CITY OF HAVERHILL
MASSACHUSETTS 01830

PLANNING BOARD

CITY HALL, ROOM 201
FOUR SUMMER STREET
HAVERHILL, MASSACHUSETTS 01830
TELEPHONE 374-2330
FAX 374-2315

April 23, 2012

City Council President John Michitson
& City Councilors
City of Haverhill

RE: Special Permit for Sylvan Hill Cluster Residential Development
Sylvan Hill Development LLC, owner/applicant; for property located on Forest St

Members Present:	Timothy Connors, Celeste Hynick, Roy Wright, James Cronin, Jack Everette, Joseph Sullivan, Bob Driscoll and Paul B. Howard.
Members Absent:	None
Also Present:	William Pillsbury, Director of Economic Development & Planning Lori A. Woodsum, Office Manager/Planning Department

Dear City Council President & Councilors:

The Haverhill Planning Board at its meeting held on 4-11-12, Wednesday Evening, at 7:00 p.m. in Room 202, Haverhill City Hall heard the above-cited petition for a special permit. Member Jack Everett read the rules for a public hearing. Paul Howard chaired the meeting. Chairman Howard explained that the board did not deny or approve special permits but forwarded a recommendation since the city council had the ultimate authority. The chairman announced the above cited public hearing. He asked the petitioner to come forward.

Attorney Michael Migliori with offices located at 18 Essex Street in Haverhill came forward to speak. It was noted that Mr. Steve Stapinski from Merrimack Engineering Services was also present. He planned to make a brief presentation and then will have Steve Stapinski come up and touch upon some engineering matters and wrap up with the review of the department head comments with some that have just come in this afternoon.

Attorney Migliori noted that Sylvan Hill Crossing is a cluster residential plan that you have before you. The proposed development was submitted pursuant to Chapter 255-94 of the Haverhill Zoning Ordinance, which is the cluster development ordinance. The project consists, as indicated on your plan, 29 single family homes on individual lots. The

proposed density comes out to 1.45 units per acre. The underline zoning in this district is RM, residential medium, which technically allows for basically 2 units per acre, 20K square foot lots. What you have before you is a by right plan that was filed with the city council and subsequently forwarded to you for your review and recommendation back to the council. The plan depicts the layout of 29 conventional single family houses on individual lots. The site itself is adjacent to the Liberty Hill Condo's, West Lowell Avenue Apartments and across from Briarwood Apartments. The site abuts the open space of West Meadow Hill Condominium along with other land of the city being used as open space. The proposed development has 10.88 acres of land or a little over 54% of the site set aside as open space. The public will have access from West Lowell Avenue and there will be an additional 3 foot wide trail servicing the open space from the easterly side of the project but he could be wrong there. There are wetlands which traverse the site/land through West Lowell Avenue. The wetlands and streams are proposed to remain undisrupted and the development has been planned to meet all the City of Haverhill's Conservation Requirements regarding the 50 foot no build 25 foot, no disturb zone as well as the city and state DEP Storm Water Management Requirements. There will be no increase in drainage runoff to adjacent properties from this site. Everything will be contained in accordance with the ordinance. The site is serviced by both city water and sewer on Forest Street and they will be extended into the property. Telephone, electric, cable and any other utilities will all be located with underground servicing individual homes. The plan is to construct the homes with green meaning energy star requirements and using and having more possible and sustainable products in their construction. All of the house lots meet the minimum of the RH Zoning Requirements which is required by the cluster ordinance. Some of you may be aware but was not sure that the planning board had much of a role with the comprehensive permit that was issued but the site was previously approved pursuant to a comprehensive permit a 40B project and at that time contained 88 units. It was noted that 36 of those units were to be single family homes and 52 were to be town homes, which was an approved comprehensive permit. The lots were obviously significantly smaller than those before you this evening and there was substantially more impervious area as a result of the number of units, the roofs, the driveways, etc. Additionally there was no dedicated open space on the site. He knew that it was necessary to cross wetlands in a couple of locations. The previously approved plan did have substantial environmental impact as compared to the one proposed for you this evening. It was noted that plan, the 40B plan with the affordable housing component is no longer proposed to be constructed and in its place is the plan before you.

Attorney Migliori went on to say that the new plan showed the 29 homes. The plan along with the significant open space that came as a result of a significant amount of new planning to develop a neighborhood was responsive to the current real estate climate and market demand as well as the programs to maximize open space on the site. This would also reduce the environmental impacts of the development on the natural resources on the site respecting the topography and resource areas on the property. The new development will be sensitive to the density existing in the area and the abutters along the frontage of Forest Street but still generating new revenue for the city and fulfill a demand for a type of new housing not found in the more dense areas of the city including the downtown area. Should the special permit for the cluster development be granted by the city council then the plan would need additional approval by the Conservation Commission and they will return back to planning with a more refined designed definitive plan for approval at that

stage. It was noted that this cluster development plan meets or exceeds all of the requirements contained in the zoning ordinance under which it has been submitted. The attorney planned to stop at this point to ask Steve Stapinski to come forward to address some of the engineering aspects.

Steve Stapinski, Merrimack Engineering Services, 66 Park Street, Andover, MA came forward to speak. As Attorney Migliori indicated the plan that was previously approved by the Board of Appeals with the 88 units is no longer proposed to go forward. The plan that we have this evening for 29 single family homes has a roadway alignment which is similar in nature as to what was approved by the zoning board and approved by the conservation commission and the other city departments at the time of that plan. All of the houses would be serviced with sewer and water that would be extended into the site from Forest Street. There are some minor off site sewer improvements that they were going to be doing as part of the plan. He thought that the Water Department and the Sewer Department have submitted reports to you noting those improvements and one of the things that is a little different about this plan and this particular area is that the density is less dense than what is allowed under zoning in terms of the size of the lots and the total development on the site. But more importantly it was less dense than the abutting land uses. The Liberty Hill Development just to the east of this site has 40 units per acre. The condominiums that area located just to the west of the site have a density of 28 units per acre. So it is substantially more dense in the area and noted that across the street there are the Briarwood Apartments with a density of 14 units an acre. You can see that we are kind of in an area that is very dense. There is West Meadow Hills which is located at his end of our property, which has 365 units on 84 acres. There are about 4 units an acre which is roughly 4.5 units an acre. It was noted that their open space has been laid out to abut the open space on West Meadow Hill. It also abutted City of Haverhill Open Space and thought that the conservation commission agent has indicated in his correspondence that there is additional land that is waiting to be taken by the city for open space for another subdivision on West Lowell Ave which he thought was Jillian's Way. Mr. Stapinski felt this made a lot of sense from a planning standpoint and that there is a tremendous amount of contiguous open space. They were going to make the open space available to the public in that their open space actually has a 3 foot wide trail link that runs along the narrowest part that actually comes out onto the street. So that even though a lot of the lots abut the open space everyone within the subdivision and the public themselves would have access into... (Inaudible) fee simple access. It was noted that they also provided a secondary trail easement that would allow access into the open space from the end of the cul-de-sac. He explained that the people that live at the end of Liberty Hills, the people who live at the apartments on West Lowell Avenue as well as the single family house abutters and the West Meadow Hill abutters would all have access to our open space as well.

Mr. Stapinski ended his presentation at this point and noted that he would be happy to answer any questions that you might have for him.

Member Celeste Hynick was just looking through the design standards. She had just a few things pop out very quickly like the length of the cul-de-sac and it being no greater than 800 feet, a 28 foot wide roadway width, the minimum center line for the radii should be 270 feet and we specify the type of curbing should be granite. She wanted to know if they would be applying for a waiver on the definitive stage on these items.

Mr. Stapinski noted that there would be a waiver to the center line radius and to the cul-de-sac length. Granite curbing would still be proposed to be installed and it would be sloped granite edging which they normally do in the subdivisions.

Member Hynick asked about the 28' width and if it was a typo at 26.

Mr. Stapinski noted that they were requesting a waiver for 26 feet. He knew that the board in the past has tended to look for 24' or 26' wide width pavement and in this case probably twenty six.

The chairman noted that the standard is 28 feet.

Member Everette noted that the access where you changed it to further up the street wanted to know if that was going to be sloped too much to get in there.

Mr. Stapinski noted that the access that we have on this plan was actually the access that was at the same location as the comprehensive permit. He has those plans with him tonight that show the finish grading. There was going to be grading within the right of way and grading on the site to make the transition. He noted at the time of the comprehensive permit they went out with the city engineer to make sure there was adequate site distance in each direction, which was something that did come up at that time. They also had a traffic study done at that time as well by Dermot Kelley and that information had been submitted to the city departments at that point. So they have kept the intersection at the same location as it was previously approved by the city departments.

The chairman asked if there were any other questions. He opened this portion of the hearing to comments from the public.

The planning director, William Pillsbury, asked Attorney Migliori if he wanted to speak before people in the audience came forward to speak.

Attorney Migliori asked if he was going to mention all the reports from the department heads.

The planner's response was... not in detail.

Attorney Migliori wanted to summarize the reports considering that some of those reports came in late. He noted that if you looked at those reports that everyone appears to be in favor of the project as submitted. Some of those reports have certain things that they would like to see. He knew that Mr. Pettis, the city engineer, has indicated that he wanted to see some linkage for an additional $600.00 per unit, traffic mitigation, and certainly would like a chance to discuss that at the city council level. There is a lot of linkage these days and it is becoming very expensive to build here. However, other than that issue they did not have any issues and incorporating anything else that Mr. Pettis has in his letter.

He noted the same thing for the report from the Health Department. They have no objections to anything contained in the letter from Mr. Godin.

Special Permit Cluster Development for Sylvan Hill
4/11/12 Planning Board Meeting

Regarding the letter from Mr. Moore of the Conservation Department... there were no objections to anything contained in his report and would be happy to have that incorporated into any decision that the board makes tonight.

It was noted by Attorney Migliori that it was similarly noted by Water/Wastewater, Mr. Jessel, in his report to the board and they had no issues with anything that he has suggested in his report.

The Fire Department report requested sprinklers in each home and they did not have any objection to installing sprinklers in the home.

The building inspector, Mr. Osborne, just indicated that the subdivision complies with dimensional density regulations for 255.

It was noted in summary by Attorney Migliori that he did not see any negative comments from any of the department heads review of the project. They could certainly live with any of the requests made by any of the department heads and could be incorporated into the final decision. He thanked the board and returned to his seat.

Chairman Paul Howard asked if there was anyone else that wanted to speak on this project. He asked the person speaking from their seat to come forward to the microphone and state her name and address for the record.

The following people came forward to speak about their concerns: Michele Mena, 44 Hatch Street; Lise Norris, 645 W. Lowell Ave Bldg. 45; Andrea O'Brien, 111 Forest Street; Susan McGregor, 681 W. Lowell Avenue; Some of the concerns are as follows: wetlands and water issues, the water will hit property at 44 Hatch St., a walkway with Jillian's Village and open space and leaving area for trails; abutter felt the area was too wet so they would not be able to have any foot traffic there; water going down the hill and hitting the Riverbend Condo area; wanted to hear more facts on the proposed project; no traffic report to review to see how new traffic will disrupt the traffic there presently; how long will it take for conservation approval and how it will affect the traffic with the new construction of project; tying into the sewer and decreasing their property values; reviewing the proposed plan; the access point on W. Lowell Ave. and where that access point is or if they are accessing the project from that point and the possibility of access behind the home at 681 W. Lowell Ave; and wanted to know if the only access point was from Forest Street.

Mr. Stapinski clarified that the only access would be Forest Street into the property in terms of vehicular access to the units. There is a pedestrian access way that would be existing from the...

Planning Director Pillsbury excused himself for interrupting Mr. Stapinski but asked the abutters to listen to Mr. Stapinski as he tried to answer a lot of the concerns of the abutters right now at this meeting. He just wanted to have one conversation going on so that it would be easier for everyone. He asked Mr. Stapinski to continue with his explanation.

Mr. Stapinski pointed to an area on the plan that showed a light green...to the left on the drawing was the open space. There is also going to be open space along the River Bend Condominiums where you could see a kind of solid green space off the bottom of the site and Attorney Migliori is going to point to that area. So that is open space and that links to the large open space by a three foot wide fee simple trail. Then to the right of that there is

a graveled roadway that is there right now that provides access to some of the houses that are on the property... the foundations in the back. There will be a trail easement over that so you can walk from the roadway and into the woods in the back and that access is also wide enough for emergency vehicles like the Fire Department truck or a forest management truck like Conservation in case they needed to get in there. That easement was proposed to be 10 feet wide. There is also another parcel of land to the left of the Riverbend and Attorney Migliori could point to the green area (on the plan) sort of down at the bottom of the plan sheet to connect over to the one to the left of it. There is a strip of land to the west of the Riverbend Condominiums that goes with the site that provides access into the property from... it will be into the open space from West Lowell Avenue and then people could walk up along where the utility poles and wires are located and walk into the site.

Abutter—from their seat... "It's all wet land there and a brook there."

Mr. Stapinski answered no... the brook is to the left...

People all speaking out of order noting: behind the dumpsters... that is where the dumpsters are... there is a big pond and we used to go there as a kid and there is a well up there too...

Chairman Howard explained to the abutters that all they were saying was that there is the ability to have access there and it was not on property owned by this developer and they are providing access within their subdivision to access that land. All they are doing is telling you where the points of access are available to get into the property whether you choose to use those or not it was up to you.

Someone was speaking out and gave no name... (Inaudible).

The chairman explained that if you wanted to speak that you had to come forward to the podium. You are not supposed to speak from your seat. He asked if there was anyone else that wanted to speak.

William Drapeau, 147 Mercury Terrace, part of the Jefferson Estate Community and also kind of part of Liberty Hill came forward to speak. His concerns are the following: Access point on Forest Street that would certainly increase the traffic there and believed if that was correct there was also a 4 way stop right in that area and he was concerned with the traffic in that area and also the water pressure. If they were going to be accessing the town water he knew that that Jefferson Estates further up on the hill does have more water pressure (inaudible) so if you add more units in there then noted that he was just concerned about the water pressure problem there.

Chairman Howard asked if there was anyone else that wanted to speak.

Lisa Aach, 115 Forest Street, came forward to speak. She has similar concerns as the others but where this is exactly across from her property was really concerned about her child and other children in the area and referred to how bad the traffic is there presently.

She has a hard time getting out into the street from her house. She noted that it was absolutely terrible trying to get out onto Forest Street. She would like more info on the traffic reports and wanted to know when it was proposed to start; the length of time to take to build and to put up. She felt that there was a lot more information that they did not receive yet and did not know how far this was into the planning. She just wanted more information. Plus there were more questions and concerns of the neighbors that still have not been answered.

Lise Norris, 645 West Lowell Ave, came forward to speak. She wanted to know if it was going to be disturbed at all and would they be able to see these homes through this forest area there and wanted to know if any of that will be removed. The water pressure is also a concern and the drainage is a big concern of hers. She heard that other condominiums in the area of Haverhill and Methuen who have complexes that have homes built near... and they have had their share of problems and have been very costly for them. She was really scared that this will eventually happen to them.

Chairman Howard asked if there was anyone else that wanted to speak.

Kay Espinola, 645 West Lowell Ave, came forward to speak. She lived in the condo's there and she did not quite understand when they mentioned the Jillian Village area. She wanted to know if there was going to be an opening there onto their property or is that going to be an enclosed in place. She wanted to know if there was going to be an access between Jillian's Way and the property that they want to build.

The chairman asked if there was anyone else that wanted to speak. No one else came forward to speak at this time. He asked the proponent if he wanted to speak.

Steve Stapinski came forward to speak. He thought that the primary concern in terms of water pressure would just say off initially that the city previously hired Camp, Dresser & McKee to prepare a study to determine whether or not there was adequate water supply and water pressure for the 88 units and it fact they had found that there was. The Water Department recommended that the study be updated because of changes that might have been done in the area and the city has another consultant. It was noted that they agreed to do that as Attorney Migliori said as the Water Department has recommended. And... if there are improvements that needed to be made as they find them in that study then they will evaluate whether or not we want to do those when we go forward with the definitive plan.

In terms of the storm drainage and as Attorney Migliori indicated and Mr. Stapinski thought that he mentioned they were not proposing to cross any wetlands or alter any wetlands and in fact the Haverhill Conservation Commission has a by-law that does not permit any disturbance within 25 feet of the wetlands or the waterways and no buildings within 50 feet of the wetlands or the waterways. They were complying 100% with this development. As he mentioned, the previous development there were two wetlands crossings, there were alterations of the wetlands and significant building in the buffer zone. However, in this particular case we used the wetlands streams more or less as a way to sort of define the limits of our work. So why would development located, as we looked at the plan, the Forest Street side of those wetlands and those wetlands and streams will be

part of the open space so they will remain untouched. So whatever was there now would still remain in tact. He also added that those streams that come down to West Lowell Avenue from the hill really over at Morgan Drive at the Liberty Hill Condominiums and the area of Mercury Way was sort of the head water of that wetland and comes through our site down West Lowell Avenue. It was noted that as part of the plan even though we are not crossing the wetlands we were still within 100 feet of them so we will have to go to the Conservation Commission for a permit called a Notice of Intent and they give an Order of Conditions to construct the development. As part of those regulations that permit will have to comply with the state regulations with water quality and runoff so that there is not increase in the peak runoff from the site after it is built. The planning board has similar standards that they have in place and would be complying with those standards as well. We've shown on the plan the location of the catch basins and the drainage collection system. We've also shown at least 2 areas where there will be storm water detention areas constructed so that we'll be building some small ponds on the site that will retain the water after the large storms dissipate and become empty again. So there would be sort of detention areas to slow the runoff down so that none of the drainage systems offsite or abutting the property would be negatively impacted. The calculations for those will be submitted with the definitive plan after the special permit would be issued.

There was a question that came up relative to the woods in the area of the Riverbend Condominiums. They would not be cutting the woods on their property. There was actually a wooded buffer on their site at the top of the hill that will remain in place. They would not be disturbing that. In the open space area between the road and the property line most if not all of that will remain intact as well. There might be some regarding done there but they will keep that intact and it certainly will be re-vegetated if it is disturbed.

Mr. Stapinski referred to the traffic impact in that area. We look at it in terms of the 88 units and compare it to the 29 proposed lots which will have substantially less traffic by at least a two thirds reduction. If far as the length of time to develop the site it probably is two years and maybe three. The site work itself and road improvements probably will take six to nine months to implement and the house construction would parallel all that so that would be about the time of disturbance and impact into the neighborhood, which he noted was typical for most developments. Mr. Stapinski did not think that there were any other questions.

Attorney Migliori came forward to speak. He mentioned an issue regarding Jillian's Village and thought that were it came from was Mr. Moore's letter where he was describing the combination of the parcels up there. Mr. Moore referenced the parcel that the city owned, the parcel that Jillian's Village is discussing transferring ownership of to the city and the parcel that we have that we would be transferring to the city if the city wanted it, which was the open space piece. What Mr. Moore says in his report was… the final ownership of the Sylvan Hill Open Space should be consistent with the Mayor's decision on the Jillian's Village Open Space. It was noted that it came up in the contacts of whatever happens to the open space parcel that Jillian's Village has the same thing should happen with this parcel of open space so that at least they are in the same entity or all owned by the city so there would be one controlling agency. There was no impact on Jillian's Village in any way.

The attorney thought that Mr. Stapinski covered just about everything else that was mentioned but perhaps for the procedure that we were proceeding under. Perhaps some

of the folks are not aware of what happens or what is going on. Attorney Migliori explained that the planning board this evening would give some sort of recommendation to the city council to further that matter and assuming that the council agrees with the special permit then the final definitive plans will come back before the board for further review and will get into all of the details that so many of you are interested in seeing. He thought that Steve did cover all of the other issues which primarily were primarily were water pressure, drainage, length of the time period for completion, access and hopefully they have covered it all.

Andrea O'Brien, 111 Forest Street, Haverhill, MA 01832, came forward to speak. She thought that it was substantially less than the 88 homes that was previously proposed but noted that it was not an adequate answer to how this will affect the traffic in the area. We are looking at 29 properties which was practically 60 cars. Also, no one touched upon how this would affect the property value of the homes that were already there. Her house is right across the street, which is a single family home. She wanted to know how that would affect the value of her home with a complex right across the street.

Chairman Howard noted there was no way of knowing that. It could increase the value or it could decrease the value. There was no way that you could tell that.

Andrea O'Brien asked about the traffic to say that it is less that the previously 88 homes that were supposed to go in there.

The chairman noted that it was mentioned that a traffic study was done for the comprehensive permit which evaluated 88 units and this is less...

Andrea O'Brien agreed that this was less but they had not seen the traffic study and wanted to know how or what were the results of the traffic study.

The chairman noted that she was asking for things that were either in the preliminary stage.

Ms. O'Brien noted as a resident we have a right to know. She asked the question and no one seems to answer. She was just told that it was less than the 88 houses and wanted to know how that will affect the traffic. She thought that was a valid question.

Someone from their seat spoke out noting the following... we have to have a police detective out there at the four-way stop because it was so bad there. It was just going to cause more trouble... she knew that they wanted to put houses up there and understood that but asked to take in concern of the other things.

Mr. Stapinski came forward and referred to the traffic report that recommended that the proposed street would be put under stop sign control so that there would be a stop sign which they would show at the definitive plan stage at the intersection of the proposed street with Forest Street. Forest Street was found to have adequate capacity to handle the traffic flow. It was a recommendation by the city engineer that the intersection of Broadway and Forest Street be improved. And as part of the city engineer's recommendation to the board he is recommending that there be money put aside for traffic improvements at that

intersection. In terms of the intersection of Forest Street and West Lowell Avenue there was not enough traffic to meet the warrants for any other patrol other than a stop sign. You cannot put traffic signals there because there was not enough traffic there for a traffic signal. It was noted that at the intersection of all of the streets with River Street there was not enough traffic even with Michaels or the old Pat's Roast Beef to justify traffic signals at any of those streets only stop signs are the only traffic control devices that meet the warrants of the state for traffic control. So if there is an issue otherwise then it is an enforcement of an existing traffic control device which they cannot control.

Member Timothy Connors asked Mr. Stapinski when the survey was done in respect to the 88 lot development.

Mr. Stapinski answered 5 or 6 years ago.

Member Connors wanted to know if that was the most recent traffic survey that you had done regarding that

Mr. Stapinski answered right… and really there has been no further development on Forest Street since that time because at the time the Liberty Hill and the Mercury Terrace development that was approved back in the 1970's. He knew that there was a lot of discussion about the status of those permits but everything was taken into account as fully permitted when the study was done.

Member Connors noted so there have not been any other developments created…

Mr. Stapinski… no other development created here… Innisfree Drive and the other subdivision that were closer to Broadway were already in place when the Sylvan Hill project was proposed.

Member Connors thanked Mr. Stapinski for his response.

Susan McGregor, 681 West Lowell Ave, came forward to speak. She had one question as it related to traffic. She noted that she was at the opposite end of West Lowell Ave where the Gazette used to be located. She understood that there was another development that was going to go into that area, which also subsequently has been reduced in size. So adding that area if that is still a possibility in this area that will also create more traffic at this particular 4 way stop. She did not know if that other development was still in process. They already moved a house over to accommodate the easement to get into this property and there has been nothing said since. So if you were to add that area and this possible area you are talking not just about 29 units any more you are talking about a much larger number if that other development also gets approved. She did not know where that was in planning but they were talking about significantly more than 29 units with 2 cars but did not know the status of that other…

Chairman Howard noted that you cannot link projects like that… you can't hold something that may or may not happen in the future. If that happens in the future…

Susan McGregor knew that it was in progress and all of a sudden it halted but it was just a question… it was not her area and that was why she was asking because she did not know how it would effect traffic that is all. She did not know anything about it she just had a question.

The Chairman noted this is the last person.

Michele Mena, 44 Hatch Street, came forward to speak. She noted that it was still going and it was approved because her brother is going to do the same thing that you guys are going through… I will give you their name and number. Ms.Mena felt that this would cause a lot of traffic there and felt that they needed to do another traffic update because there is a lot of traffic going in there. She moved there 5 years ago so there is a lot of work going on and there is a lot of traffic. On her road which used to be dead… if you Google, Map Quest all of that shows that there is so much traffic going through from Haverhill to Salem, NH because it is a back road. So there is a lot more traffic going up and down that Forest Street. We do need to get that evaluated. Then there is Target and all those other stores in that area. The industrial park so you have to do another traffic report because there is a lot of traffic. She did not like going up and down that street any more… but it was what she was used to because she has lived there her whole life. She thanked that board and returned to her seat.

Chairman Howard asked if there were any more comments from the board members. There were no other questions or comments from the board members. The public portion of the hearing was closed and the hearing was turned over to the planning director for his comments.

Planning Director William Pillsbury noted that the request was for a special permit that was filed with the city council for the 29 lot cluster development. The role of the planning board was to consider a recommendation to the city council on the special permit. The reviews of the city department were in the board packages and specifically the Fire Dept., City Engineer, Water/Wastewater, and Conservation Departments have raised issues in their letters and all of these items need to be responded to and addressed by the applicant throughout the process which we indicated will go from tonight's recommendation as to whether this complies and really the recommendation is only whether the project is in compliance with the zoning requirements of Chapter 255-94 and meets the special permit criteria to go forward to the city council. So the recommendation is on that basis alone. It was not on the detailed development, detailed definitive development of this project that comes back to this planning board as was pointed out earlier for a definitive plan. All of the contents of the departmental letters should be made conditions of the recommendation to the city council and overall the review indicated that the project does comply with the requirements of the zoning ordinance for approval as a cluster development and with that recommended a conditional, favorable recommendation to the city council with the conditions being incorporation of the city department letters and any additional concerns raised by the board this evening as a result of this hearing which will be made in the form of a conditional favorable recommendation to the city council.

Member Roy Wright asked the people in the audience if they all understood what the planner just said. He explained that this process just allowed them to start... It was noted that there were 8 letters up here from the various city department heads who are going to watch this like hawks. Nothing untoward was going to happen here... this just gives them permission to start.

Member Sullivan noted it would start the permit process.

Someone asked if that meant that it could get shut down.

Member Roy Wright noted that he would not go so far to say that... these gentlemen want to build it and they are going to comply with the city engineer, head of the Water Dept. etc. He noted that was there business and they were good at it. Nothing awful was going to happen in the City of Haverhill as a result of this board yes tonight... it just starts the process.

Planning Director William Pillsbury noted that subsequent public hearings will be held by the city council which that date has been scheduled. He asked Attorney Migliori for that date if he had it for the City Council hearing. Then there will be a series of hearings that will be held by the Conservation Commission which would address all of the drainage issues and those issues as well. Then it would be ultimately back before the planning board with a definitive plan which will have all of these analyses completed.

Attorney Migliori informed the planner that the city council hearing was scheduled for May 15, 2012.

The planner noted that it would be on a Tuesday night with the city council in the council chambers which will be the next hearing after this hearing here this evening. He asked Mr. Stapinski if he filed with Conservation yet...

Mr. Stapinski noted that they would file with conservation most likely concurrently with the definitive plans with the planning board.

The planner noted that the next hearing will be the city council hearing and then conservation and then the definitive plan stages will be...

Mr. Stapinski noted it would be later in the summer.

Member Timothy Connors had a concern. He thought it was a point that was well raised tonight... he just wanted to implement a condition that a new traffic survey be done considering it was about 5 years ago that the last one was done for a different lot development. He thought there were... he was not sure when Target was built and all the other commercial buildings that were on Rt. 97, Broadway, were indicative or whether they were taken into consideration when that other traffic study was done. He just asked that it be imposed as a condition.

Chairman Howard noted it could be made part of the motion.

Member Joseph Sullivan felt that it should be updated also.

The chairman noted that a motion was in order.

Motion
Member Timothy Connors voted to send a favorable recommendation to the city council with the conditions stated by Mr. Pillsbury as well as an updated traffic survey. Member Roy Wright seconded the motion. Members Timothy Connors, Celeste Hynick, Roy Wright, James Cronin, Jack Everette, Joseph Sullivan, Bob Driscoll and Paul B. Howard all voted to send a **favorable, conditional recommendation to the city council**. No members were absent. Motion passed.

City department reports are attached to these minutes and considered part of this decision.

Signed,

Paul B. Howard
Chairman

Cc: Special Permit Cluster Residential Development for Sylvan Hill File
Mayor James Fiorentini
City Council (copy)
City Clerk (original)
Owner/Applicant
City Engineer John Pettis, III—Room 214
Engineer/Surveyor

#1

RECEIVED
APR 11 2012
Econ Devlp & Planning
& B.O.A.

Haverhill

Engineering Department, Room 214
Tel: 978-374-2335 Fax: 978-373-8475
John H. Pettis III, P.E. - City Engineer
JPettis@CityOfHaverhill.com

April 11, 2012

MEMO TO: HAVERHILL PLANNING BOARD

Subject: ***Special Permit Plan – Sylvan Hill Crossing***

I have reviewed the Plan and have the following comments:

1. The previous site project included design and construction for the reconstruction of the Forest Street/Broadway intersection. I recommend that Special Permit approval be subject to the applicant providing at least $600 per unit in traffic mitigation, as have most recent projects.
2. I recommend that Special Permit approval be subject to the applicant providing off-site drainage improvements, to be determined by the City Engineer.
3. I will address numerous other topics (including buildable lots, roadway geometry, stormwater design including catch basin spacing, underdrains, fencing at detention areas and Clerk of Works requirement) during the Definitive plan stage.

Please contact me if you have any questions.

Sincerely,

John H. Pettis III, P.E.
City Engineer

C: Stankovich, Ward, Moore, Hunter
Merrimack Engineering

#1

Haverhill

Board of Health
Inspection Services
School Nurse Leader
Community Health Coordinator
Phone: 978-374-2325
978-374-2341
978-374-2338
978-374-2430
Fax: 978-374-2337
bdufresne@cityofhaverhill.com

Rec'd
4-11-12
mcv

April 11, 2012

MEMO

To: William Pillsbury – Planning Director
From: Les Godin – Health Department

Re: Sylvan Hill Crossing

Given that the proposed development is to be serviced by municipal water and sewer, this department has no objections at this time however I offer the following comments:

1. The plan indicates the removal of the existing buildings in the proposed open space.
2. It should be noted that the filling of foundations shall be in accordance with the Massachusetts DEP 310 CMR 16.05 requirements for the disposal of asphalt brick and concrete (ABC) rubble.
3. Any existing septic systems shall be abandoned in accordance with Title V of the State Environmental Code.
4. Any existing wells shall be decomissioned in accordance with the Massachusetts DEP 310 CMR 46 requirements for well drillers.

Haverhill

#1
mc ✓
rec 4-11-12

Economic Development and Planning
Conservation Department
Phone: 978-374-2334 Fax: 978-374-2337
rmoore@cityofhaverhill.com
conservation@cityofhaverhill.com

MEMO TO: William Pillsbury, Economic Development and Planning Director
FROM: Robert E. Moore, Jr., Environmental Health Technician
DATE: April 11, 2012
RE: Special Permit – Residential Cluster Subdivision – Review #1
Sylvan Hill Development, LLC for Forest Street – Sylvan Hill Crossing
Map 588, Block 422, Lots 1A, 3A, 4, 6C, 35, 36, 37, and 38

I have reviewed the forwarded information and understand that the site plan is preliminary in nature. Although the applicant has not yet filed any applications with the Commission, it appears the project is intended to comply with the Massachusetts Wetlands Protection Act and its Stormwater Regulations, along with the requirements of the City's wetlands protection ordinance.

The City owns 4 acres of open space immediately to the west of this site's 10-acre open space parcel. To the west of the 4 acre parcel is a 15-acre open space parcel that resulted from the Jillian's Village (Shelby Circle) cluster subdivision. The owner of that parcel has petitioned the City to accept the land as public open space. That petition is currently before the Mayor. The City's ownership of all three parcels would provide 30 acres of public open space in a densely developed area. To the north is the West Meadow Hill condominium complex. To the northeast are the Mercury Terrace and Morgan Drive complexes. To the south are homes along West Lowell Avenue. However, beyond the intrinsic scenic value and buffering, the value of these parcels to the City is likely limited to the potential of the forest being managed and the future possibility of providing enhanced passive recreational opportunities at the neighborhood level. **The final ownership of the Sylvan Hill open space should be consistent with the Mayor's decision on the Jillian's Village open space.**

In my opinion, the proposed project marks a significant improvement over the previous comprehensive permit (Ch. 40B) project design. **In conclusion, I wish to offer my support for the granting of this cluster development special permit.** I would request that any favorable recommendation to the Council include the following **conditions** for incorporation within the special permit:

- Upon completion of project construction, the applicant shall demarcate with signage the limits of the open space parcel(s). A trail head shall be installed at the entrance to the 10'-wide trail on Lot 22. The final design of the trail head shall be subject to the approval of the Conservation Commission.
- All stormwater management systems associated with this project shall be designed, constructed, and maintained in full compliance with the Massachusetts Stormwater Management Regulations found in the Wetlands Protection Act.

Haverhill

#1 mcv

Paul J. Jessel, Collection System Supervisor
Water/Wastewater Division
Phone: 978-374-2382 Fax: 978-521-4083
pjessel@haverhillwater.com

April 10, 2012

William Pillsbury
Planning Director/ Grants Coordinator

Subject: **Application for Special Permit for Cluster Residential Development**
On Forest Street
ID# 588-422-1A

The City of Haverhill Water and Wastewater Departments have reviewed the Special Permit Application and accompanying plan titled, "Cluster Subdivision/Special Permit Plan – Silver Hill Crossing, Haverhill, MA" dated February 9, 2012 prepared by Merrimack Engineering Services.

Wastewater

1. Stormwater Drainage fee of $300 per unit shall be required.
2. A previous Wastewater Analysis was conducted with a brief review and off-site improvement is still required for this development.
    a. At the intersection of Forest Street and West Lowell Avenue there is an existing 20-inch DI sewer approximately 10-feet away from the 10-inch A.C. pipe and 20-feet deep. Connect the 10-inch A.C. pipe into the 20-inch sewer manhole using an inside drop pipe. This is approximately 42-feet of gravity sewer. This pipe shall have the same capacity as the existing A.C. pipe 2,167 gpm. The developer shall submit plans to Engineering and Wastewater for approval.

Water

The Applicant shall address the following comments at the time of Definitive Plan preparation and prior to Definitive Plan approval:

1. The developer shall be required to pay $400 for a water analysis to update the 2003 results based upon the reduce number of lots and the age of the analysis off-site improvement may be required.
2. An easement providing access to Morgan Drive for utilities (including water) shall be provided to the City.

Water and Wastewater Divisions do not object to the special permit and request this letter be part of City Council approval. Water and Wastewater Divisions shall provide additional comments after the submission of a detail Definitive Plans and the completion of the water analysis.

Haverhill

Paul J. Jessel, Collection System Supervisor
Water/Wastewater Division
Phone: 978-374-2382 Fax: 978-521-4083
pjessel@haverhillwater.com

If you have any questions, please call my office 978-374- 2382.

Sincerely,

Paul J. Jessel
Collection System Supervisor

WWTP File#: 120059
ID #: 588-422-1A

cc: Robert Ward, W/WWTP
John Pettis, III P.E.
John D'Aoust, Water Treatment
Anthony Capachietti, Water Maintenance
Steve Stapinski, merreng@aol.com

MERRIMACK ENGINEERING SERVICES, INC.
PROFESSIONAL ENGINEERS • LAND SURVEYORS • PLANNERS
66 PARK STREET • ANDOVER, MA 01810 • (978) 475-3555, 373-5721 • FAX (978) 475-1448 • E-MAIL info@merrmackengineering.com

April 9, 2012

City of Haverhill
Planning Department
City Council
City Hall-4 Summer Street
Haverhill, Ma 01830

RE: Sylvan Hill Development

Members of the Board/Council:

Please be advised that the Plan prepared by this firm and that was submitted for approval incorrectly lists Assessors Lot 38 as part of this site and should be deleted as there is no Lot 38.

Please contact me should you have questions or comments.

Sincerely

MERRIMACK ENGINEERING SERVICES

Stephen Stapinski, PLS
Project Coordinator

Haverhill

Board of Health
Inspection Services
School Nurse Leader
Community Health Coordinator
Phone: 978-374-2325
978-374-2341
978-374-2338
978-374-2430
Fax: 978-374-2337
bdufresne@cityofhaverhill.com

March 13, 2012

RECEIVED
MAR 14 2012
Econ Devlp & Planning
& B.O.A.

TO: William Pillsbury
Planning Director

FROM: Richard Osborne
Building Inspector

RE: Sylvan Hill Development/Forest Street

This 29 unit single family subdivision complies with the dimensional & density regulation of Chapter 255. This subdivision also complies with 255-94 1-12.

RO/bld

scanned
3/23/12 to
migliori
to
mic. s.

Haverhill Fire Department

Fire Prevention / Investigation Unit

James J. Fiorentini
Mayor

Richard B. Borden
Fire Chief

D/C William F. Laliberty
Lieut. Richard Beaudoin
Insp. Steven Trocki

4 Summer St, Room 113
Tel: (978) 373-8460
Fax: (978) 521-4441

February 27, 2012

Rec'd 3/2/12

William Pillsbury, Planning Director
4 Summer Street, room 201
Haverhill, MA 01830

Re: **Sylvan Hill Development, LLC/ Forest Street/ 588-422- Lots 1A, 3A, 4, 6C, 35, 36, 37 & 38/ Special Permit for Cluster Residential**

The planning, design and construction of new buildings, renovation of existing buildings and structures to provide egress facilities, fire protection and built-in fire protection equipment shall be in accordance with 780 CMR; and any alterations, additions or changes in buildings required by the provisions of 527 CMR which in the scope of 780 CMR, 8th edition, shall be made in accordance therewith. (527 CMR 1.04(4) and 780 CMR 101.2)

Plans approved by the fire department are approved with the intent they comply in all respects to 780 CMR, 527 CMR, MGL Chapter 148 and any City of Haverhill ordinance. Any omissions or errors on the plans do not relieve the applicant of complying with applicable requirements.

I have reviewed the submitted plans for the address stated above and in the interest of public safety, have the following comments:

- **Public Safety Design Standards**
  - **The Planning Board shall consider in addition to all roadway access considerations for fire safety, the following criteria when approving a preliminary or definitive plan:**
  - **When fire safety response time to a proposed subdivision exceeds four(4) minutes from a manned fire station facility, then residential sprinklers shall be required to be installed in each unit; and or**
  - **If response distance exceeds 1.5 miles for an engine company or 2.5 miles for a ladder company from a manned fire station facility, then residential sprinklers shall be installed in each unit.**

The Public Safety Design Standard of City of Haverhill's Rules and Regulations Governing the Subdivision of Land requires the installation of residential sprinklers in each unit of this proposed cluster development project.

Respectfully,

William F. Laliberty
Deputy Fire Chief

City Council Hearing May 15 2012

FIORELLO & MIGLIORI

ATTORNEYS AT LAW

KAREN L. FIORELLO
kfiorello@fimilaw.com

MICHAEL J. MIGLIORI
mmigliori@fimilaw.com

FIREHOUSE CONDOMINIUMS
18 ESSEX STREET
HAVERHILL, MASSACHUSETTS 01832

TEL 978/373-3003 FAX 978/373-3066

February 22, 2012

John Michitson, President
Haverhill City Council
City Hall, 4 Summer Street
Haverhill, MA 01830

Thanks! :)

Abutters to Lori Planning + Mario CC

Re: Sylvan Hill Crossing
Owner: Sylvan Hill Development, LLC
1501 Main Street, Unit 47, Tewksbury, MA 01876

Land on Forest Street
Special Permit, Cluster Residential Development

Dear Mr. Michitson:

Please be advised this office represents Sylvan Hill Development, LLC, Applicant/Owner regarding the property located on Forest Street and being shown as Haverhill Assessor's Map 588 Block 422 Lots 1A, 3A, 4, 6C, 35, 36, 37 and 38.

SL 2/23/12

Sylvan Hill Development LLC is requesting a Special Permit from the City of Haverhill to construct twenty-nine (29) single family homes in a cluster residential development as set forth in the Haverhill Zoning Ordinance Chapter 255 Section 94.

The property is shown in Haverhill Assessor's Map 588 Block 422 Lots 1A, 3A, 4, 6C, 35, 36, 37 and 38 and is located in RM Zoning District.

Kindly refer this matter to the Planning Board for its review. I have enclosed the appropriate plans and fees in connection with the requested Special Permit.

Should you have any questions, or need any additional information, please don't hesitate to contact me.

Sincerely yours,

Michael J. Migliori

MJM/dma
Enc.
c.c.: Russell Ahern
Robert Ahern
Stephen Stapinski

BAYSIDE ENGINEERING

April 30, 2012

Mr. William Pillsbury, Economic Development Director
Economic Development and Planning
City Hall, Room 201
4 Summer Street
Haverhill, MA 01830

Re: ***Proposed Residential Development***
Sylvan Hill Crossing
Haverhill, MA

Dear Mr. Pillsbury,

Bayside Engineering has been requested to review the traffic generation characteristics associated with the development of a 20.01 acre parcel of land on the west side of Forest Street in Haverhill, MA. As currently proposed, the development, Sylvan Hill Crossing, is proposed to consist of 29 single family homes. Specifically, Bayside has determined current traffic volumes on Forest Street, determined the expected traffic generation associated with the 29 homes, assessed sight distances at the proposed access roadway intersection with Forest Street, and determine the impact on Forest Street. This letter summarizes our findings.

CURRENT TRAFFIC VOLUMES

A comprehensive field inventory of the proposed site was conducted in April 2012. The inventory included collection of existing roadway geometrics and traffic volumes for Forest Street. Traffic volumes were measured by means of automatic traffic recorder (ATR) counts on Forest Street.

Forest Street is a local roadway under the jurisdiction of the City of Haverhill that traverses the study area in a general north/south direction from Broadway (Route 97) to West Lowell Avenue. In the vicinity of the site, Forest Street provides one general purpose lane per direction separated by a faded yellow centerline. Illumination is provided by way of street lights mounted on telephone poles. Land use along Forest Street within the study area consists of residential properties. The posted speed limit is 30 miles per hour (mph).

To establish base traffic conditions within the study area, manual turning movement and vehicle classification counts were obtained in April 2012. Daily traffic counts were conducted on Forest Street in front of the site for a two day period using automatic traffic recorders (ATR).

Analysis of the peak-period traffic counts indicated that the weekday morning commuter peak hour occurs between 7:45 AM and 8:45 AM and the weekday evening commuter peak hour generally occurs between 5:30 and 6:30 PM. The traffic count worksheets are provided in the Appendix.

The traffic-volume data gathered as part of this study was collected during the month of April 2012. Data from the MassDOT was reviewed to determine the monthly variations of the traffic volumes. The traffic data showed April volumes to be slightly higher than average month conditions. Therefore, the April traffic volumes were used to provide for an average month analysis scenario. The 2012 existing daily and peak-hour traffic volumes are summarized below in Table 1.

TABLE 1
EXISTING TRAFFIC-VOLUME SUMMARY[a]

		Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Location	Weekday Traffic Volume[b]	Traffic Volume[c]	K Factor[d]	Directional Distribution[e]	Traffic Volume	K Factor	Directional Distribution
Forest Street, in front of site	2,420	197	8.1	68.5% SB	237	9.8	54.9% NB

[a]Two-way traffic volume
[b]Daily traffic expressed in vehicles per day.
[c]Expressed in vehicles per hour.
[d]Percent of daily traffic volumes which occurs during the peak hour.
[e]Percent of peak-hour volume in the predominant direction of travel.
NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

As shown in Table 1, Forest Street was recorded to carry approximately 2,420 vehicles per day (vpd) in front of the site. During the weekday morning peak hour, approximately 197 vehicles per hour (vph) were recorded, and during the weekday evening peak hour, approximately 237 vph were recorded.

These volumes were compared to the volumes from the previous traffic study[1] prepared for this site. The traffic data from this study had daily volumes on Forest Street slightly higher, at 3,025 vpd. The current peak hour volumes are also lower than the 2002 counts. As can be seen, traffic volumes on Forest Street today are lower than they were in 2002, which is attributable to current economic conditions.

[1] *Traffic Impact and Access Study* Proposed Residential Development; DJK Associates; September 2002.

SITE GENERATED TRAFFIC VOLUMES

Traffic volumes expected to be generated by the proposed complex were forecast trip generation data compiled by the Institute of Transportation Engineers (ITE). Trip generation data for the proposed townhouses were developed from data compiled by the ITE in *Trip Generation* manual[2], Eighth Edition. Trip generation data for LUC 210, Single-Family Detached Housing was used to determine the trips associated with the residential project. The expected trip generation for the proposed project is summarized Table 2. The traffic generation worksheets are included in the Appendix.

TABLE 2
PROPOSED TRIP-GENERATION SUMMARY

	Proposed Residential Trips[a]
Average Weekday Daily Traffic	332
Weekday Morning Peak Hour:	
Entering	8
Exiting	22
Total	30
Weekday Evening Peak Hour:	
Entering	21
Exiting	13
Total	34

[a]Based on ITE LUC 210, Single-Family Detached housing; 29 units.

On a typical weekday, the proposed residential development is expected to generate 332 vehicle trips (166 vehicles entering and 166 vehicles exiting). During the weekday morning peak hour, 30 vehicle trips (8 vehicles entering and 22 vehicles exiting) are expected. During the weekday evening peak hour, 34 vehicle trips (21 vehicles entering and 13 vehicles exiting) are expected.

FOREST STREET IMPACTS

Based on the traffic capacity parameters identified in the Highway Capacity Manual, taking into account existing geometric conditions for Forest Street, Forest Street operates well below capacity for a two-lane roadway. During the weekday peak hours, 30 to 34 additional bi-

[2]*Trip Generation.* Eighth Edition; Institute of Transportation Engineers; Washington, DC; 2009.

directional trips are expected to be added to Forest Street. Based on existing traffic flow, it is expected that the distribution of trips would be approximately 60/40 to the south. With this distribution, there would be 18 to 19 bi-directional trips exiting the site to the south on Forest Street and 12 to 15 bi-directional trips exiting to the north on Forest Street. These additional trips represent on average, one additional trip per direction every five minutes or more, which is not a significant increase. Further, with the addition of the additional trips, Forest Street will still operate well below capacity.

SIGHT DISTANCE ASSESSMENT

Speed data for Forest Street, in front of the site was also collected using the ATR in April 2012. Speeds were collected over a two day period from April 24 to April 25, 2012. The posted speed limit on Forest Street in the site vicinity is 30 mph. The speed data is summarized in Table 3.

TABLE 3
FOREST STREET VEHICLE SPEEDS[a]

Direction	Posted Speed Limit (mph)	Average Observed Speed (mph)	85th Percentile Speed (mph)
Forest Street Northbound	30	32	37
Forest Street Southbound	30	32	37

[a]Based on speed data compiled on April 24 and 25, 2012, in front of the site.

As shown in Table 3, the average speed of vehicles travelling northbound or southbound was found to be 32 mph. The 85th percentile speed was found to be 37 mph for both northbound and southbound vehicles. The 85th percentile speed is the speed at which sight distances are typically evaluated.

Sight distance measurements were performed at the intersection of Forest Street at the proposed site access roadway in accordance with Massachusetts Department of Transportation (MassDOT) standards. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway, to perceive an on-coming vehicle and safely complete a

turning or crossing maneuver with on-coming traffic. In accordance with MassDOT standards, at a minimum, sufficient SSD must be provided to the intersection.

SSD is generally more important as it represents the minimum distance required for safe stopping while ISD is based only upon acceptable speed reductions to the approaching traffic stream. However, the ISD must be equal to or greater than the minimum required SSD in order to provide safe operations at the intersections. In accordance with the American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets[3], *"If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, this may require a major-road vehicle to stop or slow to accommodate the maneuver by a minor-road vehicle. To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road."* Accordingly, ISD should be at least equal to the distance required to allow a driver approaching the minor road to safely stop.

Table 4 presents the measured SSD and ISD at the intersection of Forest Street at the proposed site access roadways.

TABLE 4
SIGHT DISTANCE SUMMARY

	Required Minimum (Feet)[a]	Measured (Feet)
Forest Street and Proposed Site Access Roadway		
Stopping Sight Distance:		
Forest Street approaching from the south	265	500+
Forest Street approaching from the north	265	500+
Intersection Sight Distance:		
Looking to the south from the site access roadway	355[b]/410[c]	500+
Looking to the north from the site access roadway	355[b]/410[c]	500+

[a]Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*; American Association of State Highway and Transportation Officials (AASHTO); 2011, and based on a 37 mph speed northbound and southbound.
[b]Recommended minimum value for vehicles turning right exiting a roadway under STOP-sign control.
[c]Recommended minimum value for vehicles turning left exiting a roadway under STOP-sign control.

[3] Geometric Design of Highways and Streets; American Association of State Highway and Transportation Officials; Washington, D.C.; 2011.

As can be seen in Table 4, the SSD measurements performed at the proposed access roadway intersection with Forest Street indicate that the intersection currently exceeds the recommended minimum requirements based on the observed 85th percentile speed of 37 mph on Forest Street (northbound and southbound, respectively). The ISD looking north and south also exceeds the minimum SSD requirements for northbound and southbound Forest Street vehicles. With the construction of the site, it is recommended that along the site frontage on Forest Street, any landscaping be set back and not exceed 3.5 feet so as to maintain sight distances.

CONCLUSION

Sylvan Hill Crossing, as currently planned is to be a 29 lot single-family sub-division. During the peak hours, 30 to 34 peak hour trips are expected, which when added to Forest Street, will not cause a significant increase in traffic volume. Sight distances at the proposed site access roadway exceed AASHTO and MassDOT requirements. It is recommended that along the site frontage on Forest Street, any landscaping be set back and not exceed 3.5 feet so as to maintain sight distances.
Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,

BAYSIDE ENGINEERING, INC.

Kenneth P. Cram, P.E.
Director, Traffic Engineering

APPENDIX

Traffic Count Data

Trip Generation Worksheets

Traffic Count Data

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

122897 A Volume
Site Code: 2121470

Start Time	SB A.M.		SB P.M.		NB A.M.		NB P.M.		Combined A.M.		Combined P.M.		24-Apr-12 Tue
12:00	1		15		1		17		2		32		
12:15	1		20		4		8		5		28		
12:30	1		9		2		15		3		24		
12:45	1	4	17	61	1	8	18	58	2	12	35	119	
01:00	1		21		0		11		1		32		
01:15	0		16		3		15		3		31		
01:30	0		18		1		21		1		39		
01:45	1	2	7	62	0	4	19	66	1	6	26	128	
02:00	2		14		1		11		3		25		
02:15	0		14		0		20		0		34		
02:30	1		31		0		12		1		43		
02:45	2	5	19	78	4	5	22	65	6	10	41	143	
03:00	1		21		0		25		1		46		
03:15	0		18		0		32		0		50		
03:30	1		16		0		24		1		40		
03:45	0	2	21	76	1	1	23	104	1	3	44	180	
04:00	0		29		0		20		0		49		
04:15	4		15		1		19		5		34		
04:30	4		39		3		26		7		65		
04:45	5	13	27	110	0	4	30	95	5	17	57	205	
05:00	5		24		4		35		9		59		
05:15	8		23		2		23		10		46		
05:30	7		32		2		23		9		55		
05:45	6	26	23	102	2	10	32	113	8	36	55	215	
06:00	9		24		4		36		13		60		
06:15	17		25		14		26		31		51		
06:30	11		15		18		15		29		30		
06:45	20	57	13	77	13	49	27	104	33	106	40	181	
07:00	21		14		7		19		28		33		
07:15	24		11		11		17		35		28		
07:30	32		10		11		27		43		37		
07:45	41	118	7	42	16	45	15	78	57	163	22	120	
08:00	32		7		12		16		44		23		
08:15	28		15		19		12		47		27		
08:30	28		7		14		3		42		10		
08:45	23	111	9	38	11	56	11	42	34	167	20	80	
09:00	23		8		17		12		40		20		
09:15	20		10		9		11		29		21		
09:30	15		5		8		8		23		13		
09:45	16	74	6	29	9	43	7	38	25	117	13	67	
10:00	16		6		6		6		22		12		
10:15	12		4		14		6		26		10		
10:30	15		6		8		8		23		14		
10:45	12	55	2	18	12	40	5	25	24	95	7	43	
11:00	9		3		13		3		22		6		
11:15	12		1		10		6		22		7		
11:30	11		2		10		3		21		5		
11:45	15	47	0	6	16	49	9	21	31	96	9	27	
Total	514		699		314		809		828		1508		
Percent	62.1%		46.4%		37.9%		53.6%						
Day Total		1213				1123				2336			
Peak	07:30		04:30		07:45		05:30		07:30		04:30		
Vol.	133		113		61		117		191		227		
P.H.F.	0.811		0.724		0.803		0.813		0.838		0.873		

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

122897 A Volume
Site Code: 2121470

Start	SB				NB				Combined				25-Apr-12
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Wed
12:00	1		19		1		17		2		36		
12:15	4		25		3		10		7		35		
12:30	0		15		1		14		1		29		
12:45	1	6	18	77	3	8	17	58	4	14	35	135	
01:00	0		15		1		8		1		23		
01:15	0		15		2		17		2		32		
01:30	1		15		0		19		1		34		
01:45	2	3	10	55	0	3	17	61	2	6	27	116	
02:00	0		21		1		14		1		35		
02:15	0		27		1		15		1		42		
02:30	0		21		0		20		0		41		
02:45	0	0	13	82	1	3	23	72	1	3	36	154	
03:00	0		35		0		15		0		50		
03:15	0		24		0		18		0		42		
03:30	1		21		0		23		1		44		
03:45	1	2	12	92	1	1	28	84	2	3	40	176	
04:00	1		23		0		30		1		53		
04:15	2		19		3		36		5		55		
04:30	1		38		2		25		3		63		
04:45	4	8	22	102	1	6	33	124	5	14	55	226	
05:00	3		27		4		34		7		61		
05:15	6		34		1		24		7		58		
05:30	7		21		2		31		9		52		
05:45	10	26	34	116	3	10	42	131	13	36	76	247	
06:00	8		29		4		34		12		63		
06:15	13		27		8		35		21		62		
06:30	18		19		15		20		33		39		
06:45	19	58	16	91	14	41	20	109	33	99	36	200	
07:00	22		17		8		20		30		37		
07:15	29		11		16		17		45		28		
07:30	38		16		10		16		48		32		
07:45	41	130	16	60	11	45	13	66	52	175	29	126	
08:00	30		9		16		17		46		26		
08:15	33		8		22		10		55		18		
08:30	36		5		15		18		51		23		
08:45	23	122	12	34	22	75	11	56	45	197	23	90	
09:00	17		5		13		8		30		13		
09:15	15		9		16		7		31		16		
09:30	16		5		9		7		25		12		
09:45	9	57	6	25	13	51	4	26	22	108	10	51	
10:00	16		3		11		4		27		7		
10:15	17		8		9		9		26		17		
10:30	11		4		12		6		23		10		
10:45	12	56	6	21	9	41	5	24	21	97	11	45	
11:00	17		2		18		3		35		5		
11:15	22		7		17		6		39		13		
11:30	18		4		14		4		32		8		
11:45	24	81	2	15	15	64	7	20	39	145	9	35	
Total	549		770		348		831		897		1601		
Percent	61.2%		48.1%		38.8%		51.9%						
Day Total		1319				1179				2498			
Peak	07:30		04:30		08:00		05:30		07:45		05:30		
Vol.	142		121		75		142		204		253		
P.H.F.	0.866		0.796		0.852		0.845		0.927		0.832		

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

122897 A Speed
Site Code: 2121470

SB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
04/24/1																
2	0	0	1	1	1	0	1	0	0	0	0	0	0	4	*	31
01:00	0	0	0	0	1	1	0	0	0	0	0	0	0	2	*	34
02:00	0	0	1	2	2	0	0	0	0	0	0	0	0	5	*	28
03:00	0	0	2	0	0	0	0	0	0	0	0	0	0	2	*	22
04:00	0	0	0	2	5	3	1	**2**	0	0	0	0	0	13	36	35
05:00	0	0	0	9	11	5	1	0	0	0	0	0	0	26	36	32
06:00	0	0	3	8	29	12	5	0	0	0	0	0	0	57	37	33
07:00	0	0	2	**21**	**52**	**34**	**9**	0	0	0	0	0	0	**118**	37	33
08:00	**2**	3	**11**	21	40	26	7	1	0	0	0	0	0	111	37	31
09:00	0	0	5	18	27	17	6	1	0	0	0	0	0	74	37	32
10:00	0	1	3	13	17	18	2	1	0	0	0	0	0	55	37	32
11:00	1	**4**	4	12	15	9	1	1	0	0	0	0	0	47	35	29
12 PM	0	1	2	6	33	16	3	0	0	0	0	0	0	61	37	33
13:00	0	0	1	18	20	19	4	0	0	0	0	0	0	62	37	33
14:00	0	2	**7**	13	23	23	**8**	**2**	0	0	0	0	0	78	38	33
15:00	**2**	0	3	19	28	22	2	0	0	0	0	0	0	76	36	31
16:00	0	2	5	**25**	**45**	29	4	0	0	0	0	0	0	**110**	36	32
17:00	0	1	5	16	44	**33**	3	0	0	0	0	0	0	102	37	32
18:00	0	**4**	4	13	32	21	3	0	0	0	0	0	0	77	36	31
19:00	0	0	0	8	25	9	0	0	0	0	0	0	0	42	35	32
20:00	0	0	5	9	14	8	2	0	0	0	0	0	0	38	36	31
21:00	0	0	2	4	13	7	1	2	0	0	0	0	0	29	36	33
22:00	0	0	0	6	7	4	1	0	0	0	0	0	0	18	36	32
23:00	0	1	0	2	2	1	0	0	0	0	0	0	0	6	*	27
%	0.4%	1.6%	5.4%	20.3%	40.1%	26.1%	5.3%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	08:00	11:00	08:00	07:00	07:00	07:00	07:00	04:00						07:00		
Vol.	2	4	11	21	52	34	9	2						118		
PM Peak	15:00	18:00	14:00	16:00	16:00	17:00	14:00	14:00						16:00		
Vol.	2	4	7	25	45	33	8	2						110		
Total	5	19	66	246	486	317	64	10	0	0	0	0	0	1213	692	
Pecent			15th Percentile :			25 MPH										
			50th Percentile :			31 MPH										
			85th Percentile :			37 MPH										
			95th Percentile :			40 MPH										

Stats		
	10 MPH Pace Speed :	28-37 MPH
	Number in Pace :	766
	Percent in Pace :	63.1%
	Number of Vehicles > 30 MPH :	762
	Percent of Vehicles > 30 MPH :	62.8%
	Mean Speed(Average) :	32 MPH

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

122897 A Speed
Site Code: 2121470

SB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
04/25/1																
2	1	0	0	4	0	1	0	0	0	0	0	0	0	6	27	24
01:00	0	0	1	1	0	1	0	0	0	0	0	0	0	3	*	29
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*
03:00	0	0	1	1	0	0	0	0	0	0	0	0	0	2	*	24
04:00	0	0	1	1	3	2	1	0	0	0	0	0	0	8	33	33
05:00	0	1	1	10	7	6	0	**1**	0	0	0	0	0	26	35	30
06:00	0	0	0	11	26	16	5	0	0	0	0	0	0	58	37	33
07:00	0	1	2	18	**55**	**41**	**12**	1	0	0	0	0	0	**130**	38	34
08:00	**2**	**2**	**8**	**26**	39	37	8	0	0	0	0	0	0	122	37	31
09:00	0	1	3	5	27	19	2	0	0	0	0	0	0	57	36	33
10:00	0	2	0	8	25	17	4	0	0	0	0	0	0	56	37	33
11:00	0	1	5	15	29	24	6	0	**1**	0	0	0	0	81	37	33
12 PM	0	0	4	18	34	19	2	0	0	0	0	0	0	77	36	32
13:00	0	2	2	14	19	16	2	0	0	0	0	0	0	55	36	31
14:00	0	0	4	19	26	30	2	0	0	0	0	0	**1**	82	37	32
15:00	**1**	**5**	**8**	12	31	30	4	1	0	0	0	0	0	92	37	31
16:00	0	2	5	13	50	24	**8**	0	0	0	0	0	0	102	37	32
17:00	0	0	2	**21**	**52**	**33**	8	0	0	0	0	0	0	**116**	37	33
18:00	0	3	5	19	39	20	5	0	0	0	0	0	0	91	36	31
19:00	0	0	3	17	23	14	3	0	0	0	0	0	0	60	36	32
20:00	0	2	1	9	8	13	1	0	0	0	0	0	0	34	37	31
21:00	0	0	2	4	10	6	1	**2**	0	0	0	0	0	25	36	33
22:00	0	2	2	5	4	7	0	1	0	0	0	0	0	21	37	30
23:00	0	0	2	5	5	3	0	0	0	0	0	0	0	15	34	30
%	0.3%	1.8%	4.7%	19.4%	38.8%	28.7%	5.6%	0.5%	0.1%	0.0%	0.0%	0.0%	0.1%			
AM Peak	08:00	08:00	08:00	08:00	07:00	07:00	07:00	05:00	11:00					07:00		
Vol.	2	2	8	26	55	41	12	1	1					130		
PM Peak	15:00	15:00	15:00	17:00	17:00	17:00	16:00	21:00					14:00	17:00		
Vol.	1	5	8	21	52	33	8	2					1	116		
Total	4	24	62	256	512	379	74	6	1	0	0	0	1	1319	753	
Pecent																

15th Percentile : 25 MPH
50th Percentile : 31 MPH
85th Percentile : 37 MPH
95th Percentile : 40 MPH

Stats

10 MPH Pace Speed : 29-38 MPH
Number in Pace : 835
Percent in Pace : 63.4%
Number of Vehicles > 30 MPH : 850
Percent of Vehicles > 30 MPH : 64.5%
Mean Speed(Average) : 32 MPH

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

122897 A Speed
Site Code: 2121470

NB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
04/24/1																
2	0	0	0	3	4	1	0	0	0	0	0	0	0	8	32	31
01:00	0	0	1	1	1	0	0	0	**1**	0	0	0	0	4	*	33
02:00	0	**1**	1	1	1	0	0	**1**	0	0	0	0	0	5	*	27
03:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1	*	27
04:00	0	1	0	1	1	0	1	0	0	0	0	0	0	4	*	28
05:00	0	0	2	1	5	1	1	0	0	0	0	0	0	10	33	31
06:00	0	0	3	6	19	**17**	3	1	0	0	0	0	0	49	37	33
07:00	0	0	2	7	17	16	2	1	0	0	0	0	0	45	37	33
08:00	0	1	**5**	**12**	18	16	**4**	0	0	0	0	0	0	**56**	37	32
09:00	0	0	0	9	**21**	11	2	0	0	0	0	0	0	43	36	33
10:00	0	0	1	6	14	17	2	0	0	0	0	0	0	40	37	34
11:00	0	0	5	11	21	10	2	0	0	0	0	0	0	49	35	31
12 PM	0	0	5	17	24	11	1	0	0	0	0	0	0	58	35	31
13:00	0	1	1	14	24	20	6	0	0	0	0	0	0	66	38	33
14:00	0	0	3	20	20	18	4	0	0	0	0	0	0	65	37	32
15:00	**1**	**3**	**8**	17	40	31	4	0	0	0	0	0	0	104	37	31
16:00	0	1	5	22	29	30	**7**	1	0	0	0	0	0	95	37	33
17:00	0	0	4	**28**	**51**	23	7	0	0	0	0	0	0	**113**	36	32
18:00	0	1	6	13	46	**33**	5	0	0	0	0	0	0	104	37	33
19:00	0	1	7	12	31	23	2	**2**	0	0	0	0	0	78	36	32
20:00	0	1	7	12	17	5	0	0	0	0	0	0	0	42	34	29
21:00	0	1	0	9	20	6	2	0	0	0	0	0	0	38	35	31
22:00	0	0	2	7	6	7	2	1	0	0	0	0	0	25	38	33
23:00	0	1	1	8	7	4	0	0	0	0	0	0	0	21	35	29
%	0.1%	1.2%	6.1%	21.2%	38.9%	26.7%	5.1%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak		02:00	08:00	08:00	09:00	06:00	08:00	02:00	01:00					08:00		
Vol.		1	5	12	21	17	4	1	1					56		
PM Peak	15:00	15:00	15:00	17:00	17:00	18:00	16:00	19:00						17:00		
Vol.	1	3	8	28	51	33	7	2						113		
Total	1	13	69	238	437	300	57	7	1	0	0	0	0	1123	719	
Pecent																

15th Percentile : 25 MPH
50th Percentile : 31 MPH
85th Percentile : 37 MPH
95th Percentile : 40 MPH

Stats

10 MPH Pace Speed : 28-37 MPH
Number in Pace : 708
Percent in Pace : 63.0%
Number of Vehicles > 30 MPH : 702
Percent of Vehicles > 30 MPH : 62.5%
Mean Speed(Average) : 32 MPH

PRECISION
D A T A
INDUSTRIES, LLC
P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

Forest Street
between Briawood Estate Driveways
City, State: Haverhill, MA
Client: Bayside/ K. Cram

122897 A Speed
Site Code: 2121470

NB

Start Time	1 14	15 19	20 24	25 29	30 34	35 39	40 44	45 49	50 54	55 59	60 64	65 69	70 9999	Total	85th % ile	Ave Speed
04/25/1																
2	0	0	0	3	3	2	0	0	0	0	0	0	0	8	32	31
01:00	0	0	0	1	1	1	0	0	0	0	0	0	0	3	*	32
02:00	0	0	0	2	1	0	0	0	0	0	0	0	0	3	*	29
03:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1	*	37
04:00	0	0	0	3	2	1	0	0	0	0	0	0	0	6	28	30
05:00	0	**1**	0	3	3	2	1	0	0	0	0	0	0	10	31	30
06:00	0	0	2	7	18	13	1	0	0	0	0	0	0	41	37	32
07:00	0	0	4	4	20	13	3	**1**	0	0	0	0	0	45	37	33
08:00	0	1	**5**	**18**	**22**	**24**	5	0	0	0	0	0	0	**75**	37	32
09:00	0	0	5	6	18	19	3	0	0	0	0	0	0	51	37	33
10:00	0	1	1	9	17	9	4	0	0	0	0	0	0	41	37	32
11:00	0	0	4	10	19	22	**7**	1	0	0	0	0	**1**	64	38	34
12 PM	0	1	1	12	21	14	7	2	0	0	0	0	0	58	39	33
13:00	0	0	4	9	27	16	4	1	0	0	0	0	0	61	37	33
14:00	0	0	2	11	35	17	6	1	0	0	0	0	0	72	38	33
15:00	0	**2**	3	21	38	17	3	0	0	0	0	0	0	84	35	31
16:00	0	0	6	22	**51**	34	**10**	1	0	0	0	0	0	124	38	33
17:00	0	0	6	20	48	**48**	8	1	0	0	0	0	0	**131**	37	33
18:00	**2**	1	1	**23**	37	35	7	**3**	0	0	0	0	0	109	38	33
19:00	0	0	**10**	12	22	16	6	0	0	0	0	0	0	66	37	32
20:00	0	2	6	10	22	14	2	0	0	0	0	0	0	56	36	31
21:00	0	0	0	8	11	5	2	0	0	0	0	0	0	26	37	32
22:00	0	0	2	5	7	8	2	0	0	0	0	0	0	24	37	33
23:00	0	1	3	7	8	1	0	0	0	0	0	0	0	20	32	28
%	0.2%	0.8%	5.5%	19.2%	38.3%	28.2%	6.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.1%			
AM Peak		05:00	08:00	08:00	08:00	08:00	11:00	07:00					11:00	08:00		
Vol.		1	5	18	22	24	7	1					1	75		
PM Peak	18:00	15:00	19:00	18:00	16:00	17:00	16:00	18:00						17:00		
Vol.	2	2	10	23	51	48	10	3						131		
Total	2	10	65	226	451	332	81	11	0	0	0	0	1	1179	755	
Pecent																

15th Percentile : 26 MPH
50th Percentile : 32 MPH
85th Percentile : 37 MPH
95th Percentile : 41 MPH

Stats

10 MPH Pace Speed : 29-38 MPH
Number in Pace : 739
Percent in Pace : 62.7%
Number of Vehicles > 30 MPH : 772
Percent of Vehicles > 30 MPH : 65.5%
Mean Speed(Average) : 32 MPH

Trip Generation Worksheets

Proposed Residential, Haverhill, MA

Land Use Code (LUC) 210 - Single-Family Detached housing
Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs: Dwelling units
Independent Variable (X): 29

Ln T = 0.92 Ln (X) + 2.71 $R^2 = 0.96$
Ln T = 0.92 Ln 29 + (2.71)
Ln T = 5.81
T = 332.92
T = 332 vehicle trips
with 50% (166 vpd) entering and 50% (166 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.70 * (X) + 9.74 $R^2 = 0.96$
T = 0.70 * 29 + (9.74)
T = 30.04
T = 30 vehicle trips
with 25% (8 vph) entering and 75% (22 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

Ln T = 0.90 Ln (X) + 0.51 $R^2 = 0.91$
Ln T = 0.90 Ln 7 + (0.51)
Ln T = 3.54
T = 34.49
T = 34 vehicle trips
with 63% (21 vph) entering and 37% (13 vph) exiting.

SATURDAY DAILY

Ln T = 0.95 Ln (X) + 2.59 $R^2 = 0.92$
Ln T = 0.95 Ln 7 + (2.59)
Ln T = 5.79
T = 326.66
T = 326 vehicle trips
with 50% (163 vpd) entering and 50% (163 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.89 * (X) + 9.56 $R^2 = 0.91$
T = 0.89 * 29 + (9.56)
T = 35.37
T = 35 vehicle trips
with 53% (19 vph) entering and 47% (16 vph) exiting.

Proposed Residential, Haverhill, MA

Land Use Code (LUC) 210 - Single-Family Detached housing
Source: Institute of Transportation Engineers (ITE) - 8th Edition

Average Vehicle Trips Ends vs: Dwelling units
Independent Variable (X): 29

SUNDAY DAILY

T = 8.84 * (X) - 13.31 $R^2 = 0.94$
T = 8.84 * 29 - 13.31
T = 243.05
T = 243 vehicle trips
with 50% (122 vpd) entering and 50% (121 vpd) exiting.

SUNDAY PEAK HOUR OF GENERATOR

Ln T = 0.91 Ln (X) + 0.35 $R^2 = 0.87$
Ln T = 0.91 Ln 29 + 0.35
Ln T = 3.41
T = 30.39
T = 30 vehicle trips
with 53% (16 vph) entering and 47% (14 vph) exiting.