

DOCUMENT CONTROL LIST  
**Civil Engineering Peer Review**

*Updated September 13, 2012*

20. Initial Draft Peer Review Report dated August 9, 2012 from Graves Engineering
21. Response to Graves Peer Review letter dated August 15, 2012 from Omni
22. Zoning exception plan dated August 15, 2012
23. Second Draft Peer Review Report dated September 13, 2012 from Graves Engineering

jl



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August 9, 2012

Littleton Zoning Board of Appeals  
Zoning Board of Appeals Office, Room 303  
37 Shattuck Street  
Littleton, MA 01460

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**Subject: 15 Great Road Apartments 40B Project  
Initial Draft Peer Review Report**

Dear Zoning Board of Appeals Members:

We received the following documents on July 11, 2012:

- Plans entitled "Village Green Apartments" 40B Comprehensive Permit Application at 15 Great Road, Littleton, MA dated July 9, 2012, prepared by Places Associates, Inc. for Fifteen Great Road LLC. (13 sheets)
- Bound document entitled Stormwater Analysis for "Littleton Green Apartments" Comprehensive Permit Project in Littleton, Mass. Dated July 9, 2012, prepared by Places Associates, Inc. for Fifteen Great Road LLC II.

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' conformance with applicable "Littleton Board of Appeals Model Rules for the Issuance of a Comprehensive Permit", "Code of the Town of Littleton, Massachusetts, v41, Chapter 173, Zoning", "Code of the Town of Littleton, Massachusetts Chapter 249, Subdivision of Land Regulations", "Code of the Town of Littleton, Massachusetts, Chapter 171, Wetlands Protection", Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy and standard engineering practice. As part of this review GEI visited the site with the applicant and their consulting engineer on August 2, 2012.

Our comments follow:

**Model Rules for the Issuance of a Comprehensive Permit**

1. An earlier version of the application package included a list of waivers dated February 16, 2012 that applied to a previous layout of the project. The waiver list must be updated as necessary to apply to the current project layout and must be submitted for review. (§4(a))
2. The tabulation of site features from the former layout must be updated to reflect the current layout. The required tabulation consists of: proposed buildings by type, size (number of bedrooms, floor area), and ground cover, and a summary showing the percentage of the tract to be occupied by buildings, by parking and other paved vehicular areas, and by open areas. The data was previously submitted partially in the narrative and partially in separate attachments. It would be helpful if the information were submitted together on a plan sheet. The tabulation must not only include the major buildings (e.g. the townhome and garden buildings) but also must include ancillary buildings. (§4(e))

### **Chapter 173, Zoning**

3. A table summarizing the required and proposed parking must be provided in order to evaluate compliance with the parking requirements. The table must be broken down by parking areas and the buildings they serve. For example, 85 parking spaces are proposed in the area of Buildings A – D (28 parking spaces are actually proposed instead of the 35 labeled on the east side of the access road opposite Building C). The table should clarify which buildings are to be served by these parking spaces. The Zoning requirements call for two parking spaces per dwelling unit; thereby indicating that the parking area could accommodate 42 dwelling units. However, the February 16, 2012 narrative indicates there will be 106 dwelling units. (§173-32)

### **Chapter 249, Subdivision of Land Regulations**

4. Considering the Subdivision of Land Regulations as a road infrastructure design and construction guide, consideration should be given to increasing the access driveway binder thickness of interior ways from 1-1/2" to 2-1/2" as cited in the Regulations. The binder asphalt is usually the only asphalt course in place during construction activities. A thicker binder course will provide a more durable road surface during and after the construction phase of the project. (Appendix A, Lane Roads and Minor Roads)

### **Chapter 171, Wetlands Protection**

5. GEI has no issues.

### **Stormwater Management & Hydrology Review**

6. In the hydrology computations a minimum time-of-concentration of 10 minutes (0.17 hours) was used. Per TR-55 (hydrology modeling methodology), the minimum time of concentration is 6 minutes (0.1 hours). This affects the calculated peak rates of runoff and times of the peak rates of runoff. This can be addressed in the hydrology calculations to be prepared during detailed design.
7. The labels in the post-development drainage diagram need to be fully coordinated with the Post-Development Watershed Plan. For example, "Subcatchment R-AB" refers to Buildings A and B but models roof runoff from Buildings B and C, and Subcatchment R31 refers to Buildings 31 and 32 but models roof runoff from Buildings 30 and 31. Likewise, we couldn't find Subcatchment 27 on the Post-Development Watershed Plan.
8. The value of "P2" used to calculate sheet flow time-of-travel in post-development conditions is not consistent with the "P2" value used in the pre-development conditions. This has a small effect on the calculated travel time for sheet flow. The values must be consistent; this can be addressed in the hydrology calculations to be prepared during detailed design.
9. In the post-development conditions, runoff from the area east of Building 32 will discharge via a swale to the project perimeter instead of to Basin C. As such, this area can't be included in Subcatchment 301 because Subcatchment 301 discharges to Basin C. The area is not significantly large; this can be addressed in the hydrology calculations to be prepared during detailed design.

10. On the Post-Development Watershed Plan, lines need to be added to separate Subcatchments 401 and 404, and Subcatchments 444 from 456. This can be addressed in the hydrology calculations to be prepared during detailed design.
11. In post-development conditions Pond 250 (a recharge system) will surcharge during storms more intense than a two-year storm. The recharge system must be revised during detailed design so it doesn't surcharge.
12. In post-development conditions Pond RC-30 (a recharge system) will surcharge during a 100-year storm event. The design must be revised during detailed design so it doesn't surcharge.
13. The hydrology calculations indicate the open basins will function, but design revisions for some of the basins will be necessary during detailed design. The open basins must be designed so that the emergency spillways and the peak water surfaces during a 100-year storm event are each at least one-foot below the top of the basin's berm so that adequate freeboard is provided.
14. The hydrology computations and stormwater management documents are preliminary and will be revised as the project moves forward to detailed design. The preliminary information submitted indicates that the stormwater management scenario being developed for the project can reasonably be expected to support the proposed project once final design revisions are made.

#### General Engineering Comments

15. Vertical profiles of the interior ways were not included in the plan set. Based upon our review of the proposed topographic contours, vertical alignment of the interior ways does not seem to be unreasonable. However, vertical profiles must be included in the construction plan set to allow for detailed review of pertinent features such as vertical curves and leveling areas at intersections.
16. The plans propose driveways at the townhomes as short as approximately eighteen feet as measured from the road (e.g. at Buildings 19, 20, 23, 24, 26, 28). The plans propose one garage parking space for each townhome, so households with two vehicles must also rely on driveway parking. We are concerned that some of the driveways are too short for longer vehicles, and the possibility exists for a vehicle parked in a driveway to protrude into the travel lane or onto a sidewalk. As defined by Massachusetts Department of Transportation in their Project Development and Design Guide, a passenger vehicle is nineteen feet long. A vehicle would have to be parked very close to a garage door in order for the vehicle not to encroach on a travel lane or a sidewalk, if encroachment can even be avoided. It has been our experience that a minimum driveway length of twenty-two feet typically works well for townhomes. Alternatively, the plans could provide "extra" parking spaces scattered throughout the site to allow persons with a longer vehicle an alternative place to park within a reasonable walking distance of their dwelling.
17. The plans propose four "extra" parking spaces between Buildings 17 and 18. We feel this is a good concept; the "extra" parking spaces could provide parking off the interior ways for households with more than two vehicles and/or gatherings at the dwelling units.

Consideration should be given to adding additional "extra" parking areas dispersed throughout the project to discourage parking on the interior ways. For example, "extra" parking could be considered near Buildings 4, 7 & 13, 14 and in the area of Buildings 24 – 28.

18. "Off-street" parking rather than perpendicular parking should be provided for the recycling center to avoid conflicts between vehicles backing out of the parking spaces and vehicles using the project entrance/exit.
19. Cape Cod berm is proposed along the road. For better protection of pedestrians, a vertical curb must be used instead of Cape Cod berm in areas where a sidewalk is adjacent to an interior way.
20. The plans show the water main truncating at the access road to Grist Mill and in Great Road. The plans must note whether the water main will be connected to the existing water main in one or both locations. It would be prudent to create a looped water system.
21. The plans only show three fire hydrants on Sheet 5 and none on Sheet 4. The proposed number of fire hydrants appears to be inadequate. The design engineer should solicit the Fire Department and Littleton Water Department relative to the number and locations of fire hydrants.
22. On Sheets 4 and 5, the text associated utility line-types is too small to read. The text must be enlarged.
23. Based upon the information submitted to date, the size of the conceptual wastewater disposal area does not appear to be unreasonable. The wastewater design flow will exceed 10,000 gallons per day; therefore the applicant will have to apply to Massachusetts Department of Environmental Protection for a groundwater discharge permit. The wastewater disposal system design will certainly be refined as the permitting process proceeds.

#### General Comments

24. The recycling, maintenance and wastewater treatment buildings must be labeled on Sheets 3, 4 and 5.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,  
Graves Engineering, Inc.



Jeffrey M. Walsh, P.E.  
Project Manager

Comment	Notes	Delivery
<b>Model Rules for the Issuance of a Comprehensive Permit</b>		
1. An earlier version of the application package included a list of waivers dated February 16, 2012 that applied to a previous layout of the project. The waiver list must be updated as necessary to apply to the current project layout and must be submitted for review. (§4(a))	Waiver list will be resent to the peer engineer	August 16
2. The tabulation of site features from the former layout must be updated to reflect the current layout. The required tabulation consists of: proposed buildings by type, size (number of bedrooms, floor area), and ground cover, and a summary showing the percentage of the tract to be occupied by buildings, by parking and other paved vehicular areas, and by open areas. The data was previously submitted partially in the narrative and partially in separate attachments. It would be helpful if the information were submitted together on a plan sheet. The tabulation must not only include the major buildings (e.g. the townhome and garden buildings) but also must include ancillary buildings. (§4(e))	This information will be summarized on a plan sheet	August 16
<b>Chapter 173, Zoning</b>		
3. A table summarizing the required and proposed parking must be provided in order to evaluate compliance with the parking requirements. The table must be broken down by parking areas and the buildings they serve. For example, 85 parking spaces are proposed in the area of Buildings A -D (28 parking spaces are actually proposed instead of the 35 labeled on the east side of the access road opposite Building C). The table should clarify which buildings are to be served by these parking spaces. The Zoning requirements call for two parking spaces per dwelling unit; thereby indicating that the parking area could accommodate 42 dwelling units. However, the February 16, 2012 narrative indicates there will be 106	Information will be provided plan identified in the response to item 2 above.	August 16

<b>dwelling units. (§173-32)</b> <b>Chapter 249, Subdivision of Land Regulations</b>		
4. Considering the Subdivision of Land Regulations as a road infrastructure design and construction guide, consideration should be given to increasing the access driveway binder thickness of interior ways from 1-1/2" to 2-1/2" as cited in the Regulations. The binder asphalt is usually the only asphalt course in place during construction activities. A thicker binder course will provide a more durable road surface during and after the construction phase of the project. (Appendix A, Lane Roads and Minor Roads)	Acknowledge receipt of suggestion	Private way. No change will be made to plans.
<b>Chapter 171, Wetlands Protection</b>		
5. GEI has no issues.	No comment required	
<b>Storm water Management &amp; Hydrology Review</b>		
6. In the hydrology computations a minimum time-of-concentration of 10 minutes (0.17 hours) was used. Per TR-55 (hydrology modeling methodology), the minimum time of concentration is 6 minutes (0.1 hours). This affects the calculated peak rates of runoff and times of the peak rates of runoff. This can be addressed in the hydrology calculations to be prepared during detailed design.	Clarification will be made in plans	Final Construction Documents
7. The labels in the post-development drainage diagram need to be fully coordinated with the Post-Development Watershed Plan. For example, "Subcatchment R-AB" refers to Buildings A and B but models roof runoff from Buildings Band C, and Subcatchment R31 refers to Buildings 31 and 32 but models roof runoff from Buildings 30 and 31 . Likewise, we couldn't find Subcatchment 27 on the Post-Development Watershed Plan.	Technical issue will update plans	Second phase peer review
8. The value of "P2" used to calculate sheet flow time-of-travel in post-development conditions is not consistent with the "P2"	Clarification will be made in plans	Final Construction Documents

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<p>value used in the pre-development conditions. This has a small effect on the calculated travel time for sheet flow. The values must be consistent; this can be addressed in the hydrology calculations to be prepared during detailed design.</p>		
<p>9. In the post-development conditions, runoff from the area east of Building 32 will discharge via a swale to the project perimeter instead of to Basin C. As such, this area can't be included in Subcatchment 301 because Subcatchment 301 discharges to Basin C. The area is not significantly large; this can be addressed in the hydrology calculations to be prepared during detailed design.</p>	<p>Clarification will be made in plans – arrow will be added showing direction of flow</p>	<p>Second phase peer review</p>
<p>10. On the Post-Development Watershed Plan, lines need to be added to separate Subcatchments 401 and 404, and Subcatchments 444 from 456. This can be addressed in the hydrology calculations to be prepared during detailed design.</p>	<p>Clarification will be made in plans</p>	<p>Final Construction Documents</p>
<p>11. In post-development conditions Pond 250 (a recharge system) will surcharge during storms more intense than a two-year storm. The recharge system must be revised during detailed design so it doesn't surcharge.</p>	<p>Clarification will be made in plans</p>	<p>Final Construction Documents</p>
<p>12. In post-development conditions Pond RC-30 (a recharge system) will surcharge during a 100-year storm event. The design must be revised during detailed design so it doesn't surcharge.</p>	<p>Clarification will be made in plans</p>	<p>Final Construction Documents</p>
<p>13. The hydrology calculations indicate the open basins will function, but design revisions for some of the basins will be necessary during detailed design. The open basins must be designed so that the emergency spillways and the peak water surfaces during a 100-year storm event are each at least one-foot below the top of the basin's berm so that adequate freeboard is provided.</p>	<p>Civil will show proof</p>	<p>Second phase peer review</p>
<p>14. The hydrology computations and stormwater management documents are preliminary and will be revised as the project moves forward to detailed design. The preliminary information submitted indicates that the stormwater</p>	<p>No comment required</p>	

management scenario being developed for the project can reasonably be expected to support the proposed project once final design revisions are made.		
<b>General Engineering Comments</b>		
15. Vertical profiles of the interior ways were not included in the plan set. Based upon our review of the proposed topographic contours, vertical alignment of the interior ways does not seem to be unreasonable. However, vertical profiles must be included in the construction plan set to allow for detailed review of pertinent features such as vertical curves and leveling areas at intersections.		Final Construction Documents
16. The plans propose driveways at the townhomes as short as approximately eighteen feet as measured from the road (e.g. at Buildings 19, 20, 23, 24, 26, 28). The plans propose one garage parking space for each townhome, so households with two vehicles must also rely on driveway parking. We are concerned that some of the driveways are too short for longer vehicles, and the possibility exists for a vehicle parked in a driveway to protrude into the travel lane or onto a sidewalk. As defined by Massachusetts Department of Transportation in their Project Development and Design Guide, a passenger vehicle is nineteen feet long. A vehicle would have to be parked very close to a garage door in order for the vehicle not to encroach on a travel lane or a sidewalk, if encroachment can even be avoided. It has been our experience that a minimum driveway length of twenty-two feet typically works well for townhomes. Alternatively, the plans could provide "extra" parking spaces scattered throughout the site to allow persons with a longer vehicle an alternative place to park within a reasonable walking distance of their dwelling.	Provided additional parking	Second phase peer review
17. The plans propose four "extra" parking spaces between Buildings 17 and 18. We feel this is a good concept; the "extra" parking spaces could provide parking off the interior ways for households with	Accommodated suggestions - additional parking at buildings as shown on exhibit	Second phase peer review

Response to Graves Peer Review Letter of August 9, 2012

<p>more than two vehicles and/or gatherings at the dwelling units. Consideration should be given to adding additional "extra" parking areas dispersed throughout the project to discourage parking on the interior ways. For example, "extra" parking could be considered near Buildings 4, 7 &amp; 13, 14 and in the area of Buildings 24 -28</p>		
<p>18. "Off-street" parking rather than perpendicular parking should be provided for the recycling center to avoid conflicts between vehicles backing out of the parking spaces and vehicles using the project entrance/exit.</p>	<p>Currently in review</p>	<p>TBD</p>
<p>19. Cape Cod berm is proposed along the road. For better protection of pedestrians, a vertical curb must be used instead of Cape Cod berm in areas where a sidewalk is adjacent to an interior way.</p>	<p>Vertical curbing will be used in areas where a sidewalk is adjacent to an interior way.</p>	<p>Final Construction Documents</p>
<p>20. The plans show the water main truncating at the access road to Grist Mill and in Great Road. The plans must note whether the water main will be connected to the existing water main in one or both locations. It would be prudent to create a looped water system.</p>	<p>Ongoing meetings with LWD</p>	<p>Connections as agreed to with LWD will be detailed on Final Construction Documents</p>
<p>21. The plans only show three fire hydrants on Sheet 5 and none on Sheet 4. The proposed number of fire hydrants appears to be inadequate. The design engineer should solicit the Fire Department and Littleton Water Department relative to the number and locations of fire hydrants.</p>	<p>Meetings with LWD and Littleton Fire Safety</p>	<p>Hydrants as agreed to with LWD &amp; Fire Safety will be detailed on Final Construction Documents</p>
<p>22. On Sheets 4 and 5, the text associated utility line-types is too small to read. The text must be enlarged</p>	<p>Plans have been updated</p>	<p>Second phase peer review</p>
<p>23. Based upon the information submitted to date, the size of the conceptual wastewater disposal area does not appear to be unreasonable. The wastewater design flow will exceed 10,000 gallons per day; therefore the applicant will have to apply to Massachusetts Department of Environmental Protection for a groundwater discharge permit. The wastewater disposal system design will certainly be refined as the permitting</p>	<p>No comment required</p>	

Response to Graves Peer Review Letter of August 9, 2012

process proceeds.		
<b>General Comments</b>		
24. The recycling, maintenance and wastewater treatment buildings must be labeled on Sheets 3, 4 and 5.	Plans have been updated	Second phase peer review





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September 13, 2012

Littleton Zoning Board of Appeals  
Zoning Board of Appeals Office, Room 303  
37 Shattuck Street  
Littleton, MA 01460

**Subject: 15 Great Road Apartments 40B Project  
Second Draft Peer Review Report**



Dear Zoning Board of Appeals Members:

We received the following documents on August 15, 2012 from Omni Properties:

- Tabulated "Response to Graves Peer Review Letter of August 9, 2012" (6 pages).
- Plan entitled Village Green Apartments Zoning Exception Plan, 15 Great Road, Littleton, MA dated July 9, 2012, stamped as "Progress Print, August 15, 2012", prepared by Places Associates, Inc. for Fifteen Great Road LLC. (1 sheet)
- Correspondence from Fifteen Great Road II, LLC to Littleton Zoning Board of appeals dated August 15, 2012.
- Tabulated "Fifteen Great Road Waivers Requested" dated August 14, 2012. (10 pages)
- Sheet A.201 of a plan entitled Rental Sign dated July 24, 2012, prepared by Maugel Architects, Inc. for Fifteen Great Road II LLC. (1 sheet)
- Sheet A.201 of a plan entitled Entry Sign dated July 24, 2012, prepared by Maugel Architects, Inc. for Fifteen Great Road II LLC. (1 sheet)
- Plan entitled Village Green Apartments Render Plan 3 of 3 dated August 15, 2012, prepared by Places Associates, Inc. for Fifteen Great Road II LLC. (1 sheet)

We received the following documents on August 23, 2012 from Places Associates, Inc.:

- Tabulated list of responses to comments from Graves Engineering. (5 pages)
- Excerpt of plans showing revised parking layout at the recycling facility.
- Plan entitled Village Green Apartments Zoning Exception Plan, 15 Great Road, Littleton, MA dated July 9, 2012, stamped as "Progress Print, August 15, 2012", prepared by Places Associates, Inc. for Fifteen Great Road LLC. (1 sheet)

We received the following documents on September 5, 2012 from the Littleton Zoning Board of Appeals office:

- Correspondence from Senator James Eldridge and Representative James Arciero to Littleton Residents dated August 30, 2012.

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- Bound document entitled Environmental Notification Form (ENF) Application for Village Green and The Orchards, prepared by Places Associates, Inc. for 15 Great Road LLC I & II, with attachments.

We received the following document on September 6, 2012 from the Places Associates, Inc.:

- Bound document entitled Stormwater Analysis for "Littleton Green Apartments" Comprehensive Permit Project in Littleton, Mass. dated July 9, 2012 and revised September 4, 2012, prepared by Places Associates, Inc. for Fifteen Great Road LLC II.

Graves Engineering, Inc. (GEI) has been requested to review and comment on the plans' conformance with applicable "Littleton Board of Appeals Model Rules for the Issuance of a Comprehensive Permit", "Code of the Town of Littleton, Massachusetts, v41, Chapter 173, Zoning", "Code of the Town of Littleton, Massachusetts Chapter 249, Subdivision of Land Regulations", "Code of the Town of Littleton, Massachusetts, Chapter 171, Wetlands Protection", Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy and standard engineering practice. As part of this review GEI visited the site with the applicant and their consulting engineer on August 2, 2012.

This letter is a follow-up to our previous review letter dated August 9, 2012. For clarity, comments from our previous letter are *italicized*, and our comments to the Applicant's responses are depicted in **bold**. Previous comment numbering has been maintained. Our latest comments beginning with "Acknowledged..." indicate a comment was addressed to our satisfaction and further review by our office is not necessary. Other comments require further consideration by the Board, and/or document revision(s) and subsequent review by our office.

**The plans submitted are preliminary plans and as such do not contain sufficient detailed information to consider these construction-ready plans. The preliminary plans were reviewed in the context of whether or not the preliminary design and information are consistent with applicable regulations and good engineering practices, and whether or not the preliminary design could be advanced to detailed design and construction-ready documentation.**

Our comments follow:

#### Model Rules for the Issuance of a Comprehensive Permit

1. *An earlier version of the application package included a list of waivers dated February 16, 2012 that applied to a previous layout of the project. The waiver list must be updated as necessary to apply to the current project layout and must be submitted for review. (§4(a))*

**The waiver request list was updated. We offer the following comments:**

- a. **Zoning Bylaws §173-16 to §173-19** – In the narrative, the word "units" should be changed to "parking spaces".
- b. **Zoning Bylaws §173-32.B(1)** – 403 parking spaces are proposed instead of 407 as listed in the waiver request.

- c. **Zoning Bylaws §173-32.C.** – The Board may wish to require a minimum sidewalk width of six (6) feet wherever perpendicular parking is proposed adjacent to a sidewalk. The wider sidewalk would serve the same purpose as a wheel bumper or wheel guard, namely to maintain the usable width of the sidewalk. As an alternative to a wider sidewalk, a grass strip between the parking spaces and sidewalk could also serve the same purpose.
2. *The tabulation of site features from the former layout must be updated to reflect the current layout. The required tabulation consists of: proposed buildings by type, size (number of bedrooms, floor area), and ground cover, and a summary showing the percentage of the tract to be occupied by buildings, by parking and other paved vehicular areas, and by open areas. The data was previously submitted partially in the narrative and partially in separate attachments. It would be helpful if the information were submitted together on a plan sheet. The tabulation must not only include the major buildings (e.g. the townhome and garden buildings) but also must include ancillary buildings. (§4(e))*  
**Acknowledged.** The tabulation was revised. The tabulation was included on the Zoning Exception Plan.

### Chapter 173, Zoning

3. *A table summarizing the required and proposed parking must be provided in order to evaluate compliance with the parking requirements. The table must be broken down by parking areas and the buildings they serve. For example, 85 parking spaces are proposed in the area of Buildings A – D (28 parking spaces are actually proposed instead of the 35 labeled on the east side of the access road opposite Building C). The table should clarify which buildings are to be served by these parking spaces. The Zoning requirements call for two parking spaces per dwelling unit; thereby indicating that the parking area could accommodate 42 dwelling units. However, the February 16, 2012 narrative indicates there will be 106 dwelling units. (§173-32)*

**Acknowledged.** A summary table was provided on the Zoning Exception Plan. The parking count exceeds 2.0 spaces per dwelling unit in the area of townhomes. In the area of the garden-style dwelling units, the parking count is proposed to be 1.5 parking spaces per dwelling unit. The count does not appear to be unreasonable for these one-bedroom apartments. Finally, if in the future parking were found to be deficient for the garden-style dwelling units, there is room to increase the parking by approximately 18 spaces by expanding toward the wastewater treatment building, or by up to approximately 34 spaces if parking were expanded to the east. In summary, the overall parking count is 2.12 parking spaces per dwelling unit and sufficient room for parking expansion near the garden-style units is available if expansion is ever needed.

### Chapter 249, Subdivision of Land Regulations

4. *Considering the Subdivision of Land Regulations as a road infrastructure design and construction guide, consideration should be given to increasing the access driveway binder thickness of interior ways from 1-1/2" to 2-1/2" as cited in the Regulations. The binder asphalt is usually the only asphalt course in place during construction activities. A thicker binder course will provide a more durable road surface during and after the construction phase of the project. (Appendix A, Lane Roads and Minor Roads)*

**The applicant acknowledged receipt of the suggestion and chose to make no plan revisions. We defer to the Board whether the binder asphalt thickness should be increased.**

**Chapter 171, Wetlands Protection**

5. *GEI has no issues.*  
**No further comment.**

**Stormwater Management & Hydrology Review**

6. *In the hydrology computations a minimum time-of-concentration of 10 minutes (0.17 hours) was used. Per TR-55 (hydrology modeling methodology), the minimum time of concentration is 6 minutes (0.1 hours). This affects the calculated peak rates of runoff and times of the peak rates of runoff. This can be addressed in the hydrology calculations to be prepared during detailed design.*

**Acknowledged. The hydrology computations were revised.**

7. *The labels in the post-development drainage diagram need to be fully coordinated with the Post-Development Watershed Plan. For example, "Subcatcment R-AB" refers to Buildings A and B but models roof runoff from Buildings B and C, and Subcatchment R31 refers to Buildings 31 and 32 but models roof runoff from Buildings 30 and 31. Likewise, we couldn't find Subcatchment 27 on the Post-Development Wafershed Plan.*  
**Acknowledged. The Post-Development Watershed Plan and the post-development drainage diagram (presented with the hydrology calculations) were revised to address consistency issues.**

8. *The value of "P2" used to calculate sheet flow time-of-travel in post-development conditions is not consistent with the "P2" value used in the pre-development conditions. This has a small effect on the calculated travel time for sheet flow. The values must be consistent; this can be addressed in the hydrology calculations to be prepared during detailed design.*

**Acknowledged. The post-development hydrology calculations were revised.**

9. *In the post-development conditions, runoff from the area east of Building 32 will discharge via a swale to the project perimeter instead of to Basin C. As such, this area can't be included in Subcatchment 301 because Subcatchment 301 discharges to Basin C. The area is not significantly large; this can be addressed in the hydrology calculations to be prepared during detailed design.*

**The post-development plan was revised to include a note showing where a proposed swale will discharge runoff. The concept is not unreasonable and is now consistent with the modeling in the post-development hydrology calculations. Detailed design of the swale must be included in the construction drawings. The detailed design may simply consist of grading for a swale or may include another method(s) such as a drainage pipe under the south end of the parking area between Buildings 32 and 33.**

10. *On the Post-Development Watershed Plan, lines need to be added to separate Subcatchments 401 and 404, and Subcatchments 444 from 456. This can be addressed in the hydrology calculations to be prepared during detailed design.*

**Acknowledged. The Post-Development Watershed Plan was revised. The hydrology computations are consistent with the Post-Development Watershed Plans.**

11. *In post-development conditions Pond 250 (a recharge system) will surcharge during storms more intense than a two-year storm. The recharge system must be revised during detailed design so it doesn't surcharge.*

The top of the recharge system was raised approximately one foot and the hydrology computations were revised to include the hydraulic connection between Pond 250 and Pond 200 (Basin A). The hydrology modeling concept is reasonable. During detailed design the top-of-system elevations will have to be evaluated in detail to confirm there will be adequate earth cover over the system and there will not be issues with stormwater breakout from the recharge system to the adjacent slope.

12. *In post-development conditions Pond RC-30 (a recharge system) will surcharge during a 100-year storm event. The design must be revised during detailed design so it doesn't surcharge.*

**Acknowledged. The post-development hydrology computations were revised by increasing the storage volume. The hydrology revisions will have to be incorporated into the detailed design plans.**

13. *The hydrology calculations indicate the open basins will function, but design revisions for some of the basins will be necessary during detailed design. The open basins must be designed so that the emergency spillways and the peak water surfaces during a 100-year storm event are each at least one-foot below the top of the basin's berm so that adequate freeboard is provided.*

The hydrology computations show that Basins D and F will have one-foot of freeboard. The hydrology computations show that Basins A, B and C can function, but revisions to the basin design will need to be made during detailed design to provide at least one-foot of freeboard.

14. *The hydrology computations and stormwater management documents are preliminary and will be revised as the project moves forward to detailed design. The preliminary information submitted indicates that the stormwater management scenario being developed for the project can reasonably be expected to support the proposed project once final design revisions are made.*

The revised hydrology computations are also preliminary and we consider them subject to further revision as the project goes to detailed design and the preparation of construction drawings. The modeling is satisfactory for the purpose of preliminary design and site development evaluation. One hydrology revision the design engineer will find he has to make is to change the pond routing method from the Storage-Indication Method to the Dynamic Storage-Indication Method to account for tailwater effects caused by downstream infrastructure such as diversion manholes such as Pond 53 (the diversion manhole between Building 8 and Building 9). The Storage-Indication assumes free outflow whereas the Dynamic-Storage Indication Method does not assume free outflow but calculates the outflow based upon tailwater effects, if any are present. The design engineer will also have to revise the outlet of rain garden RG-D (between Buildings 28 and 19) to avoid overland flow of runoff from the rain garden to Basin D across the walkway; the flow varies between about 2 cubic feet

per second (cfs) and 4.6 cfs depending upon the storm event. Again, this is a level of detail typically addressed at detailed design.

Finally, narrative entitled "Compliance with Stormwater Quality Requirements" presented in the Stormwater Analysis discusses with MADEP stormwater management standards. The narrative indicates that compliance with the standards can be achieved; we concur that based upon the preliminary information submitted it appears likely that compliance with the standards can be achieved. Our analysis was based upon the information submitted and reasonable engineering assumptions where detailed design information has not been generated yet. For example, the subsurface recharge system sizes and locations have been shown on the plans, but elevation information has not been generated yet. As the design process moves forward, detailed information such as recharge system elevations, pipe invert elevations and pipe sizes will be generated that would allow for review of the specific systems being proposed for the project. With the applicant's submittal of detailed information and detailed supporting information, issues such as the following can be reviewed to evaluate compliance with the MADEP stormwater management standards: Standard 3 – Recharge: recharge system offset to groundwater, groundwater mounding at each specific recharge location based upon actual discharge to each system; Standard 4 – Water Quality: sizing of best management practices (BMP's) such as forebays, rain gardens and proprietary treatment units; Standards 8 and 9 – construction-phase and long-term operation and maintenance plans; and Standard 10 – a completed Illicit Discharge Statement. Based upon the information submitted to date, the applicant has reasonably demonstrated that compliance with Standard 1 – no new untreated discharge and Standard 2 – Peak Rate Attenuation can be achieved and has demonstrated that Standard 5 – Land Use with Higher potential Pollutant Load, Standard 6 – Critical areas and Standard 7 – Redevelopment does not apply.

#### General Engineering Comments

15. Vertical profiles of the interior ways were not included in the plan set. Based upon our review of the proposed topographic contours, vertical alignment of the interior ways does not seem to be unreasonable. However, vertical profiles must be included in the construction plan set to allow for detailed review of pertinent features such as vertical curves and leveling areas at intersections.  
A set of revised plans was not submitted. The design engineer indicated their intention to provide vertical curbing and to include this revision on the final set of plans.
16. The plans propose driveways at the townhomes as short as approximately eighteen feet as measured from the road (e.g. at Buildings 19, 20, 23, 24, 26, 28). The plans propose one garage parking space for each townhome, so households with two vehicles must also rely on driveway parking. We are concerned that some of the driveways are too short for longer vehicles, and the possibility exists for a vehicle parked in a driveway to protrude into the travel lane or onto a sidewalk. As defined by Massachusetts Department of Transportation in their Project Development and Design Guide, a passenger vehicle is nineteen feet long. A vehicle would have to be parked very close to a garage door in order for the vehicle not to encroach on a travel lane or a sidewalk, if encroachment can even be avoided. It has been our experience that a minimum

driveway length of twenty-two feet typically works well for townhomes. Alternatively, the plans could provide "extra" parking spaces scattered throughout the site to allow persons with a longer vehicle an alternative place to park within a reasonable walking distance of their dwelling.

As presented on the Zoning Exception Plan, "additional parking" was added near Buildings 5, 10, 16 and 26. The Zoning Exception Plan also identifies townhouse driveways that are between eighteen feet and twenty feet in length. There are a total of 297 parking spaces proposed at the townhouse buildings: 142 spaces in the garages, 142 spaces in the driveways and 13 "extra" parking spaces. Of those, 33 spaces (11.1%) are driveway spaces between eighteen feet and twenty feet long. The thirteen "extra" parking spaces account for 4.4% of the parking spaces. The revised parking layout does not appear to be unreasonable. Please see Comment #3 relative to the overall provision for parking at the project. Finally, to clarify the concern for vehicle encroachment, if a Comprehensive Permit is issued, then the Board may wish to consider a condition that prohibits parked vehicles from encroaching on an interior way or sidewalk and/or set a specific minimum driveway length.

17. The plans propose four "extra" parking spaces between Buildings 17 and 18. We feel this is a good concept; the "extra" parking spaces could provide parking off the interior ways for households with more than two vehicles and/or gatherings at the dwelling units. Consideration should be given to adding additional "extra" parking areas dispersed throughout the project to discourage parking on the interior ways. For example, "extra" parking could be considered near Buildings 4, 7 & 13, 14 and in the area of Buildings 24 – 28.  
As presented on the "Zoning Exception Plan", "additional parking" was added near Buildings 5, 10, 16 and 26. The revised parking layout is reasonable and is an improvement to the overall parking scheme. However, the plan also eliminated thirteen parking spaces at Buildings A – D. The new parking layout must be incorporated into the next plan set issued to the Board. Please see Comment #3 relative to the overall provision for parking at the project.
18. "Off-street" parking rather than perpendicular parking should be provided for the recycling center to avoid conflicts between vehicles backing out of the parking spaces and vehicles using the project entrance/exit.  
A plan excerpt showing "off-street" parking was provided. The revised parking layout is reasonable and is an improvement compared to the former "on-street" parking. The new parking layout must be incorporated into the next plan set issued to the Board.
19. Cape Cod berm is proposed along the road. For better protection of pedestrians, a vertical curb must be used instead of Cape Cod berm in areas where a sidewalk is adjacent to an interior way.  
A set of revised plans was not submitted. The design engineer indicated their intention is to provide vertical curbing and to include this revision on the final set of plans.
20. The plans show the water main truncating at the access road to Grist Mill and in Great Road. The plans must note whether the water main will be connected to the existing water main in one or both locations. It would be prudent to create a looped water system.

A set of revised plans was not submitted. The design engineer indicated their intention is to make connections as agreed to with Littleton Water Department and to provide this information on a final set of plans.

21. *The plans only show three fire hydrants on Sheet 5 and none on Sheet 4. The proposed number of fire hydrants appears to be inadequate. The design engineer should solicit the Fire Department and Littleton Water Department relative to the number and locations of fire hydrants.*

We understand the applicant has solicited comments from Littleton Water Department and from Fire Safety. A set of revised plans was not submitted. The design engineer indicated their intention is to submit this information on a final set of plans.

22. *On Sheets 4 and 5, the text associated utility line-types is too small to read. The text must be enlarged.*

The design engineer indicated the plans were updated and would be submitted for "second phase peer review". A set of revised plans was not submitted nor reviewed as part of this "Second Draft Peer Review".

23. *Based upon the information submitted to date, the size of the conceptual wastewater disposal area does not appear to be unreasonable. The wastewater design flow will exceed 10,000 gallons per day; therefore the applicant will have to apply to Massachusetts Department of Environmental Protection for a groundwater discharge permit. The wastewater disposal system design will certainly be refined as the permitting process proceeds.*

It has come to our attention that in addition to serving the 40B project, the applicant may wish to discharge wastewater from twenty-two single-family homes to the 40B wastewater system. At 110 gallons per day (gpd) per DEP and assuming the single-family homes have four bedrooms each, the additional flow would be 9,680 gpd. The 40B flow would be approximately 43,560 gpd (based upon 396 bedrooms at 110 gpd per bedroom), and the combined flow from the 40B project and the single-family homes would be approximately 53,240 gpd. Based upon our understanding of design flows and wastewater loading rate data presented by MADEP in their document entitled Guidelines for the Design, Construction, Operation and Maintenance of Small Wastewater Treatment Facilities and Land Disposal, the size of the conceptual wastewater disposal area does not appear to be unreasonable relative to serving the 40B project and the 22 single-family homes. Again, permitting of this facility would be through MADEP, likely through their Groundwater Discharge Permit Program.

Beyond the issue of land area for wastewater disposal, there is the issue of land area needed for wastewater treatment and ancillary equipment. The plans show an "L"-shaped building south of the disposal area. A 25 foot by 62 foot portion of the building has been identified on Sheet 7 of the plans as "WWTP" (wastewater treatment plant). No other wastewater treatment components have been identified on the plans. For treatment systems such as this, it is common to also have other components such as subsurface tanks and/or a standby generator. Our concern is whether or not components such as these have been incorporated into the land area identified as "WWTP". It is our understanding that the wastewater treatment and disposal system is being designed by a different engineer than the site design engineer. If not already done, the site design engineer should coordinate with the

wastewater design engineer and incorporate any pertinent design information such as the latest treatment and disposal system layout into the site plans to demonstrate that adequate land area has been reserved for the wastewater treatment system and disposal fields.

**General Comments**

24. *The recycling, maintenance and wastewater treatment buildings must be labeled on Sheets 3, 4 and 5.*

The design engineer indicated the plans were updated and would be submitted for "second phase peer review". A set of revised plans was not submitted nor reviewed as part of this "Second Draft Peer Review".

**Additional Comments, September 13, 2012**

25. The wastewater collection system has been included on the plans but is yet to be designed in detail. The preliminary layout appears to be reasonable. In general, the layout consists of sewer mains along the interior driveways and a sewer service lateral to serve each building. Based upon our review of the proposed topography, it appears that most of the site could be served by a gravity collection system, but possibly with a lift station to convey wastewater collected at the southern portion of the site and a lift station to serve Buildings 30 and 31.

**Summary**

Based upon the preliminary information submitted to date, our previous review comments have been addressed such that it appears the project could move forward to detailed design following the preliminary design basis presented already. The plans submitted are not at the level of detail where they could be issued for construction, nor would one expect the plans to contain detailed information at this point in the permitting process. Where detailed information was not yet generated, it appears that reasonable engineering assumptions were made by the design engineer.

We trust this letter addresses your review requirements. Feel free to contact this office if you have any questions or comments.

Very truly yours,  
Graves Engineering, Inc.

  
Jeffrey M. Walsh, P.E.  
Project Manager