve.	SDS	3/4/2024
31	C-9		Where does the area north of the proposed sidewalk drain near station 12+25L? What are the limits of the existing curb removal? Please clarify.	This area sheet flows directly to the proposed rain garden, or it is collected in catch basin CB-65.	SP	3/6/2024
32	C-9		What is the type of outfall for WQU-66? Is it flared end or riprap? Please show on plan.	Outfalls are flared end sections with a riprap apron. Outlets are shown on Sheet C-13 and sizing calculations are provided in Appendix B of the Drainage Report.	SP	3/6/2024
33	C-9		The plans need more grading at the rain garden area at northeast side around STA 11+00 . The plan doesn't show the depth of rain garden or how contours match back into existing contour around it. Please revise.	The Roadway Plan & Profile Sheet C-13 shows grading around the pond and how existing contours are met.	SP	3/6/2024
34	C-9		We observed large existing trees where the rain garden is proposed during our site visit. Will the trees be replaced/replanted? Can the rain garden be installed without or limited impacts to trees?	The existing trees within the limits of the proposed rain garden will be retained or removed as shown on the Demolition Plan Sheet C-4. Additionally, some large trees on the opposite side of proposed Main Road will be retained.	SP	3/6/2024
35	C-9		How does the water line tie in near STA 10+20? Will there be a tapping sleeve and valve or cut in tee? There is also no valve shown near the tee. Consider providing three valves (two on the main and one on the service) to limit future shut downs. Has coordination with DPW on preferred connection type and number of valves at the tee been done?	The water mains will tie-in with a cut and tee. Three gate valves will be provided off of the Great Road and King Street water mains. Coordination with DPW will be made prior to construction.	SP	3/7/2024
36	C-9		The gas line and water line are tied to same dashed line near STA 10+20? Please revise to tie into the correct lines.	The gas line and water line have been revised to tie-in to their respective existing utility lines within Great Road (Sheet C-13).	SP	3/7/2024
37	C-9		The existing catch basin neat STA 11+00 RT ties into an existing drainage system. It is not clear where this system outfalls and if any of this system is being maintained. The existing catch basin is in a low spot and should be maintained or grading should be revised. Please clarify.	The existing catch basin outfalls at an unknown location. The catch basin will be removed. Runoff in this area will be collected in the proposed catch basins and routed to the proposed rain garden.	SP	3/7/2024
38	C-10		Profile missing sag curve information. Add information to this sheet for each vertical curve. Please revise.	Sag curve information is included for each vertical curve.	SDS	3/4/2024
39	C-10		Proposed contours should be labeled. Please revise.	Proposed contours are labeled on each sheet.	SP	3/7/2024
40	C-10		Confirm 10' minimum separation between parallel laterals of proposed water and sewer lines.	All parallel laterals of proposed water and sewer lines have a minimum of 10 ft. of separation. Dimensions have been added to Roadway Plan & Profile Sheets.	SP	3/7/2024
41	C-10	§249-32 D. (6)	Proposed water lines should be added to the profile. Please revise.	Proposed water lines have been added to the profile.	SP	3/7/2024
42	C-10		Crossing utilities should be added to the profile. Please revise.	Crossing utilities have been added to the profile.	JT	3/7/2024



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42a			Gas, electric, and telephone are not included in the profile. These are all new utilities so these can be installed to avoid conflict with the utilities shown in the profile. It is assumed these utilities will follow the min depths shown on C-32 and will go under the utilities shown in the profile if there are conflicts. Consider adding to the profile to confirm additional bends are not required.		JT	3/7/2024
43	C-10		Based on the profile it appears the catch basins are not at the low points. Please confirm and revise to make sure they are located at the low points.	Locations of catch basins have been revised to be at low points.	SP	3/7/2024
44	C-10		Provide drain and sewer pipe size and material in profile. Please revise.	Drain and sewer pipe size and material have been added in profile.	SP	3/7/2024
45	C-11 & C-13		Show profile slope on profile view. Please revise.	Profile slope is shown on profile view.	SDS	3/4/2024
46	C-12		The proposed Drain manholes DMH-17, DMH-14 and DMH-11 are on top of the crown of the road which is not recommended. We suggest to move the drain manholes off of the crown.	Drain manholes have been moved off of the top of the crown of the road.	SP	3/7/2024
47	C-13		Is there a water line in King Street that the 8" stub can connect to on C-13 & C-15? It is better for the system to be looped than to have a dead end. Please confirm.	The water line will be looped with connections on Great Road and King Street (Sheets C-13 and C-20).	SP	3/7/2024
48	C-16		DMH-17 has 4 pipes entering the drain manhole with angles less than 90 degree. The details indicate a standard 4' inside diameter manhole. Please confirm that the DMHs proposed do not require larger diameter manholes to accommodate the pipes.	All drain manholes have been checked to ensure that the standard 4-ft. inside diameter is adequate for all pipes. Drain manholes requiring larger diameters are noted on the Roadway Plan & Profile sheets.	SP	3/7/2024
49	C-23		There are no curb cuts, stormwater BMPs, and drainage system to accommodate any of the other sites. What are future plans for the other sites and how will they tie into the infrastructure proposed?	All other sites will have on-site stormwater management.		
49a	C-23		We recommend that this be made a condition of approval that the lots will have on-site stormwater management separate from the roadway infrastructure.			
50	C-24		The typical application of MUTCD Figure 6H-3 will not be sufficient to cover the work at the entrance on Great Road given the existing shoulder is only 2' wide. Verify required work zone width at Auman Rd entrance. Figure 6H-6 may be more appropriate for this situation. Please revise.	Figure 6H-6 (TA-6) Shoulder Work with Minor Encroachment has been added to Sheet C-29 for proposed utility connections on Great Road. See notes for additional traffic management details.	SDS	3/4/2024
51	C-24		Typical Applications for middle lane closure such as TA-30 should be added for sewer work to be installed on King Street. Please revise.	Figure 6H-10 (TA-10) Lane Closure on a Two-Lane Road Using Flagger has been added to Sheet C-29 for proposed utility connections on King Street. See notes for additional traffic management details.	SDS	3/4/2024
52	C-25		Sewer Doghouse manhole detail is missing. Please provide.	Sewer Doghouse Manhole detail is provided on Sheet C-32.	SP	3/7/2024
53	C-25		Water quality unit detail is missing. Please provide.	Water Quality Unit details are provided on Sheet C-37.	SP	3/7/2024
54	C-27	§249-43 E.(8)	Specify tree species as defined in Town regulations §249-43 E.(8) on detail sheet for tree planting. Please revise.	Tree species will be identified prior to planting and will be submitted in writing to the Town of Littleton for approval. Please see the note on Sheet C-8.	SP	3/7/2024
55	C-27	§249-43 E.(9)	Specify minimum 3" caliper trees in tree planting detail. Please revise.	The tree planting detail has been revised to specify 3 in. minimum caliper trees.	SP	3/7/2024
56	C-27	§249-43 E.(10)	Specify 6" loam where trees are planted from back of sidewalk to the limit of work. Please revise.	Tree Planting detail has been revised to specify 6 in. of loam where trees are planted between the back of sidewalk to limit of work.	SP	3/7/2024



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57	C-19,C-27		There are two details for erosion control barrier shown on the detail page, "erosion control barrier" and "siltsoxx perimeter erosion barrier" detail. It appears only the "perimeter erosion barrier" is called out on the plans. Where is the "erosion control barrier" being used? Please clarify.	Siltsoxx Perimeter Erosion Barrier detail has been removed.	SDS	3/4/2024
58	C-28		Please revise Wheelchair Ramp Type B detail to match curb transition shown in MassDOT standard detail E 107.6.0 to show transition curb ending at front of the detectable warning panel.	Wheelchair Ramp Type B detail has been revised to match MassDOT Standard Detail E 107.6.0.	SDS	3/4/2024
59	C-29	§249-73	Collector Road Typical Section should show Type VA-4 Granite Curb instead of Type VA-6 Granite Curb per Littleton Standard Details. Please revise.	Collector Road Typical Section has been revised to show Type VA-4 Granite Curb.	SDS	3/4/2024
60	C-29	§249-81.B.	Concrete Sidewalk detail should show 8" Gravel Borrow, Type B to match included Town's typical section for collector road. Please revise.	Concrete Sidewalk detail has been revised to show 8 in. of gravel borrow.	SDS	3/4/2024
61	C-29	§249-66 E.	The max slopes on the Collector Road Typical Section should be specified. Please revise.	The collector road maximum grade has been specified as 8%.		
61a			This comment is referring to the cut slopes beyond the back of sidewalk to be labeled with a max slope, currently no label is shown. Please revise. Please also remove the Full Depth Pavement detail on C-30, the application of this is unclear and it contradicts the collector road detail.			
62	C-29		Please revise Vertical Granite Curb detail to match MassDOT Standard Detail E106.3.0.	Vertical Granite Curb detail revised to match MassDOT Standard Detail E 106.3.0.	SDS	3/4/2024
63	C-29	§249-81 D.	The sidewalk minimum width of 5'-0" should be specified on the Concrete Sidewalk detail. Please revise.	Concrete Sidewalk detail revised to show a 5-ft. minimum width.	SDS	3/4/2024
64	C-29		There are no plantings are shown in the plans for the rain garden. The detail indicates native plantings and to see the plans. Please revise to show the plantings in the plans.	Plantings are shown in the detail on Sheet C-34.	SP	3/7/2024
65	C-29		Please explain the purpose of the impermeable liner on the sides of the rain garden.	The impermeable liner has been removed from the rain garden.	SP	3/7/2024
66	C-29		For the rain garden it notes minimum 1' separation to seasonal high groundwater. It should have a minimum of 2' separation to seasonal high groundwater. What is the ESHWT at this location?	The note has been revised to indicate a 4-ft. separation. The ESHWT has been estimated to be 251.5 feet at this location per test pit #1.	SP	3/7/2024
67	C-29		The typical concrete easement of sanitary sewers or storm drains detail has text on the right side that are cut off. Please fix.	Detail was adjusted to prevent text from being cut off.	SP	3/7/2024
68	C-30 - C-56	§249-66 E.	Show slopes off back of sidewalk on sections to confirm they are less than or equal to 3:1 in fill and less than or equal to 4:1 in cut per Town regulations. Please revise.	Slopes are shown as a maximum of 3:1 for both cut and fill, in accordance with Town of Littleton regulations. Slopes off the back of sidewalk are labeled in all sections.	SDS	3/4/2024
69	C-30 - C-56		Sidewalk detail shows max of 7.5% for wheelchair ramp slope but sections show 7.7%. Please revise sections to show 7.5%.	Sidewalk section has been revised to show a wheelchair ramp slope of 7.5%.	SDS	3/4/2024
ZONING BYLAWS						
70		§173-18.D.	Adequate access to each structure for fire and service equipment shall be provided. Please coordinate with the Littleton Fire Department to confirm adequate access.	Roadway 20-ft. clear width and acceptable turning radii are provided for emergency vehicle access. Vehicle access and final location of fire hydrants will be coordinated with the Littleton Fire Department.	SP	3/7/2024



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71		§173-28 Street frontage exception	A zoning table should be added to the plans to show the "provided" and "required" information associated with the street frontage exception requirements. Please revise.	Street frontage and lot size requirements for the King Street Common District have been met, which differ from the Street Frontage Exception requirements. Each lot size and frontage was listed in the previously approved Preliminary Subdivision Plan, and is visible in the attached Definitive Subdivision Plan of Land by Hancock Associates.	SP	3/7/2024
72		§173-31 Intensity of Use Schedule	A zoning table should be added to the plans to show the "provided" and "required" information associated with the intensity of use schedule requirements. Please revise.	The site is part of a master planned development and is subject to the zoning as approved by the Board and as on the "King Street Commons - Master Plan 550 King Street" plans dated 3/22/22. A zoning table has been provided on Sheet C-8.	SP	3/7/2024
STORMWATER REPORT						
73	General Comment		Has there been a drainage analysis performed to confirm the spread and HGL of the proposed closed drainage system? Did the drainage analysis account for all the area that will enter the closed drainage system or just the area within the limit of work?	A drainage analysis has been performed to confirm the spread and HGL of the proposed closed drainage system. The spread is limited to half the travel lane or less for the 10-year storm in accordance with the Massachusetts PD&DG. The HGL follows the crown of the pipes for the 10-year storm, with the exception of pipes D-1, D-2, D-3 and D-12 all of which are supercharged less than 0.51 ft. above the pipe crown and below the respective rim elevations. This design exception was decided upon to meet the minimum pipe cover and to avoid utility conflicts. The drainage analysis has been revised to include all of the area that will enter the drainage system.	SP	3/7/2024
74	General Comment	Methodology	The Methodology section refers to the City of Haverhill requirements. Please revise.	Methodology section has been revised to refer to the Town of Littleton requirements.	SP	3/7/2024
75	General Comment	§38-17.C.5	Estimated seasonal high groundwater elevation (November to April) in areas to be used for stormwater retention, detention, or infiltration. The report and plans do not indicate seasonal high groundwater or if test pits have been performed. Please clarify.	Test pits were performed on December 21, 2023. The ESHGW is conservatively estimated to be 251.50 ft. in the area of the proposed rain garden infiltration with gravelly sand soil. Please see the Drainage Report for test pit logs and a map of ESHGW at test pit locations.	SP	3/7/2024
76	Page 6:Regulatory Compliance		The project is mentioned to be a redevelopment project with 35,475 sf of new development and notes that the site only needs to meet the standards to the maximum extent practicable because it is a redevelopment project. This is incorrect the project is a mix of redevelopment and new development. The new impervious area needs to fully meet the standards. Please revise.	The Drainage Report has been revised to reflect redevelopment and new development.	SP	3/7/2024
77	Standard 2: Peak Rate Attenuation		The proposed peak rate is 12.93 cfs for DP-1 for the 2 year storm which is higher than existing peak flow of 12.75 cfs. This does not meet the peak rate requirement. Please revise.	Peak flow rates have been revised accordingly to be less than the existing peak flow rates.	SP	3/7/2024
78	Standard 3: Recharge		Most of the site according to NRCS Soil resource report is 656 (unknown hydraulic group), but the narrative mentions "The NRCS Soil Resource Report indicates that the site is comprised mostly of hydrologic group C/D soils". The narrative mentions "70% over group D soils (24,833 SF)". The neighboring soils are A, B, and C/D. Was testing done to confirm soil type? Please confirm the soils are actually D soils, otherwise the recharge requirement could be much larger.	Test pits were performed on December 21, 2023 and January 21, 2024. The Site is primarily composed of HSG A soil. Test pit logs confirming the soil types are attached to the Drainage Report.	SP	3/7/2024
79	Required Recharge Volume		The required recharge volume is not met. The proposed rain garden infiltrates 6,180 CF of runoff which is 97% of the required 6,386 CF. 100% of required recharge volume has to be infiltrated. Please revise.	The revised site layout and test pit data produces a required recharge volume of 9,517 CF. The proposed rain garden infiltrates 9,548 CF, 100% of the required recharge volume. Calculations are provided in the Drainage Report.	SP	3/7/2024
80	Recharge		Drawdown calculations for the rain gardens are missing. Please provide.	Drawdown calculations have been added to the Drainage Report (page 13).	SP	3/7/2024
81	Standard 4: Water quality/C-9		Is WQU-65 noted in the plan the same as noted WQU-1 noted in the report? Please use consistent naming.	Structure nomenclature has been revised to be consistent throughout the Site Plans and Drainage Report.	SP	3/7/2024
82	Standard 4: Water quality		It is noted that the existing stormwater pond has an unknown WQV capacity. This is an above ground system and should be surveyed to confirm the capacity. If it is being utilized, it should be modelled in HydroCAD. Please revise.	The existing stormwater wetland will not be used for detention or infiltration of runoff from the right-of-way. The overflow of the proposed rain garden outlets near the existing stormwater wetland to maintain Design Point #1.	JT	3/7/2024
83	Standard 4: Water quality		The narrative indicates that there is an existing stormwater pond but the plans show this is flagged as a wetland. Please confirm if this is a wetland or an existing stormwater pond.	This is a constructed stormwater wetland. It will not be used for stormwater management for runoff from the right-of-way.	JT	3/7/2024



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84	Standard 4: Water quality		The recharge calc says the rain garden treats 6,180cf but the Standard 4: Water quality section mentions "The proposed rain garden holds a total WQV of 2,853 CF". The HydroCAD calcs indicate 2,853 cf. Please clarify.	The proposed rain garden holds a water quality volume (WQV) of 9,548 CF.	SP	3/7/2024
85	Standard 4: Water quality		New Impervious area needs to fully meet the requirement. Please provide calc showing the required water quality volume for the increase in impervious area as well.	The water quality volume (WQV) calculation for the new impervious area is now provided in the Drainage Report (page 14). The new impervious area fully meets the requirement.	SP	3/7/2024
86	Table 3: Water Quality Unit Summary		WQU-1 treatment capacity is 6.5 cfs whereas the peak flow is 38.75cfs for the water quality storm event. The WQU appears to be undersized and does not have a bypass manhole. Will it function properly?	WQU-56 is sized as a Cascade CS-5 unit. The Cascade unit is equipped with an internal bypass weir for high flows. The treatment capacity was confirmed by Contech and is provided in Appendix B of the Drainage Report.	JT	3/7/2024
87	Table 3: Water Quality Unit Summary		WQU-2 treatment capacity is 0.9 cfs but the peak flow is 2.84 cfs for the water quality storm event. The WQU is appears to be undersized. Please clarify.	WQU-66 is sized as a Cascade CS-4 unit. The Cascade unit is equipped with an internal bypass weir for high flows. The treatment capacity was confirmed by Contech and is provided in Appendix B of the Drainage Report.	JT	3/7/2024
88	Watershed Plans	§38-17.C.6.	The existing and proposed vegetation and ground surfaces with runoff coefficients for each should be shown on the watershed plans. Please revise.	A key indicating existing and proposed ground surfaces and runoff coefficients have been added to the revised Drainage Area figures.	SP	3/7/2024
89	Watershed Plans		How does the area in EX-5 get to DP-1? The closed drainage system does not appear to discharge to the existing stormwater pond. Please clarify.	Upon further analysis of the existing drainage system, it has been confirmed that runoff from EX-5 is routed through a closed drainage system to an outfall on the west side of the site. The existing conditions have been revised to include this outfall, designated as Design Point #3 (DP-3).	SP	3/7/2024
90	Watershed Plans		DP-1 stormwater pond is surrounded by higher elevation on the northeast side and a highway ramp at the northwest side. Please confirm if this stormwater pond has an overflow or an outlet.	The proposed rain garden has an outlet control structure (OCS-67) which is routed to a flared end section located to the southeast of the existing stormwater wetland. A riprap emergency spillway is located on the northwest edge of the pond. Please see sheets C-13 and C-34.	SP	3/7/2024
91	C-4, Watershed Plans		The watershed boundary near the island close to Great road is not accurate. The boundary should be drawn perpendicular to the contours to show what will actually enter the catch basins and what will bypass. Please revise.	The watershed boundary has been drawn perpendicular to elevation contours. Please see revised Drainage Area figures.	JT	3/7/2024
92	Post Development Watershed Plan		How does the area southwest of PR-1 get to the rain garden? It looks like it would runoff on to Great road. Please clarify.	The area southwest of PR-1 flows into catch basins (CB-64 and CB-65) before being routed to WQU-66, or it sheet flows into the rain garden.	SP	3/7/2024
93	Post Development Watershed Plan		All of the area on the southwest side of PR-2 and the area north of PR-7 runs onto the site. These areas need to be accounted for and modeled in HydroCAD. Please review and revise all watershed boundaries to include areas that run onto the site.	Areas that runoff onto the site are now included in the watershed boundary and modeled in HydroCAD for both the pre-development and post-development conditions.		
93a	Post Development Watershed Plan		The area on the southwest side of PR-2 which is now south of PR-3 is not included in the watershed boundary for PR-1. The grading has been revised to eliminate the swale that allows this area to run on to the site into PR-1. The grading as created a depression area between the limit of work and the neighboring property. The depression does not have an outlet. This area and depression needs to be accounted for and modeled in HydroCAD. Please clarify how this area will drain. Please review and revise.			
94	Post Development Watershed Plan		Proposed drainage should be shown on the Watershed figure for clarity. Please revise.	Proposed drainage structures and pipes have been added to the Drainage Area figures.	SP	3/7/2024
95	Post Development Watershed Plan		Where does the stormwater runoff go for the parking lot between PR-6 and PR-9? Please clarify.	Stormwater runoff for the parking lot between PR-6 and PR-9 (now PR-21 and PR-26) will infiltrate into the ground or be managed by temporary stormwater and erosion controls such as silt socks and/or a temporary stormwater swale and pond during demolition and construction phases. The contractor will prepare a SWPPP prior to construction. Runoff from this area will be managed on each individual lot prior to their future development.		
95a	Post Development Watershed Plan		We recommend that this be made a condition of approval that the lots will have on-site stormwater management separate from the roadway infrastructure.			
96	HydroCAD		The HydroCAD model shows a 12" round culvert, 6" orifice, and 24" grate for the rain garden outlet that are not shown on the plans. Please revise.	The outlet control structure has been added to the plans, and a detail has been added (Sheet C-34).	SP	3/7/2024



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97	Hydrodynamic Separation Product Calculator		CDS 2025-5 is listed in Contech's calcs but CDS 3035-6 is noted in the water quality calcs. The plans do not have a detail indicating the model. Please revise to provide consistent naming.	The water quality units will be Contech Cascade separators sizes CS-4 and CS-5. Details are provided (Sheet C-37).	SP	3/7/2024
98	Hydrodynamic Separation Product Calculator		For WQU-1, the water quality calcs indicate a 38.75 cfs peak flow rate for the water quality storm event but the chart only goes up to 14.58 cfs flowrate with a treated flow rate of 1.6 cfs. Please explain why the chart only goes up to half the flowrate. Does the internal bypass have capacity for these flows?	The internal bypass has capacity for these flows and the water quality units are sized based on the net annual load removal.	SP	3/7/2024
99			CDS stormwater treatment system typical detail shows an offline layout with a bypass manhole but the bypass manhole is not shown on the plans. It appears the manufacturer recommends an offline system with a bypass manhole. Please clarify.	The water quality unit stormwater details have been revised.	SP	3/7/2024
100	Riprap sizing		For proposed outfall #1, Rip rap should be shown on the plans with sizes and dimensions based on calculations. Please revise.	Riprap calculations are included in the Drainage Report in Appendix B.	SP	3/7/2024
101	Illicit discharge statement		Illicit discharge statement should be signed. Please sign.	The Illicit Discharge Compliance Statement has been signed.	SP	3/7/2024
O&M Plan						
102	O&M		Rain garden is not included in the O&M. Please include in the O&M plan.	The rain garden has been added to the O&M Plan.	SP	3/7/2024
103	O&M		Street sweeping schedule refers to the City of Haverhill. Please revise.	The Street Sweeping Schedule has been revised to indicate the Town of Littleton.	SP	3/7/2024
104	O&M	Stormwater Checklist/§38-18.B.3	The O&M plan shall include the signature(s) of the owner(s).	The O&M Plan has been signed by the owner.	SP	3/7/2024
Sewer Plan						
105	C-9 through C-16		A vertical scale should be included for each profile.	Vertical scales have been added for each profile.	HCS	2/29/2024
106	C-9 through C-16		The proposed manhole rims in profile view are not shown at grade. Please revised.	The proposed manhole rims have been checked with grading and are at grade. The rims may not appear at grade in profile view because the manholes are not located on the centerline, or are located within a curbed island.	HCS	2/29/2024
107	C-9		SMH-1-1 is shown with less than 4 feet of cover over the sewer which is a concern. Consider making it deeper.	SMH-1-1 now has a minimum of 4 ft. of cover.	HCS	2/29/2024
108	C-9 through C-16		There are numerous stubs for future connections (P-1-1, P-1-3, P-1-11, etc.). A call out for a cap at the end of each stub is missing. Please revise.	Callouts for caps at the end of each stub have been added.	HCS	2/29/2024
109	C-10		There is no north arrow on the plan view. Please add.	A north arrow has been added to the plan view.	HCS	2/29/2024
110	C-10		The section of profile to the left of Station 15+00 is already shown on C-9. Delete this section from C-10.	Profiles have been modified to avoid overlap of sections.	HCS	2/29/2024
111	C-10		The section of profile to the left of Station 15+00 is already shown on C-9. Delete this section from C-10.	Profiles have been modified to avoid overlap of sections.	HCS	2/29/2024
112	C-11		What flow will be entering the proposed collection system at the tie in to the existing SMH? Are P-1-14 and the downstream pipes sized adequately for this flow?	Pipes are sized based on estimated flow for the development.	HCS	2/29/2024
113	C-11		Label for P-1-12 is missing on the plan view. Please revise.	The label has been added.	HCS	2/29/2024



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114	C-11		SMH-1-6 seems unnecessary. Can it be eliminated and SMH-1-5 connected directly to SMH-1-7?	SMH-1-6 has been removed.	HCS	2/29/2024
115	C-11		There is a pipe shown leaving SMH-1-7 in the profile view that does not exist in the plan view. Please delete.	The pipe has been deleted.	HCS	2/29/2024
116	C-11		SMH-2-1 is shown with less than 4 feet of cover over the sewer which is a concern. Consider making it deeper.	SMH-2-1 now has a minimum of 4 ft. of cover.	HCS	2/29/2024
117	C-11		Why is there a 0.9' drop in SMH-2-1? Please revise.	SMH-2-1 inverts have been revised.	HCS	2/29/2024
118	C-11		The section of profile to the right of Station 24+50 is already shown on C-12. Delete this section from C-11.	Profiles have been modified to avoid overlap of sections.		
118a	C-11 (now C-16)		On C-15 move the Match Line for Sheet C-16 to the right so it aligns with the end of the profile view.			
119	C-12		P-2-2 is not shown in the profile. Please revise.	P-2-2 has been added to the profile.	HCS	2/29/2024
120	C-11		The invert out at SMH-2-6 should be 0.1' below the invert in. Please revise.	SMH-2-6 inverts have been revised.	HCS	2/29/2024
121	C-11		The section of profile to the right of Station 28+00 is already shown on C-13. Delete this section from C-12.	Profiles have been modified to avoid overlap of sections.		
121a	C-11 (now C-16)		Delete the portion of the profile to the right of the Matchline for Sheet C-20 (SMH-2-7, SMH-2-8, DMH-9, CB-8, etc.)			
122	C-13		P-2-13 is shown with less than 4 feet of cover over the sewer which is a concern. Consider making it deeper.	A minimum cover of 4 ft. is provided for all sewer pipes. The Town of Littleton requires a minimum of 3 ft. of cover.	HCS	2/29/2024
123	C-13		The pipes entering SMH-2-9 and SMH-2-10 are not shown. Please revise.	Plans have been revised.	HCS	2/29/2024
124	C-13		The invert out at EX-SMH-S16-1 is roughly 270.19. Please fix depth of manhole in profile. There should be an internal drop connection from the proposed P-2-21 into the existing manhole. Also, please show the existing manhole in a different color than the proposed infrastructure (i.e. light gray).	The Phase 1 sewer system has been revised to tie-in to the town sewer via doghouse manhole instead of EX-SMH 16-1.	HCS	2/29/2024
125	C-14		SMH-1-5 is missing in the profile. Please revise.	Profile has been revised.	HCS	2/29/2024
126	C-15		P-1-14 is not shown connecting into SMH-1-17 in the profile. Please revise.	Profile has been revised.	HCS	2/29/2024
127	C-15		Add King Street label to plan view.	King Street label has been added to the plan view.	HCS	2/29/2024
128	C-15		Recommend tying into the sewer on King Street at S15-1 or S15-2 instead of installing a doghouse manhole.	Tying the sewer into S15-1 or S15-2 was considered to avoid installing a doghouse manhole. The doghouse manhole design option has been chosen to avoid utility easements and provide flexibility for future development of the sites.	HCS	2/29/2024
129	C-17		Recommend inserting a column into the Sewer Pipe Data tables which indicated the sheet number that each pipe segment is shown on.	A column has been added to the sewer pipe data tables indicating the sheet number the pipe segment is shown on.	HCS	2/29/2024
130	C-17		A 9" sewer pipe is not typical. Consider switching all 9" pipes to either 8" or 10".	Sewer pipes are now 10 in. or 12 in. PVC.	HCS	2/29/2024
131	C-17		All sewer pipes should be PVC.	Sewer pipes are now 10 in. or 12 in. PVC.	HCS	2/29/2024



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132	C-17		The inverts in to SMH-1-8 all need to be at least 0.1' above the invert out. Please revise.	SMH-1-8 inverts have been revised.	HCS	2/29/2024
133	C-17		The invert out of SMH-2-6 should be 0.1' below the invert in. Please revise.	SMH-2-6 inverts have been revised.	HCS	2/29/2024
134	C-17		The "station to" is missing for P-1-11. Please revise.	The "station to" has been added.	HCS	2/29/2024
135	C-17		The slope of P-1-13 is 0.006 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
136	C-17		The slope of P-2-1 is 0.021 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
137	C-17		The slope of P-2-3 is 0.006 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
138	C-17		The slope of P-2-4 is 0.006 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
139	C-17		The slope of P-2-13 is 0.006 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
140	C-17		The slope of P-2-15 is 0.021 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
141	C-17		The slope of P-2-17 is 0.021 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
142	C-17		The slope of P-2-20 is 0.021 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
143	C-17		The slope of P-2-21 is 0.007 based on the inverts. Please revise.	The pipe slope has been revised.	HCS	2/29/2024
144	C-17		The pipe location for P-1-14 should be Existing SMH to SMH-1-7 based on the design. Please revise.	The pipe location has been revised.	HCS	2/29/2024
145	C-17		The pipe location for P-1-15 should be SMH-1-7 to SMH-1-8 based on the design. Please revise.	The pipe location has been revised.	HCS	2/29/2024
146	C-17		The pipe location for P-1-17 should be SMH-1-8 to SMH-1-9 based on the design. Please revise.	The pipe location has been revised.	HCS	2/29/2024
147	C-17		The pipe location for P-1-21 should be SMH-1-9 to SMH-1-10 based on the design. Please revise.	The pipe location has been revised.	HCS	2/29/2024
148	C-17		It's recommended that the pipe location for all pipes that are stubs for future connections should be expressed as "Stub into SMH-X-X". Please revise. List of pipes that this would apply to: P-1-1, P-1-3, P-1-5, P-1-6, P-1-8, P-1-9, P-1-11, P-1-16, P-1-18, P-1-19, P-1-20, P-2-1, P-2-5, P-2-6, P-2-9, P-2-10, P-2-12, P-2-14, P-2-16, P-2-18, P-2-19	Wording has been revised to "Stub into SMH-X-X".	HCS	2/29/2024