TOWN OF GLASTONBURY
PROFESSIONAL SERVICES PROCUREMENT NOTICE
REQUEST FOR QUALIFICATIONS
HEBRON AVENUE
MODERN ROUNDABOUT DESIGN
RPGL-2016-12

The Town of Glastonbury is seeking to engage the services of a Consulting Engineering firm to provide engineering services for the preparation of contract plans and documents for the following transportation project: Modern Roundabout Design on Hebron Avenue. This project includes the design and specification preparation for modern roundabouts to be constructed at the intersection of Hebron Avenue and New London Turnpike and at the intersection of Hebron Avenue and House Street.

The firm selected may also be required to prepare environmental documents, assist in gaining necessary regulatory permits, and make presentations at public meetings. Firms responding to this request should be of adequate size and sufficiently staffed to perform the assignment described above.

Although no determination has been made at this time respondents are advised of the following: There may be a Disadvantaged Business Enterprise (DBE) sub-consultant goal for this project. The project may include a Connecticut Small Business (SBE) and Minority Owned Business Enterprise (MBE) sub-consultant goal. The firm selected for this project may also be required to participate in the Small Business Participation Pilot Program (SBPPP).

The selected firm must meet all Municipal, State, and Federal affirmative action and equal employment opportunity practices. The Town of Glastonbury is an Affirmative Action/Equal Opportunity Employer. Minority / Women /Disadvantaged Business Enterprises are encouraged to submit a proposal.

Interested individuals and firms should request the instructions for submitting a qualifications statement from the Office of the Purchasing Agent, 2155 Main Street, P.O. Box 6523, Glastonbury, CT 06033-6523 or via the Town's website **www.glastonbury-ct.gov.** Responses to the Proposal must be submitted to the Purchasing Agent no later than **September 11, 2015 at 11:00 AM. LATE PROPOSALS WILL NOT BE CONSIDERED.**

Mary F. Visone
Purchasing Agent

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SECTION I – GENERAL INFORMATION

EXECUTIVE SUMMARY

Hebron Avenue between Main Street and Sycamore Street in Glastonbury is Town-owned and maintained. Hebron Avenue east of Sycamore Street is owned by the State of Connecticut and is better known as State Route 94. The subject Town owned portion of the corridor is classified as an urban arterial road with average daily traffic approaching 19,000 vehicles over the most congested portions. A single travel lane is provided in each direction over most of the subject corridor with turning pockets at several intersections, including a 460' right-turn lane on the westbound approach to House Street. The existing traffic signal located at the intersection of Hebron Avenue, Sycamore Street, and the Route 2 Exit 8 eastbound off-ramp is owned and maintained by the State of Connecticut, while the existing traffic signal located at the Hebron Avenue/New London Turnpike intersection is Town-owned and maintained.

Following preparation of a preliminary report referenced elsewhere in this document and following extensive discussion a decision was made to proceed with design and construction on a modern roundabout at the intersections of New London Turnpike and House Street. It is expected that construction of the two roundabouts would occur separately and not concurrently in order to avoid severe congestion and construction related impacts to local businesses. It is expected that the roundabout at the New London Turnpike intersection would be 110’ in diameter and be constructed during the 2016 Construction season, with the House Street intersection roundabout being constructed in 2017. Conveyance of land on the northeast corner of the House Street intersection is expected such that the House Street roundabout may be constructed without a need for property acquisition, though sidewalk easement acquisition may still be necessary.

Appropriate aesthetic features would be expected to be included in the Consultant’s design.

The Town’s Local Traffic Authority has indicated that the Hebron Avenue/House Street intersection is rated as a top priority for implementation of safety improvements. The Department of Transportation has clearly indicated that signalization of this intersection would not be allowed. Thus, the Consultant’s services shall be limited to design of a roundabout at this location. It is further noted that a Development proposal has been approved for the parcel located on the northeast corner of the intersection. The proposal consists of construction of 145 apartment units.

The chosen Consultant shall be tasked with design of ancillary features that promote increased pedestrian and bicyclist safety at the subject intersections and throughout the corridor.

SPECIAL CONSIDERATIONS

- A report entitled “Hebron Avenue Roundabouts” Prepared by Tighe and Bond for the Town of Glastonbury Department of Physical Services Glastonbury, Connecticut December 19, 2014. This report may serve as a reference for this project and is included with this document as Attachment C.

- All application materials that were submitted to the Capital Region Council of Governments for funding under the Connecticut Local Road Accident Reduction Program may also serve as a reference for this project and are included as Attachment D. Said materials pertain exclusively to the Hebron Avenue/House Street intersection.

GENERAL SCOPE

The Town of Glastonbury is seeking to engage the services of a Consulting Engineering firm to provide engineering services for the preparation of contract plans and documents for this project. The Consulting Engineering firm selected may also be required to provide environmental documents, assist in gaining regulatory permits, and make public presentations on the project. The design fee will be negotiated on a Lump Sum basis.

The project construction would be expected to be completed over two (2) construction seasons.

- The Town of Glastonbury Engineering Division will be performing the necessary topographic and boundary surveys and will be preparing any property maps necessary for right-of-way and easement acquisition. Consultant services shall be limited to preparation of design drawings and preparation of Specifications suitable for public bidding. The Consultant shall also provide construction cost opinions for both roundabouts. It is expected that Town of Glastonbury Engineering Division staff will perform construction inspection and administration duties. However, the Consultant may be retained for selected functions pertinent to the construction phase.

- Engineering services related to the proposed intersection improvements shall meet the requirements of the Connecticut Department of Transportation "Consultant Administration and Project Development" Manual, and "Traffic Signal Design Manual", latest revisions, and other applicable Department of Transportation guidance documents.

- The Consultant will be required to obtain current traffic count information for subsequent use with industry standard microsimulation models. The chosen Consultant shall have experience using the VISSIM microsimulation model utilized by the Connecticut Department of Transportation. A preliminary design report shall be prepared. Said report shall predict peak period Levels of Service, average queue, and 95th percentile queue lengths on all approaches to both subject intersections. The Consultant shall perform additional analysis as necessary to ensure that resultant construction will not adversely impact intersections with Main Street and Sycamore Street.

- The Consultant shall prepare necessary details relative to aesthetic treatments utilized within and at the periphery of both roundabouts.

- The Consultant will be required to interact with the Connecticut Department of Transportation in order to gain concurrence on design concepts such that the Department is satisfied that implementation would not adversely affect the existing State signalized intersection located at the Route 2 eastbound Exit 8 off- ramp.

- The Consultant shall investigate the feasibility and approximate cost to relocate existing overhead utilities underground within the project limits and throughout the Hebron Avenue corridor as a whole.

- The Consultant shall investigate the feasibility and wisdom of installing pedestrian safety enhancements such as manually operated Rapid Flashing Beacons at Roundabout approaches.

SECTION II – CONSULTANT'S SERVICES

- The Consultant shall perform professional services as stated and according to instructions received from the Town. The Consultant's services shall include all design related incidental services.

- All drawings, reports, and other documents prepared by the Consultant according to this Agreement shall be submitted to the Town for its review and approval.

- No such approval shall in any way be construed to relieve the Consultant of responsibility for technical adequacy or operate as a waiver of any of the Town's rights under this Agreement. The Consultant shall remain liable to the Town according to applicable laws and practices for all damages to the Town caused by the Consultant's negligent performance of any of the services furnished under this Agreement.

- The Consultant shall conduct regular meetings with the Town, and other appropriate parties, at a location established by the Town to review progress. The Consultant will provide written notes of each meeting to all attending parties before the next meeting. The Consultant shall attend and make presentations at public meetings for the purpose of gaining necessary approval and provide information to the general public.

- The Consultant's services under agreements reached shall be as described above. The Town does not guarantee future design or construction phase work.

SECTION III - SUBMISSION OF QUALIFICATIONS STATEMENT

MINIMUM REQUIREMENTS

- Firm/Individual shall be registered with the Secretary of the State of Connecticut, the State of Connecticut Board of Examiners for Professional Engineers and Land Surveyors, or other appropriate State of Connecticut licensing boards.

- Firm/Individual shall have demonstrated successful experience with similar roundabout design within the past five (5) years. Firm/Individual shall have demonstrated experience utilizing the VISSIM microsimulation model.

- Respondents are advised that there may be a Disadvantaged Business Enterprise (DBE) sub-consultant goal for this project. Likewise, this project may include a Connecticut Small Business (SBE) and Minority Owned Business Enterprise (MBE) sub-consultant goal. However, no determination has been made at this time.

- The Consulting Engineering firm selected for this project may be required to participate in the Small Business Participation Pilot Program (SBPPP). However, no determination has been made at this time. To be eligible to participate in the SBPPP, firms must be currently certified as one of the following: a Connecticut Department of Transportation certified Disadvantaged Business Enterprise (DBE), a Connecticut Department of Administrative Services (DAS) certified Small/Minority Business Enterprise (SBE/MBE), or certified under one of the United States Small Business Administration's Programs; (8(a) firm; Small Disadvantaged Business(SDB); HUB Zone; US SBA Loan recipient (Loan Note documentation required).

- The selected firm must meet all Municipal, State, and Federal affirmative action and equal employment opportunity practices.

TERM OF SERVICE

The selected firm will be expected to commence services within 15 days of contract execution or on such other schedule as may be agreed to with the Town. The Town anticipates allocating up to five (5) months for the design project described herein, including data collection, meetings, consultant design, and preparation of bid documents, etc.

PROPOSAL INSTRUCTIONS

- By submitting a Qualifications Statement, you represent that you have thoroughly examined and become familiar with the Scope of Services outlined in this RFQ and you are capable of performing the work to achieve the Town's objectives.

- All firms are required to submit an original and seven (7) copies of their Qualifications Statement to Mary F. Visone, Purchasing Agent, 2155 Main Street, Glastonbury, CT by the date and time listed in the proposal response page. All Qualifications Statements will be opened publicly and recorded as received. Respondents may be present at the opening; however, there will be no public reading. Qualification Statements received later than the time and date specified will not be considered. The Qualifications Statement must be submitted in a sealed envelope or package and the outside shall be clearly marked with the Respondent's Company Name, Address and the following:

  SEALED REQUEST FOR QUALIFICATIONS
  PROFESSIONAL SERVICES PROCUREMENT NOTICE
  HEBRON AVENUE ROUNDABOUT DESIGN
  RPGL- 2016-12
  SEPTEMBER 11, 2015
  TIME – 11:00 A.M.

- All respondents are required to submit the information detailed below. **Responses shall be organized and presented in the order listed below to assist the Town in reviewing and rating proposals.** Responses should be presented in appropriate detail to thoroughly respond to the requirements and expected services described herein.

  1. Table of Contents to include clear identification of the material provided by section and number.
  2. A letter of transmittal indicating the firm's interest in providing the service and any other information that would assist the Town in making a selection. This letter must be signed by a person legally authorized to bind the firm to a contract.
  3. Name and telephone number of person(s) to be contacted for further information or clarification.
  4. Current Federal Form SF330.

5. A background statement including a description of the firm/individual submitting the proposal and any sub-consultants.

6. A detailed statement describing the organizational structure under which the firm proposes to conduct business. Proposed sub-consultants should be clearly identified, and their relationship to any "parent" firm or subsidiary firm, with any of the parties concerned, must be clearly defined.

7. A list of key staff members who would be involved with the project, including their assigned roles and a description of their background and experience.

8. A description of relevant engineering experience of the firm, including specific reference to similar services as required by the Town under this proposal.

9. List of similar projects completed over the past five (5) years with the contact name, address, and telephone number of the owners' representative in each project.

10. Overall approach to the engineering needs of the Town for the roundabout project.

11. Proposed schedule for completion of engineering services as required to meet the Town's intended schedule.

12. A concluding statement as to why the respondent is best qualified to meet the needs of the Town.

13. Proposal Response Form (**ATTACHMENT A**).

14. Respondent is required to review the Town of Glastonbury Code of Ethics adopted July 8, 2003 and effective August 1, 2003. Respondent shall acknowledge that they have reviewed the document in the area provided on the attached Ethics Acknowledgement form included on **ATTACHMENT A.** The selected respondent will also be required to complete and sign a Consultant Acknowledgement Form prior to award. The Code of Ethics and the Consultant Acknowledgment Form can be accessed on the Town of Glastonbury website at http://www.glastonbury-ct.gov. Upon entering the website, click on Bids and Proposals icon which will bring you to the links for the Code of Ethics and the Consultant Acknowledgement Form. If the respondent does not have access to the internet, a copy of these documents can be obtained through the Purchasing Department at the address listed within this proposal.

15. Statement of Non-Collusion (**ATTACHMENT B**).

16. The Town of Glastonbury is dedicated to waste reduction and the practice of using and promoting the use of recycled and environmentally preferable products. Respondents are encouraged to submit RFQ responses that are printed double-sided (except for the signed proposal page) on recycled paper, and to use paper dividers to organize the RFQ for review. All proposal pages should be secured with a binder clip, staple or elastic band, and shall

not be submitted in plastic binders or covers, nor shall the proposal contain any plastic inserts or pages. We appreciate your efforts towards a greener environment.

17. Any technical questions regarding this RFQ shall be made in writing and directed to Stephen Braun, Town Engineer/Manager Assistant Town Engineer, 2155 Main Street Glastonbury, CT 06033 or by email to stephen.braun@glastonbury-ct.gov. For administrative questions concerning this proposal, please contact Mary F. Visone, Purchasing Agent, via email: purchasing@glastonbury-ct.gov.

18. All questions, answers, and/or addenda, as applicable, will be posted on the Town's website at www.glastonbury-ct.gov. (Upon entering the website, click on Bids & Proposals icon). It is the respondent's responsibility to check the website for addenda prior to submission of any proposal. Note: Responses to requests for more specific contract information than is contained in the RFQ shall be limited to information that is available to all respondents and that is necessary to complete this process. The request must be received at least five (5) business days prior to the advertised response deadline.

19. Failure to include any of the above-referenced items in the submitted proposal may be grounds for disqualifying said proposal.

20. This Request for Qualifications does not commit the Town of Glastonbury to award a contract or to pay any costs incurred in the preparation of a proposal to this request. All proposals submitted in response to this Request for Qualifications become the property of the Town of Glastonbury. The Town of Glastonbury reserves the right to accept or reject any or all proposals received as a result of this request, to negotiate with the selected respondents, the right to extend the contract for an additional period, or to cancel in part or in its entirety the Request for Qualifications, if it is in the best interests of the Town to do so.

EVALUATION CRITERIA

- A Selection Committee, appointed by the Town Manager, will evaluate all proposals received for completeness and the respondent's ability to meet all requirements as outlined in this Request for Qualifications. The Selection Committee will then short list the specific firms whose proposals best meet all criteria required.

- The following factors will be considered by the Town when evaluating the proposals:

    - Specialized design and technical competence of individuals assigned to the project including level of experience in utilizing the VISSIM microsimulation model.

    - Capacity and the capability to perform the work within the time allotted.

    - Past record of performance on similar contracts with the Town and other clients with respect to such factors as control of costs, quality of work, and cooperation with the client; including knowledge of Federal, State and Municipal procedures.

- Overall approach to meeting the technical needs of the Town for the Roundabout project.

- Schedule

- Overall quality, thoroughness, and responsiveness to the Town's requirements as summarized herein.

SELECTION PROCESS

- This request for qualifications does not commit the Town of Glastonbury to award a contract or to pay any costs incurred in the preparation of a proposal to this request. All proposals submitted in response to this request become the property of the Town of Glastonbury. The Town of Glastonbury reserves the right to accept or reject any or all proposals received as a result of this request, to negotiate with the selected respondents, the right to extend the contract for an additional services, or to cancel in part or in its entirety the request for qualifications, and to waive any informality if it is in the best interests of the Town to do so.

- A Selection Committee, appointed by the Town Manager, will evaluate all submittals received for completeness and the respondent's ability to meet all requirements as outlined in this RFQ. The Committee will then short list the specific firms whose statements best meet all criteria required and may conduct interviews with these firms. Upon completion of interviews, the Selection Committee will forward to the Town Manager, a list of firms recommended for further consideration.

- Top rated firms will be asked to submit a specific Scope of Services and associated fee proposal. The Town Manager shall review said proposals and negotiate an agreement based on those discussions.

- Additional technical information may be requested from any respondent for clarification purposes, but in no way changes the original qualification statement submitted.

TIMELINE

The Town intends to adhere to the schedule listed below as closely as possible, but reserves the right to modify the schedule in the best interest of the Town as required.

Publicize RFQ	**08-27-15**
RFQ Due Date	**09-11-15 @ 11:00AM**
Shortlist of Proposals Received	**09-21-15**
Interviews with Top Respondents	**10-07-15**
Fee Proposal and Scope of Services	**10-21-15**
Contract Effective Date	**11-02-15**
Completion of Design	**02-15-16**

INSURANCE

The following insurance requirements are the Town's general requirements. Insurance requirements with the awarded respondent are subject to final negotiations, and all agreements may be subject to the Department of Transportation's insurance and audit requirements, as applicable.

The Respondent shall, at its own expense and cost, obtain and keep in force during the entire duration of the Project or Work the following insurance coverage covering the Respondent and all of its agents, employees, sub-contractors and other providers of services and shall name the Town of Glastonbury, its employees and agents as an Additional Insured on a primary and non-contributory basis to the Respondent's Commercial General Liability and Automobile Liability policies. **These requirements shall be clearly stated in the remarks section on the Respondent's Certificate of Insurance**. Insurance shall be written with Carriers approved in the State of Connecticut and with a minimum Best's Rating of A-VIII. In addition, all Carriers are subject to approval by the Town. Minimum limits and requirements are stated below:

1) Worker's Compensation Insurance:
- Statutory Coverage
- Employer's Liability
- $500,000 each accident/$500,000 disease-policy limit/$500,000 disease each employee
- A Waiver of Subrogation shall be provided in favor of the Town of Glastonbury and its employees and agents.

2) Commercial General Liability:

- Including Premises & Operations, Products and Completed Operations, Personal and Advertising Injury, Contractual Liability and Independent Contractors.
- Limits of Liability for Bodily Injury and Building Damage
  Each Occurrence $1,000,000
  Aggregate $2,000,000 (The Aggregate Limit shall apply separately to each job.)
- A Waiver of Subrogation shall be provided in favor of the Town of Glastonbury and its employees and agents.

3) Automobile Insurance:

- Including all owned, hired, borrowed and non-owned vehicles
- Limit of Liability for Bodily Injury and Building Damage:
  Per Accident $1,000,000
- A Waiver of Subrogation shall be provided in favor of the Town of Glastonbury and its employees and agents.

4) Errors and Omissions Liability or Professional Services Liability Policy:

- Provide Errors and Omissions Liability or Professional Services Liability Policy for a minimum Limit of Liability $2,000,000 each occurrence or per claim. The Town, its employees and agents shall be named Additional Insured for this specific Project. The certificate shall specify that the Town shall receive 60 days advance written notice of cancellation or non-renewal specific to this Project.

- The Respondent agrees to maintain continuous professional liability coverage for the entire duration of this Project, and shall provide for an Extended Reporting Period in which to report claims for five (5) years following the conclusion of the Project.

The Respondent shall provide a Certificate of Insurance as "evidence" of General Liability, Auto Liability including all owned, hired, borrowed and non-owned vehicles, and statutory Worker's Compensation and Employer's Liability coverage.

The Respondent shall direct its Insurer to provide a Certificate of Insurance to the Town before any work is performed. The Certificate shall specify that the Town shall receive 30 days advance written notice of cancellation or non-renewal. The Certificate shall evidence all required coverage including the Additional Insured and Waiver of Subrogation. The Respondent shall provide the Town copies of any such Policies upon request.

INDEMNIFICATION

To the fullest extent permitted by law, the Respondent shall indemnify and hold harmless the Town and their respective consultants, agents, and employees from and against all claims, damages, losses, and expenses, direct, indirect or consequential (including, but not limited to, fees and charges of engineers, attorneys and other professionals, and court and arbitration costs) arising out of or resulting from the performance of the Respondent's work, provided that such claim, damage, loss, or expense is caused in whole or in part by any negligent act or omission by the Respondent, or breach of its obligations herein or by any person or organization directly or indirectly employed or engaged by the Respondent to perform or furnish either of the services, or anyone for whose acts the Respondent may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

As to any and all claims against the Town or any of its consultants, agents, or employees by any employee of the Respondent, by any person or organization directly or indirectly employed by Respondent to perform or furnish any of the work, or by anyone for whose acts Respondent may be liable, the indemnification obligation stated herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Respondent under worker's or workman's compensation acts, disability benefit acts, or other employee benefit acts.

The above insurance requirements are the Towns' general requirement. Insurance requirements with the awarded respondent are subject to final negotiations.

ATTACHMENT A
PROPOSAL RESPONSE PAGE

TOWN OF GLASTONBURY
PROPOSAL **RPGL #** **2016-12**
DATE ADVERTISED **08-27-15** **DATE / TIME DUE** **09-11-15 @ 11:00 AM**

NAME OF PROPOSAL **HEBRON AVENUE ROUNDABOUTS ENGINEERING SERVICES REQUEST FOR QUALIFICATIONS**

The Respondent acknowledges receipt of the following Addenda:

Addendum #1 _____(Initial/Date) **Addendum #2** _____ (Initial/Date) **Addendum #3** _____(Initial/Date)

CODE OF ETHICS:
I/We have reviewed a copy of the Town of Glastonbury's Code of Ethics and agree to submit a Consultant Acknowledgement Form if I/we are selected. Yes _____ No _____ *

***Respondent is advised that effective August 1, 2003, the Town of Glastonbury cannot consider any proposal where the respondent has not agreed to the above statement.**

Type or Print Name of Individual	**Doing Business as (Trade Name)**
Signature of Individual	**Street Address**
Title	**City, State, Zip Code**
Date	**Telephone Number / Fax Number**
E-Mail Address	**SS # or TIN#**

(Seal – If proposal is by a Corporation)

Attest

ATTACHMENT B
NON-COLLUSION STATEMENT

The company submitting this proposal certifies that it is being submitted without any collusion, communication, or agreement as to any matter relating to it with any other respondent or competitor. We understand that this proposal must be signed by an authorized agent of our company to constitute a valid proposal.

Date: _____

Name of Company: _____

Name and Title of Agent: _____

By (SIGNATURE): _____

Address: _____

_____

_____

Telephone Number: _____

ATTACHMENT C – TIGHE AND BOND REPORT
HEBRON AVENUE ROUNDABOUTS

Tighe&Bond

Hebron Avenue Roundabouts

Town of Glastonbury
2155 Main Street
Glastonbury, CT 06033

December 19, 2014

Section 1
Introduction

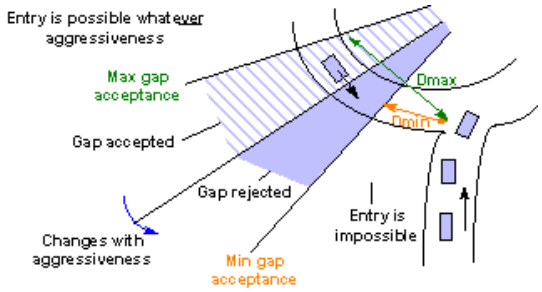
This report reviews the potential benefits of modern roundabouts at the Hebron Avenue intersections with New London Turnpike (NLT) and House Street and specifically compares the results to the proposed traffic signalization analysis provided by the Town of Glastonbury for the NLT intersection. The modern roundabout traffic analysis results show that roundabout installations at the NLT and House Street intersections can improve overall traffic operations in the corridor and at the intersections, significantly reduce vehicle crashes at the existing intersections and most importantly, the roundabouts fit within the existing Right of Way (ROW) of the intersections, with limited sidewalk and grading easements. For the House Street roundabout, an easement/ROW acquisition is required from 347-349 Hebron Avenue on the northeast corner. It should be noted that this corner is the site of the pending development. The addition of a westbound right turn lane in the roundabout improves traffic operations at the Hebron Avenue intersection with House Street. These modern roundabouts can dramatically improve the Hebron Avenue corridor, with the NLT roundabout done first.

Section 2
Traffic Operation Analysis

2.1 Modern Roundabout

Existing traffic operation analysis for the Hebron Avenue corridor was obtained from CTDOT and the Town of Glastonbury. The existing analysis included a full Synchro model of the existing signalized intersections along the corridor with 2016 projected traffic volumes as well as an initial VISSIM microsimulation model of a roundabout at the New London Turnpike intersection created by CTDOT. The VISSIM software uses car following theory and driving behavior methodology and models each individual car within the geometric layout of the roadway network. It is the only software allowed by CTDOT for designing modern roundabouts in Connecticut where traffic volumes are a controlling factor.

The provided VISSIM microsimulation model for the NLT roundabout option was reviewed and calibrated to more accurately simulate the operation of the proposed roundabout concept and it was also expanded to include the roundabout option at the House Street intersection. Traffic analyses were performed for the 2016 afternoon peak hour as it includes the highest amount of circulating volume at the proposed roundabout. The volumes were conservatively balanced between the intersections to ensure that no volume would be lost within the network. In addition, the minimum acceptable gaps, the space within the traffic stream for which vehicles will decide to enter the roundabout, were conservatively set at 2.7 seconds. Recent research has shown that minimum gap inputs can be decreased to as low as 2.2 seconds as more drivers are becoming accustomed to driving in roundabouts. The acceptance of smaller gaps leads to more intersection capacity and efficient traffic operations. Therefore, the VISSIM analysis with a minimum gap of 2.7 seconds can be considered conservative and similar to expected operation at the opening of a roundabout in an area where roundabouts are not yet common. Improvements in traffic operation are expected over time as drivers become more comfortable with entering the roundabout during shorter gaps.



The VISSIM analysis results for the roundabout concepts are depicted on Table 1 in Appendix A. Overall, the roundabout at NLT operates at LOS C while the House Street roundabout operates at LOS A. Acceptable delays of LOS C occur on the eastbound, southbound and northbound approaches to the New London Turnpike intersection. The westbound approach to the intersection operates efficiently at LOS B. All approaches to the House Street roundabout operate efficiently with LOS A and B.

A review of the average vehicular queue lengths from the VISSIM analysis shows that all approaches to both roundabouts will be less than 50 feet or two vehicle lengths. Maximum or design queue lengths, which may occur at peak times, were accommodated without crossing adjacent roadways with the exception of the westbound queue at the NLT intersection. The maximum westbound queue was approximately 350 feet passing through the unsignalized intersection of Hebron Avenue with Concord Street. At House

Street, the westbound maximum queue is expected to extend approximately 425 feet, terminating just before the intersection of Hebron Avenue at the Route 2 expressway ramps. The design queuing along Hebron Avenue between the New London Turnpike and House Street the roundabouts is not expected to extend between both roundabouts based upon the VISSIM simulations. In addition, the average queues are a fraction of the average queues for the traffic control signal. The ongoing peak hour queuing on Hebron Avenue today will be dissipated with the construction of the roundabouts.

To address the potential for westbound queuing extending into the Route 2 Eastbound off ramp intersection, an alternative layout for the House Street roundabout was considered, adding an exclusive westbound right turn lane from Hebron Avenue to House Street. This turn lane will allow for the significant westbound right turn volume onto House Street of over 330 vehicles in the afternoon peak to be removed from the through traffic stream in the roundabout allowing for more efficient operation and reduced queuing. The VISSIM analysis results for the revised layout are shown in Table 2 in Appendix A and result in a westbound queue of 312 feet, reduced from 425 feet without the additional westbound right turn lane. This provides a sufficient comfort level with CTDOT on the potential queuing impacts to the Route 2 intersection.

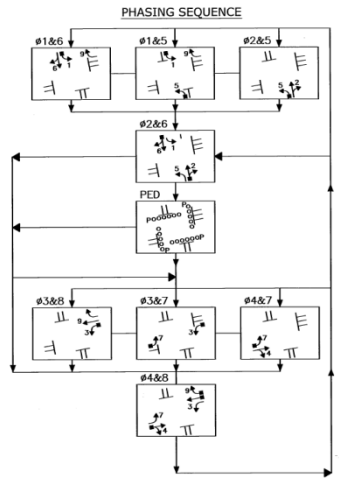
With the westbound right turn lane, the roundabout at House Street operates efficiently at LOS A on all approaches with queues that do not extend to adjacent intersections. Due to the efficiency of the House Street roundabout, traffic operation at the NLT roundabout is impacted slightly with moderate delays experienced on the eastbound and northbound approaches due to the consistent westbound traffic volume entering the roundabout. In effect, a reduced operating House Street roundabout results in a better operating New London Turnpike roundabout. However, a review of the maximum queues reveal that vehicles waiting to enter the roundabout can be accommodated without backing into adjacent roadway intersections with the exception of the westbound and southbound queues. The westbound maximum queue is increased by approximately 3 car lengths. The southbound queue extends approximately 3 cars lengths (75 feet) past the intersection with Welles Street. In both cases, the westbound and southbound queuing is similar to existing conditions at the existing signalized intersection.

It is also important to note that recent development proposals for the House Street parcel on the northeast corner of the intersection have considered a traffic signal at the House Street intersection. However, CTDOT has publicly stated it will not accept a traffic control signal at the intersection of Hebron Avenue and House Street due to the potential queuing impacts to the Route 2 eastbound off ramp intersection. This development parcel is now pending as an application to the Town with an unsignalized intersection proposal, with right turn out exit only from House Street. This pending intersection configuration was not analyzed in this study.

2.2 Traffic Signalization

As noted previously, CTDOT will not accept traffic signalization of the House Street intersection; therefore a comparison analysis for the House Street intersection was not conducted. For the NLT intersection, the proposed traffic operation analysis for the Hebron Avenue corridor was obtained from the Town who provided a traffic impact study conducted at the intersection for the previously proposed development at House Street. The proposed analysis included a full Synchro traffic model of the proposed signalized intersection at the NLT intersection with the 2016 weekday afternoon peak hour projected traffic volumes. These are the same traffic volumes used for the modern

roundabout analysis summarized above. Along with the installation of a new traffic control signal at the NLT intersection, an exclusive westbound right turn lane is proposed to help increase capacity.



The proposed traffic signal as designed is a fully actuated uncoordinated traffic control signal, which will operate with sophisticated full dual quad operation, including dual left turn advances for Hebron Avenue and New London Turnpike, through movements and an exclusive pedestrian phase. This phasing is typical for intersections with significant left turning traffic volumes on all approaches. When the intersection is operating at capacity, there are up to seven phases that can be called to service all of the volume demands.

Capacity and queue analyses were performed using *Trafficware Synchro plus SimTraffic 8 – Traffic Signal Coordination Software*. The analysis results are depicted on Table 1 in Appendix A. Overall, the proposed traffic signal operates at LOS C. The northbound approach operates with moderate delays with a LOS D, the southbound and eastbound approaches operate with acceptable delays with a LOS C and the westbound approach operates efficiently with LOS B. The provided capacity analyses do not reflect the design plans, which indicate it is considered to be coordinated with the future traffic signal at the House Street intersection.

The average vehicular queue lengths from the Synchro analysis show a maximum of 215 feet, approximately 9 vehicles on the eastbound approach, more than four times the roundabout average queues. The eastbound and northbound left turn lanes are both blocked by the average vehicular queue in the through lane making it so those vehicles turning left are forced to wait in the queue. The maximum queue lengths of 331 feet are accommodated without crossing adjacent roadways.

It is important to note that the exclusive pedestrian phase was not modeled as part of this analysis. Based upon pedestrian counts we conducted in September of 2014 there were upwards of 20 pedestrians at the intersection during the weekday afternoon peak hour. Adjusting the traffic analysis to account for 10 pedestrian calls per hour will increase the overall intersection delay and likely decrease the LOS C to LOS D for the traffic signal. This is the result of when a pedestrian call is made; the time for the pedestrian phase is taken from the main line green time, and results in a significant period when all vehicular traffic is stopped.

Section 3
Modern Roundabout SIDRA Analysis Check

In addition to the VISSIM analysis, traffic operations of the roundabout options were cross-checked using SIDRA version 6.0 software. SIDRA is a micro-analytical evaluation analysis which combines geometry and gap acceptance modeling to estimate the operation of the roundabout. SIDRA is a micro-analytical traffic evaluation tool, whereas VISSIM is a multi-modal microsimulation traffic modelling software. Based upon previous studies comparing SIDRA and VISSIM results, it appears that SIDRA tends to calculate higher average delay statistics than VISSIM. This is usually for intersections with lower traffic demands as a result of SIDRA automatically including a geometric delay component within its calculation of average vehicle delay. By contrast, the equivalent statistic calculated by VISSIM ignores geometric delay and incorporates only genuine control delay.

Along with VISSIM and RODEL, SIDRA is a widely accepted roundabout analysis tool and is used by New York State Department of Transportation (NYSDOT) and Massachusetts Department of Transportation (MassDOT) Highways. NYSDOT is the leader in roundabouts in the northeast and has studied designed and constructed dozens of roundabouts. With both VISSIM and SIDRA analyses conducted in this evaluation, the operation of the roundabout has been fully analyzed with industry and DOT accepted methods.

The SIDRA analysis, provided in Appendix B, showed similar operation at New London Turnpike with overall average delays within 7.2 seconds of the VISSIM results. SIDRA analysis at the House Street intersection (without the alternate westbound right turn lane) functioned with overall LOS A, similar to the VISSIM results.

Queuing results for the SIDRA analysis were more than those realized by the VISSIM analysis with the exception of the southbound queue approaching the House Street roundabout and the northbound queue approaching the New London Turnpike roundabout. Similar to the VISSIM analysis with the House Street westbound right turn lane, the efficiency of the House Street roundabout influences the operation of the New London Turnpike roundabout due to the consistent westbound traffic volumes resulting in delay and southbound queues that extend beyond the intersection with Welles Street. As previously mentioned, existing southbound queues are consistently observed to extend past Welles Street with the existing signalized operation.

In general, the SIDRA analysis results verify the analysis results from VISSIM with some exceptions on queueing where the SIDRA queues are expected to be longer than the VISSIM queues due to the SIDRA calculation of the delay. Regardless, CTDOT uses VISSIM analyses for designing roundabouts in Connecticut.

Section 4
Intersection Layouts

4.1 Modern Roundabout

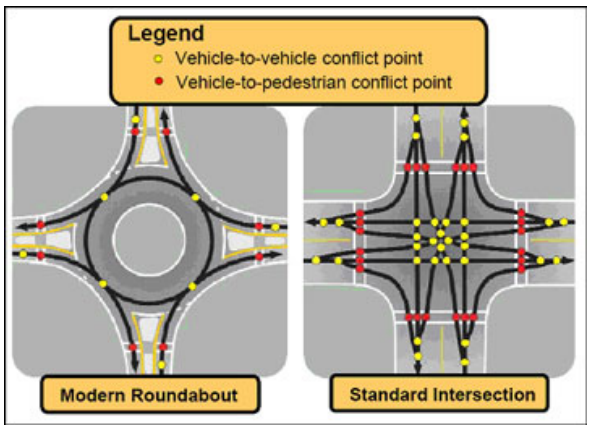
The proposed concept layout for the single lane roundabouts are shown on concept layout plans LO.01 & LO.02A included in Appendix C. Concept layout plan LO.02B, also included in Appendix C, shows the House Street roundabout with the additional westbound right turn lane. The single lane roundabouts have an inscribed diameter of 100-105 feet while the House Street option with the right turn lane extends to a 116 foot diameter in the northeast corner to accommodate the additional turn lane. All three concepts are expected to be able to accommodate a typical City/School Bus without any wheels using the central apron and will accommodate a WB-50 design vehicle with the tractor remaining in the circulatory roadway for all turning movements (the trailer wheels will ride up on the truck apron). Preliminary analysis revealed that most movements can be traversed acceptably with a WB-62 design vehicle. More detailed design and analysis will be needed to determine if a WB-62 design vehicle will be able to adequately traverse all intersection movements. In addition to bus and truck movements, turning movements were also analyzed for a design vehicle similar to ladder truck apparatus used by Glastonbury Fire Department. The roundabouts were able to accommodate all turning movements from the ladder truck without any part of the vehicle traversing the central truck apron. See the truck turning diagrams in the Appendix.

As shown on the concept plans, the roundabout at the NLT intersection will likely require sidewalk and grading easements on each corner due to the proximity of the right of way to the edge of the roadway. Based on this preliminary layout, the roadway and curbing is within the right of way.

The proposed roundabout concept at House Street will require an easement/acquisition from the property owner of 347-349 Hebron Avenue in order to accommodate the actual roundabout pavement. Similar to the NLT concept, the House Street concept is expected to require sidewalk and grading easements from adjacent properties on the northwest corner and south side of the intersection.

4.2 Pedestrian Considerations

A modern roundabout intersection creates a lower speed environment than a traffic signal, as approaching and circulating modern roundabout traffic flow is typically between 15 and 18 miles per hour, depending on the geometry of the roundabout. Generally the smaller the roundabout with appropriate deflection, the slower the speed. In addition, there are only 8 potentially conflict points for pedestrians at a roundabout where a traffic signal has 24 conflict points. On the concept plan included in Appendix C, the crosswalks are setback from the from the yield line one full vehicle length. This allows the vehicle



entering the roundabout to focus on looking left for gaps in traffic while the second vehicle in the queue is looking straight and can devote their attention to the crossing pedestrians. The setback of the crosswalks also decreases the pedestrian crossing distance since the entry and exit lanes are narrower than the circulatory roadway. The setback distance should not be too far from the yield line or the direction the pedestrian is traveling. This is important to prevent pedestrians from choosing a shorter route and crossing in an undesignated area. Six-foot wide splitter islands are proposed which will allow for a safe refuge of pedestrians so they only need to cross one direction of traffic at a time. This layout also allows pedestrians to focus on one-way traffic flow as they make the crossing.

The sidewalks proposed around the roundabout are setback from the circulatory roadway and separated with a minimum two-foot wide greenbelt. This green belt provides area for snow storage, room for street furniture, discourages pedestrians from crossing in an undesignated area and helps guide pedestrians with vision impairments to the crosswalks. This "detectable edge treatment" between sidewalks and the roundabout is a requirement of the draft Public Rights-of-Way Accessibility Guidelines and creates a non-visual cue to help vision impaired pedestrians discern where it is safe to cross.

As with all pedestrian crossings there are sidewalk ramps with detectible warning strips connecting the crosswalk to the sidewalk entrance and exits. The walkway through the splitter islands is cut-through for easier maneuverability for vision impaired pedestrians and detectible warning strips are provided along the full width of the cut-through area. Detectible warning strips alert vision impaired pedestrians that they are leaving a pedestrian area and entering the vehicular traffic area.

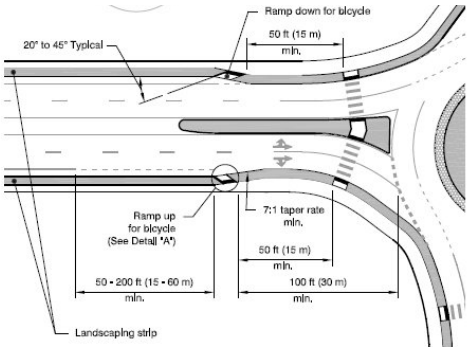
Additional pedestrian improvements at roundabouts could include raised crosswalks, low-lying landscaped splitter islands and even pedestrian signals. These options can be reviewed however they are typically used in areas with a high vehicular volumes, high pedestrian volumes, areas where it is know there are vision impaired pedestrians and at more complex crossing situations such as multi-lane roundabouts. The proposed modern roundabout at Hebron Avenue at NLT is a standard single lane roundabout. The slower travel speeds (15-18 mph) and well-defined crossings and splitter islands result in a high rate of motorists yielding to pedestrians. According to *NCHRP 572: Roundabouts in the United States*, pedestrians often have very short waiting time to cross at roundabout crosswalks.

In addition, *NCHRP 674: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities* states that the design of single-lane roundabouts should encourage low vehicle speeds in the vicinity of the crosswalk. Low speeds are shown to correlate with increased yielding behavior and reduced injury in case of a collision. The design of a single-lane roundabout should encourage narrow (or standard) lane widths in the vicinity of the crosswalk. Both roundabout concepts reviewed for this study provide for these lower speeds with the approach and splitter islands.

As noted above, detectable warnings complying with the draft PROWAG are required at both curb and island ends of crosswalks to warn pedestrians who are blind that they are leaving the pedestrian way and entering the vehicular way. One potential consideration includes planting strips along the sidewalks on the approaches to the roundabout to serve as a barrier to discourage pedestrian crossing the roadway at places other than the crosswalk. This would make it less likely that a blind pedestrian will inadvertently step from the paved walkway into the paved roadway at any point other

than the crosswalk or begin crossing from the wrong point without realizing the intersection is a roundabout. They also provide a trailing surface that long cane users can use to locate the crosswalk. Finally, the NCHRP report notes that the splitter islands should be wide enough for pedestrian refuge and to enable a two-stage crossing. The roundabout designs include these provisions, although the landscaping on the approaches has not been determined.

4.3 Bicyclist Considerations



There are no existing bike lanes on any approach to the intersection nor are there sharrows, share the road markings with bicycles. Since the proposed modern roundabout design will slow vehicular travel speeds to approximately 15-18 mph and typical on-road cyclists travel at 12 to 20 mph the difference in speed is minimal therefore improving safety for cyclists. Experienced bicyclists who currently travel on the roadways effectively and safely will be able to traverse the roundabout without much difficulty. Bicyclists that are uncomfortable travelling through the roundabout with traffic flow can utilize the pedestrian ramps to access the sidewalks and crosswalks to traverse the roundabout like a pedestrian. Bicycle ramps (from bike lane to sidewalk) are not proposed since the proposed roundabout is a simple single-lane design with low travel speeds and there no bike lanes on the approaches. These bicycle ramps can be added in the future when bike lanes are implemented.

4.4 Inscribed Circle Diameter

The inscribed circle diameter is the size of the roundabout, the diameter of the center island plus twice the width of the circulatory roadway. The inscribed circle diameter for the Hebron Avenue at NLT intersection was selected based upon the design vehicle, approach roadway alignment, travel speed and the available Right-Of-Way. The existing intersection geometry currently limits turns by large vehicles such as semi-trailers or WB-50 vehicles. A WB-50 was selected as the design vehicle. It was also important to ensure that the Town of Glastonbury fire trucks, City buses and school buses could maneuver the roundabout without needing to utilize the truck apron. An inscribed circle diameter of 100' was selected for the Hebron Avenue at NLT intersection, which is on the smaller end for a single-lane roundabout due to the right-of-way constraints and yet still accommodates larger vehicles such as City and School buses, semi-trailers and Town of Glastonbury fire apparatus.

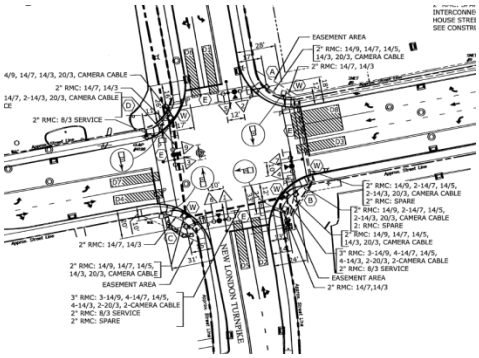
Site Category	Inscribed Circle Diameter Range
Mini-roundabout	13-25m (45-80 ft)
Urban compact	25-30m (80-100 ft)
Urban single-lane	30-40m (100-130 ft)
Urban double lane	45-55m (150-180 ft)
Rural single lane	35-40m (115-130 ft)
Rural double lane	55-60m (180-200 ft)

Roundabout diameters are based upon several factors, including vehicles accessing the roundabout, Right Of Way and geometric constraints. Single lane roundabouts are generally a minimum of 80 feet to a maximum of 130 feet in diameter for the urban condition. Roundabouts beyond 130 feet in diameter are usually multi-lanes and/or they are have higher speeds in a rural location. Other roundabouts in Connecticut vary between 100 feet and 150 feet inscribed circle diameters. The construction of a Tighe & Bond designed 100 foot inscribed circle

diameter roundabout is nearing completion at the intersection of the Route 15 Exit 47 Southbound Ramps and Park Avenue in Trumbull. This roundabout was designed to allow WB-50s to travel through the roundabout. In West Haven, at the intersection of Route 162 and SR 705 the roundabout has a diameter of 109 feet, which is designed for WB-50's. In Killingworth the roundabout at the intersection of Route 80 and Route 81 is approximately 120 feet, this was designed to maintain the existing size and to upgrade the approaches. Two roundabouts currently under State design in Monroe and Seymour have 140-150 inscribed circle diameters. Monroe is proposed to have an inscribed circle diameter of 140-150 feet due to the deflection from high speeds.

The five corners roundabout in Ellington while single lane has five legs (six if you include the gas station driveway) with an inscribed circle diameter of 150 feet. This roundabout is at the intersection of Route 286 and 74. The roundabout in Salem at Route 85 and Route 82 has two two-lane approaches and a large number of trucks, resulting in a larger diameter of 150 feet.

4.5 Traffic Signalization



The proposed construction layout for the traffic control signal and westbound right turn lane improvements at New London Turnpike is shown in Appendix F. These plans are the bid plans the Town has pending for the widening of the westbound Hebron Avenue approach to provide an exclusive right turn lane and the replacement of the span wire traffic signal with a far-side head mast arm design. This design utilizes the signal equipment layout design philosophy from the Main Street traffic signal system project and includes video detection and emergency vehicle preemption.

As shown on the plans, Hebron Avenue will be widened to a minimum of 50 feet and an exclusive pedestrian phase to stop all vehicular traffic.

Section 5
Cost Comparison

5.1 Modern Roundabout

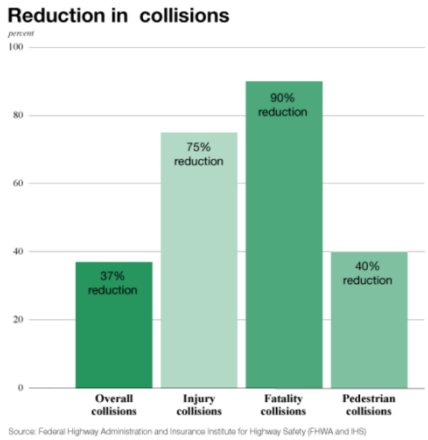
An order of magnitude cost for the single-lane modern roundabout layout for NLT shown on LO.01 & LO.02A in Appendix C is approximately 1 to 1.2 million dollars based on the known construction costs of other roundabout in Connecticut including recent pricing in 2014. These costs are obviously higher than the installation of a traffic control signal. However, the maintenance costs on roundabouts are lower than at signalized intersections, which require electricity to operate and maintenance such as bulb/LED replacements and retiming. During a power outage, a roundabout will continue to operate without any impacts or need for stop sign installation or police control. As noted previously, modern roundabouts also reduce the number of motor vehicle conflict points from 32 at a signalized intersection to eight, therefore reducing the total number of collisions, injuries and costs for emergency response. The life cycle of a roundabout before it will incur major maintenance is similar to other roadway infrastructure, with pavement replacement likely every 20 years and replacement of the roundabout curbing and other features likely after 50 years.

5.2 Traffic Signalization

The proposed traffic signalization with the addition of a westbound right turn lane at the Hebron Avenue at New London Turnpike intersection has already been designed and bid. The total cost from the low bidder is $634,576 without the two alternate granite curb items. With the granite curb items the total cost is $671,056. This is the initial cost of the traffic control system, which does not include the electricity to operate the signal or service costs (bulb replacement, re-timing, and detector maintenance). Typical annual maintenance and service costs for traffic signals are approximately $5,000 and sometimes upwards of $10,000 per year. The life cycle of a traffic control signal is approximately 20 years before it will need replacement.

5.3 Safety

The cost of vehicular crashes has long been estimated by the Federal Highway Administration (FHWA) and the Insurance Institute for Highway Safety (IIHS). FHWA statistics indicate that single lane roundabouts reduce injuries vehicular crashes by 76% and reduce or virtually eliminate the potential for fatalities by 90% over signalized intersections. Essentially a traffic signal controlled intersection has a vehicle crash rate ten times that of a single lane modern roundabout.



In addition, pedestrian fatalities exponentially increase with vehicle speeds. At single lane roundabouts, vehicular speeds are less than 20 miles per hour, significantly increasing the chance of survival for a pedestrian involved in a collision at a roundabout versus a standard traffic signalized intersection.

Section 6
Conclusion

Based on the foregoing analysis and conceptual layouts, the installation of a modern roundabout at the Hebron Avenue intersection with New London Turnpike (NLT) intersection will provide a feasible alternative to the proposed traffic control signal. The roundabout will be on the lower range in terms of size as compared to other roundabouts. Based upon the concept geometry, it will fit within the Right Of Way, will improve traffic operations and have benefits in terms of life cycle costs and significantly reduced potential for vehicular and pedestrian crashes.

The traffic control signal at NLT will provide the lowest up front cost for traffic control for the intersection and will not require a learning curve for drivers versus the roundabout. Traffic control signals are standard controls, whereas modern roundabouts are very new to the northeast and will be even newer to the driving residents of the Town of Glastonbury. If the roundabout is selected instead of the traffic signal, an education campaign for the public should be considered similar to other areas where roundabouts were first introduced. This can be accomplished with electronic and social media, as well as outreach to the community and public information meetings. There is a vast inventory of outreach examples from many agencies including CTDOT.

The installation of a modern roundabout at the House Street intersection will provide significant safety benefits and allow for the development of the parcel that addresses prior Town and CTDOT concerns for the intersection operation with full access to House Street. If considered, the roundabout should provide a westbound right turn lane to ensure CTDOT concerns on westbound queues impacting the Route 2 off ramp intersection are addressed. The roundabout will require cooperation with the property owner on the northeast corner to accommodate the roundabout pavement and a review of the recent development plans indicate there is sufficient area at the corner. The roundabout at House Street will also improve operations at the NLT roundabout intersection.

The traffic analyses conducted shows that the roundabouts can accommodate 2016 afternoon traffic volumes through the corridor with acceptable levels of delay and queuing. In addition, further improvement in traffic operation along the corridor is expected as driver familiarity with roundabouts increases. The traffic control signal will also accommodate the 2016 afternoon traffic volumes through the corridor.

The modern roundabouts can also serve as a gateway to the Glastonbury Center area, with potential landscaping in the center island depicting historical aspects of the Town with a sculpture and/or tree features.

Based upon the significantly less delays per vehicle during the peak hours (18 seconds versus 30 seconds), the modern roundabouts provide for reduced emissions with more sustainable traffic control and significant reduction of vehicle queueing in the corridor during all hours of the day. Peak hour queueing may be similar to the signal, however the queueing will be moving and not stopped like a traffic signal queue.

Roundabout corridors have been shown to handle traffic better than a series of signalized intersections. And the slower speeds at roundabouts are best for economic development encouraging more foot traffic and a greener intersection control.

Roundabouts also accommodate pedestrians and vision impaired pedestrians as well as bicyclists with their very low approach and circulating speeds.

The priority for improving the Hebron Avenue corridor begins with the installation of the modern roundabout at the NLT intersection. This intersection should be the first to be converted to a modern roundabout as it is the mid-point of the corridor. Once NLT is operating, then the House Street intersection can be converted to a modern roundabout.

Although not analyzed in this report, the Main Street intersection should also be considered for a modern roundabout, completing a true roundabout corridor. The Main Street intersection has similar geometry and space to accommodate a NLT-sized roundabout and can address the frequent back-ups on Main Street during the peak hours, affecting the traffic signal operation at Welles Street.

TABLE 1
Intersection Operation Summary - Average Vehicle Delay (sec/veh), Vehicular Levels of Service, and Queue Lengths (ft)
2016 PM Peak Hour Conditions
VISSIM Analysis - Average of 5 Runs

Hebron Avenue at New London Turnpike - Single Lane Roundabout

	EB APPROACH			WB APPROACH			NB APPROACH			SB APPROACH			INTERSECTION		
Time	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**
0:00-15:00	16.5	2.8	19.3	10.3	0.4	10.6	17.1	2.9	20.1	12.0	0.8	12.8	13.4	1.5	14.9
15:00-30:00	17.1	3.0	20.1	17.2	0.9	18.1	21.3	3.5	24.8	15.1	1.0	16.1	17.5	1.9	19.4
30:00-45:00	19.8	3.5	23.3	13.5	0.4	13.9	19.9	4.3	24.2	15.8	1.4	17.1	16.7	2.0	18.7
45:00-60:00	21.2	3.9	25.1	11.2	0.5	11.7	22.3	3.6	25.9	18.2	1.3	19.5	17.4	2.0	19.4
Total	**18.7**	**3.3**	**22.0**	**13.1**	**0.5**	**13.6**	**20.2**	**3.6**	**23.8**	**15.3**	**1.1**	**16.4**	**16.3**	**1.9**	**18.1**
			LOS C			**LOS B**			**LOS C**			**LOS C**			**LOS C**

Approach	**Avg Queue (ft)**	**Max Queue (ft)**
EB	38	316
WB	18	344
NB	42	384
SB	32	427

Hebron Avenue at House Street - Single Lane Roundabout

	EB APPROACH			WB APPROACH			SB APPROACH			INTERSECTION		
Time	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**	**Vehicle Delay**	**Stop Delay**	**Total Delay**
0:00-15:00	3.7	0.0	3.7	9.4	0.1	9.4	5.4	1.0	6.4	6.6	0.1	6.8
15:00-30:00	3.8	0.0	3.8	11.6	0.1	11.7	5.1	1.0	6.1	7.8	0.1	7.9
30:00-45:00	4.1	0.0	4.1	15.9	0.1	16.0	6.5	1.5	8.0	10.2	0.2	10.3
45:00-60:00	4.2	0.0	4.3	13.3	0.1	13.4	6.6	1.2	7.8	9.0	0.2	9.1
Total	**3.9**	**0.0**	**4.0**	**12.5**	**0.1**	**12.6**	**5.9**	**1.2**	**7.1**	**8.4**	**0.1**	**8.5**
			LOS A			**LOS B**			**LOS A**			**LOS A**

Approach	**Avg Queue (ft)**	**Max Queue (ft)**
EB	1	106
WB	7	425
SB	2	75

TABLE 2
Intersection Operation Summary - Average Vehicle Delay (sec/veh), Vehicular Levels of Service, and Queue Lengths (ft)
2016 PM Peak Hour Conditions
VISSIM Analysis - Average of 5 Runs

Hebron Avenue at New London Turnpike - Single Lane Roundabout

	EB APPROACH			WB APPROACH			NB APPROACH			SB APPROACH			INTERSECTION		
Time	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay
0:00-15:00	16.6	2.4	19.0	12.9	0.4	13.3	14.2	2.3	16.6	17.6	1.7	19.3	15.2	1.5	16.7
15:00-30:00	17.8	2.8	20.6	14.4	0.4	14.9	18.7	3.2	21.9	15.3	1.2	16.5	16.2	1.7	17.9
30:00-45:00	24.8	5.3	30.0	19.7	0.4	20.1	29.1	6.6	35.7	20.9	1.6	22.5	23.0	2.9	25.8
45:00-60:00	19.8	3.1	22.9	20.5	0.5	21.0	14.0	2.1	16.1	19.0	1.4	20.5	19.0	1.6	20.6
Total	**19.7**	**3.4**	**23.1**	**16.9**	**0.4**	**17.3**	**19.0**	**3.6**	**22.6**	**18.2**	**1.5**	**19.7**	**18.4**	**1.9**	**20.3**
			LOS C			**LOS C**			**LOS C**			**LOS C**			**LOS C**

Approach	Avg Queue (ft)	Max Queue (ft)
EB	43	408
WB	27	485
NB	40	371
SB	44	501

Hebron Avenue at House Street - Single Lane Roundabout with Westbound Right Turn Lane

	EB APPROACH			WB APPROACH			SB APPROACH			INTERSECTION		
Time	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay	Vehicle Delay	Stop Delay	Total Delay
0:00-15:00	3.2	0.0	3.2	7.7	0.2	7.9	6.0	1.2	7.2	5.8	0.2	6.0
15:00-30:00	3.3	0.0	3.3	6.8	0.2	7.0	5.5	1.4	6.8	5.2	0.2	5.4
30:00-45:00	3.3	0.0	3.3	8.1	0.3	8.4	7.7	2.5	10.2	6.0	0.3	6.3
45:00-60:00	3.0	0.0	3.1	9.4	0.2	9.6	7.0	2.0	9.1	6.7	0.3	6.9
Total	**3.2**	**0.0**	**3.2**	**8.0**	**0.2**	**8.2**	**6.6**	**1.8**	**8.3**	**5.9**	**0.3**	**6.2**
			LOS A			**LOS A**			**LOS A**			**LOS A**

Approach	Avg Queue (ft)	Max Queue (ft)
EB	1	86
WB	10	312
SB	3	87

LANE SUMMARY

Site: Hebron Avenue @ New London Turnpike - 2016 PM

Hebron Avenue @ New London Turnpike
2016 PM
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: New London Turnpike NB													
Lane 1[d]	446	3.0	584	0.764	100	17.1	LOS B	9.5	243.4	Full	1600	0.0	0.0
Approach	446	3.0		0.764		17.1	LOS B	9.5	243.4				
East: Hebron Avenue WB													
Lane 1[d]	729	3.0	807	0.904	100	16.9	LOS B	19.1	489.8	Full	880	0.0	0.0
Approach	729	3.0		0.904		16.9	LOS B	19.1	489.8				
North: New London Turnpike SB													
Lane 1[d]	636	3.0	637	0.999	100	41.2	LOS D	26.7	683.3	Full	1600	0.0	0.0
Approach	636	3.0		0.999		41.2	LOS D	26.7	683.3				
West: Hebron Avenue EB													
Lane 1[d]	458	3.0	533	0.859	100	24.4	LOS C	13.1	334.9	Full	1600	0.0	0.0
Approach	458	3.0		0.859		24.4	LOS C	13.1	334.9				
Intersection	2268	3.0		0.999		25.3	LOS C	26.7	683.3				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: Hebron Avenue @ House Street - 2016 PM

Hebron Avenue @ House Street
2016 PM
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
East: Hebron Avenue WB													
Lane 1[d]	988	3.0	1161	0.851	100	1.4	LOS A	19.1	487.9	Full	880	0.0	0.0
Approach	988	3.0		0.851		1.4	LOS A	19.1	487.9				
North: House Street SB													
Lane 1[d]	140	3.0	549	0.255	100	5.6	LOS A	1.7	42.5	Full	1600	0.0	0.0
Approach	140	3.0		0.255		5.6	LOS A	1.7	42.5				
West: Hebron Avenue EB													
Lane 1[d]	835	3.0	1092	0.764	100	1.7	LOS A	11.0	281.1	Full	1600	0.0	0.0
Approach	835	3.0		0.764		1.7	LOS A	11.0	281.1				
Intersection	1963	3.0		0.851		1.9	LOS A	19.1	487.9				

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option is selected.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

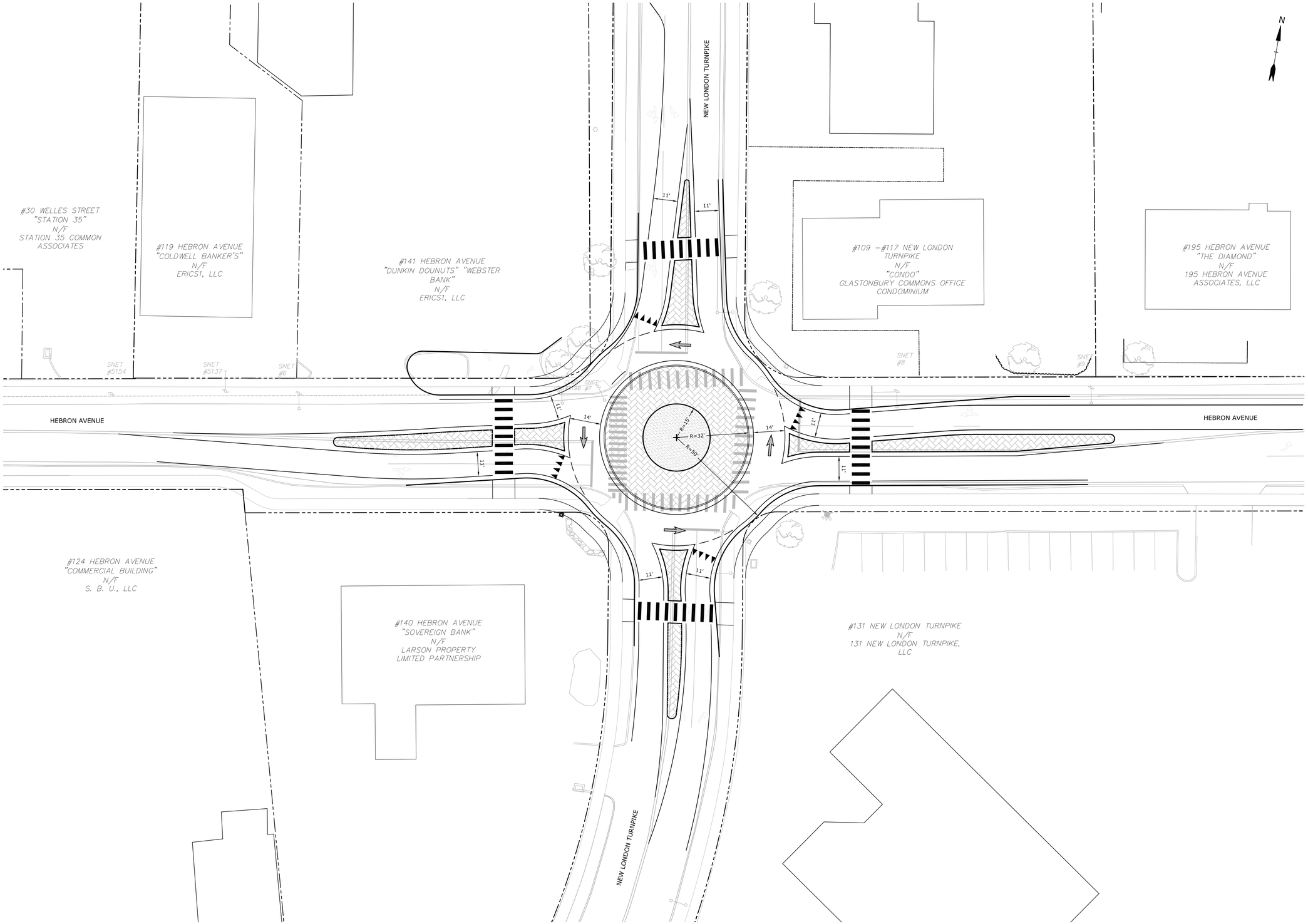
TABLE 3

Intersection Comparison Summary - Traffic Control Signal or Modern Roundabout
Hebron Avenue at New London Turnpike
2016 PM Peak Hour Conditions

	Lane Use	Signal LOS / Delay (sec / veh)	Roundabout	Signal Volume to Capacity Ratio	Roundabout	Signal Average Queue (ft.)	Roundabout	Signal Maximum Queue (ft.)	Roundabout
Overall		**C / 30.5**	**C / 18.1**						
New London Turnpike	NBL	B / 16.9	-- / --	0.22	-- / --	23	-- / --	47	-- / --
New London Turnpike	NBT>	E / 55.1	C / 23.8	0.88	0.76	184	42	331	384
New London Turnpike	SBL	D / 38.1	-- / --	0.83	-- / --	117	-- / --	247	-- / --
New London Turnpike	SBT>	C / 25.1	C / 16.4	0.48	0.99	135	32	212	427
Hebron Avenue	EBL	B / 16.1	-- / --	0.09	-- / --	9	-- / --	26	-- / --
Hebron Avenue	EBT>	C / 31.0	C / 22.0	0.66	0.86	215	38	327	316
Hebron Avenue	WBL	B / 19.9	-- / --	0.40	-- / --	30	-- / --	52	-- / --
Hebron Avenue	WBT	C / 26.0	B / 13.6	0.54	0.90	180	18	280	344
Hebron Avenue	WBR	A / 5.9	-- / --	0.30	-- / --	17	-- / --	41	-- / --

Source: Trafficware Synchro plus SimTraffic 8 – Traffic Signal Coordination Software
PTV VISSIM 6
SIDRA Intersection 6

Note: Pedestrian volumes were not included with the traffic control signal or modern roundabout analysis.



Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

Town of Glastonbury

Roundabout Feasibility

Glastonbury, CT

September 5, 2014

MARK	DATE	DESCRIPTION

PROJECT NO:	G0656
FILE:	LO-G0656-02.dwg
DRAWN BY:	MDS
CHECKED:	CDY
APPROVED:	JCB

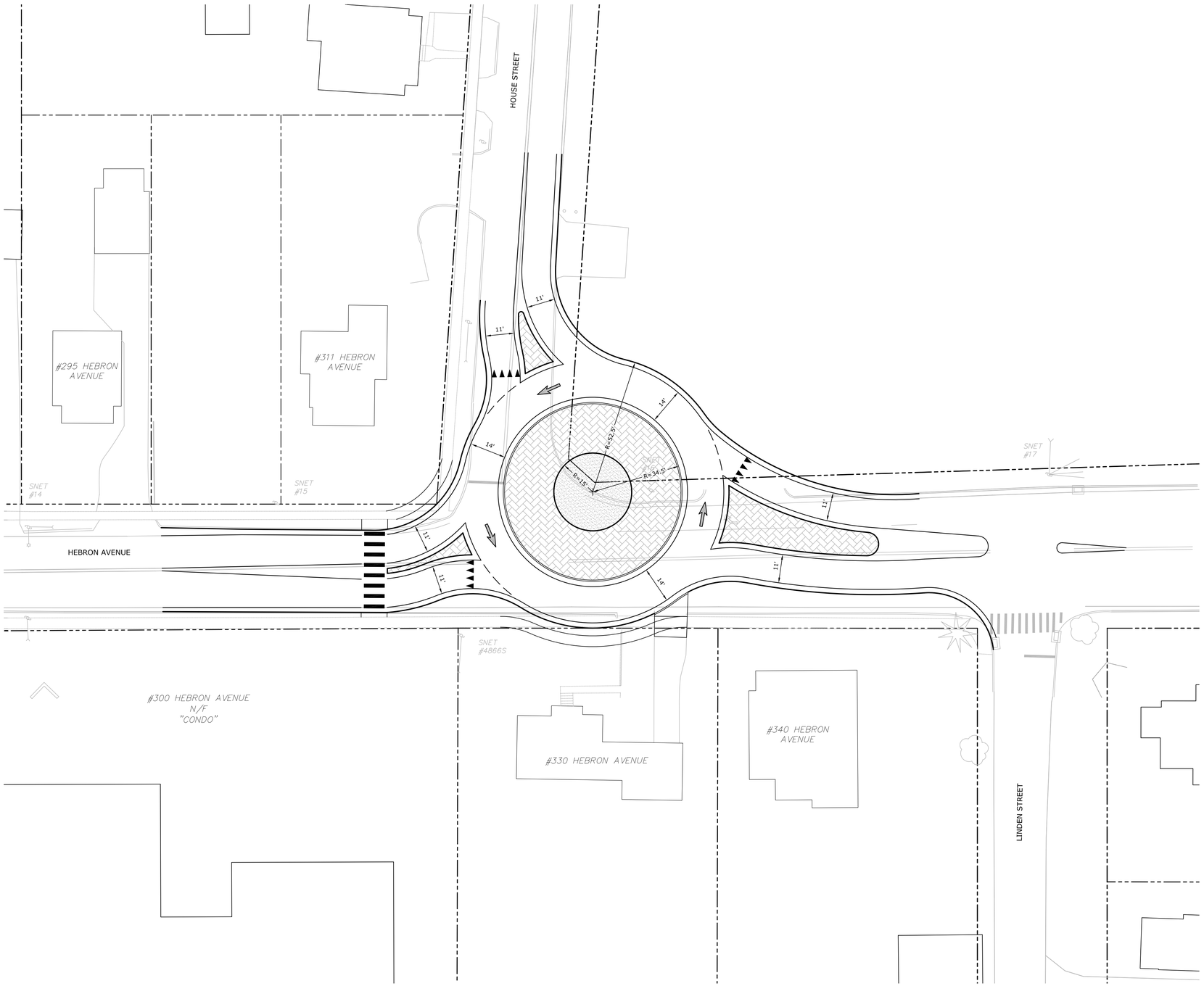
CONCEPTUAL LAYOUT PLAN
HEBRON STREET AT
NEW LONDON TURNPIKE

SCALE: 1" = 20'

LO.01

09/02/2014

Sep 02, 2014 - 3:23pm Plotted By: CDY
Tighe & Bond, Inc. J:\G0656 Glastonbury - Hebron Ave Roundabout\Drawings\Sheets\LO-G0656-02.dwg



N

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

Tighe&Bond
www.tighebond.com
1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

Town of Glastonbury

Roundabout Feasibility

Glastonbury, CT

September 5, 2014

MARK	DATE	DESCRIPTION

PROJECT NO:	G0656
FILE:	LO-G0656-02.dwg
DRAWN BY:	MDS
CHECKED:	CDY
APPROVED:	JCB

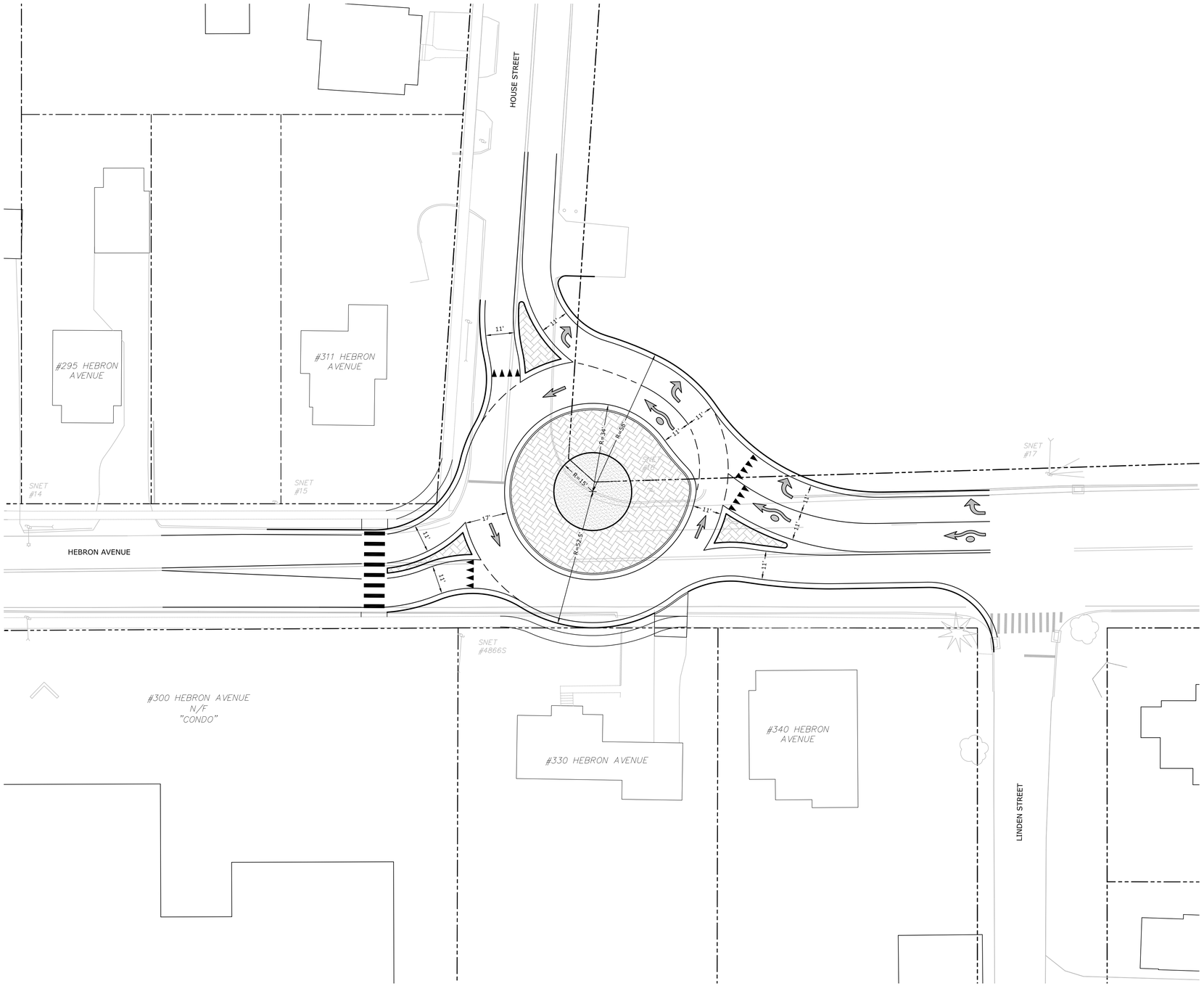
CONCEPTUAL LAYOUT PLAN
HEBRON STREET AT
HOUSE STREET

SCALE: 1" = 20'

LO.02A

09/02/2014

Sep 02, 2014-3:17pm Plotted By: CDY
Tighe & Bond Inc. J:\G0656 Glastonbury - Hebron Ave Roundabout\Drawings\Sheets\LO-G0656-02.dwg



N

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

Tighe&Bond
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1000 Bridgeport Avenue
Suite 320
Shelton, CT 06484
(203) 712-1100

Town of Glastonbury

Roundabout Feasibility

Glastonbury, CT

September 5, 2014

MARK	DATE	DESCRIPTION

PROJECT NO:	G0656
FILE:	LO-G0656-03.dwg
DRAWN BY:	MDS
CHECKED:	CDY
APPROVED:	JCB

CONCEPTUAL LAYOUT PLAN
HEBRON STREET AT
HOUSE STREET

SCALE: 1" = 20'

LO.02B

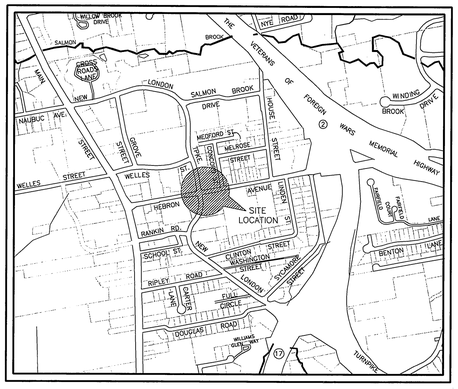
09/02/2014

Sep 02, 2014-2:23pm Plotted By: CDY
Tighe & Bond, Inc. J:\G0656 Glastonbury - Hebron Ave Roundabout\Drawings\Sheets\LO-G0656-03.dwg

TOWN OF GLASTONBURY
ENGINEERING DEPARTMENT
HEBRON AVENUE & NEW LONDON TURNPIKE
INTERSECTION IMPROVEMENTS
PW-1205
GLASTONBURY, CONNECTICUT

SHEET INDEX

SHEET NO.	DESCRIPTION	
1	TITLE SHEET	
2	DETAILS AND TYPICAL SECTIONS	
3	ROADWAY CONSTRUCTION PLAN	
4	PAVEMENT MARKING & SIGNING PLAN	
5,6,7	CROSS SECTIONS	
8	TRAFFIC SIGNAL PLAN	
9	MAST ARM SECTIONS/ELEVATIONS	
10	MAST ARM ASSEMBLY ELEVATIONS	
11	MAST ARM ASSEMBLY DETAILS	
12	MAST ARM ASSEMBLY FOUNDATION DETAILS	
TR-1000_01	GENERAL CLAUSES (TEST PROCEDURES)	CONNDOT
TR-1001_01	TRENCHING & BACKFILLING, ELECTRICAL CONDUIT	CONNDOT
TR-1002_01	TRAFFIC CONTROL FOUNDATIONS	CONNDOT
TR-1010_01	CONCRETE HANDHOLE	CONNDOT
TR-1102_01	PEDESTALS, PEDESTRIAN SIGNALS	CONNDOT
TR-1107_01	PEDESTRIAN PUSH BUTTON	CONNDOT
TR-1108_01	CONTROLLERS	CONNDOT
TR-1111_02	VEHICLE DETECTION SYSTEMS	CONNDOT
TR-1208_02	METAL SIGNS POSTS & MOUNTING	CONNDOT
TR-1210_03	SPECIAL DETAILS & PAVEMENT MARKINGS FOR TWO-WAY HIGHWAY	CONNDOT
TR-1220_01	SIGNS FOR CONSTRUCTION & PERMIT OPERATION	CONNDOT
TR-1220_02	CONSTRUCTION SIGN SUPPORT AND CHANNELING DEVICES	CONNDOT
HW 921-02	SIDEWALK RAMPS	CONNDOT



LOCATION MAP
SCALE: 1"=1000'

FEBRUARY 2014

ISSUED FOR CONSTRUCTION

RICHARD J. JOHNSON
TOWN MANAGER

DANIEL A. PENNINGTON
TOWN ENGINEER/MANAGER OF PHYSICAL SERVICES

STATE OF CONNECTICUT · DANIEL A. PENNINGTON · NO. 20101 · REGISTERED PROFESSIONAL ENGINEER

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.
IF SCALING FROM THIS PLAN, VERIFY SCALE WITH THE GRAPHIC SCALE PROVIDED ABOVE.

ALL UTILITY INFORMATION AND DATA SHOWN OR INDICATED IN THE CONTRACT DOCUMENTS ARE COMPILED FROM MAPS AND DATA FURNISHED BY OTHERS, ANY SUCH INFORMATION SHOULD NOT BE CONSTRUED AS ACCURATE OR COMPLETE AND THE CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO CONSTRUCTION.

MANUAL REVISIONS TO THIS DOCUMENT ARE PROHIBITED.
ALL REVISIONS MUST BE PERFORMED ON CADD FILE:
H: \DWG\Streets\Hebron Ave\PW-1205 Hebron Av-New Lndn Tpk Intrsct\Hebron Av - New London Tpke Intersection.dwg

PW-1205

NO.	DESCRIPTION	DATE
	DRAWING ISSUE STATUS	
2.	REMOVE MILL & OVERLAY	2/10/2014
1.	ISSUED FOR CONSTRUCTION	5/30/2013

TOWN OF GLASTONBURY CAD ENGINEERING

SCALE: AS SHOWN	DATE:
DRAWN BY: C.F.S.	1/2/2013
CHECKED BY: S.M.B.	5/30/2013
APPROVED BY: D.A.P.	5/30/2013
ST. FILE:	

DO NOT SCALE THIS DRAWING. USE THE DIMENSIONS GIVEN. IF THERE ARE ANY DISCREPANCIES OR QUESTIONS, CONTACT THE TOWN OF GLASTONBURY, ENGINEERING OFFICE.

GRID NORTH

TOWN OF GLASTONBURY INCORPORATED 1693 CONNECTICUT SEAL

TITLE SHEET
INTERSECTION IMPROVEMENTS
located at
HEBRON AVENUE
and
NEW LONDON TURNPIKE
GLASTONBURY, CONNECTICUT

SHEET NO. 1 OF 25

FILE: H:\DWG\Streets\Hebron Ave\PW-1205 Hebron Av-New Lndn Tpk Intersct\Hebron Av - New London Tpke Intersection.dwg USER: Charles Steinhiper DATE: 2/10/2014

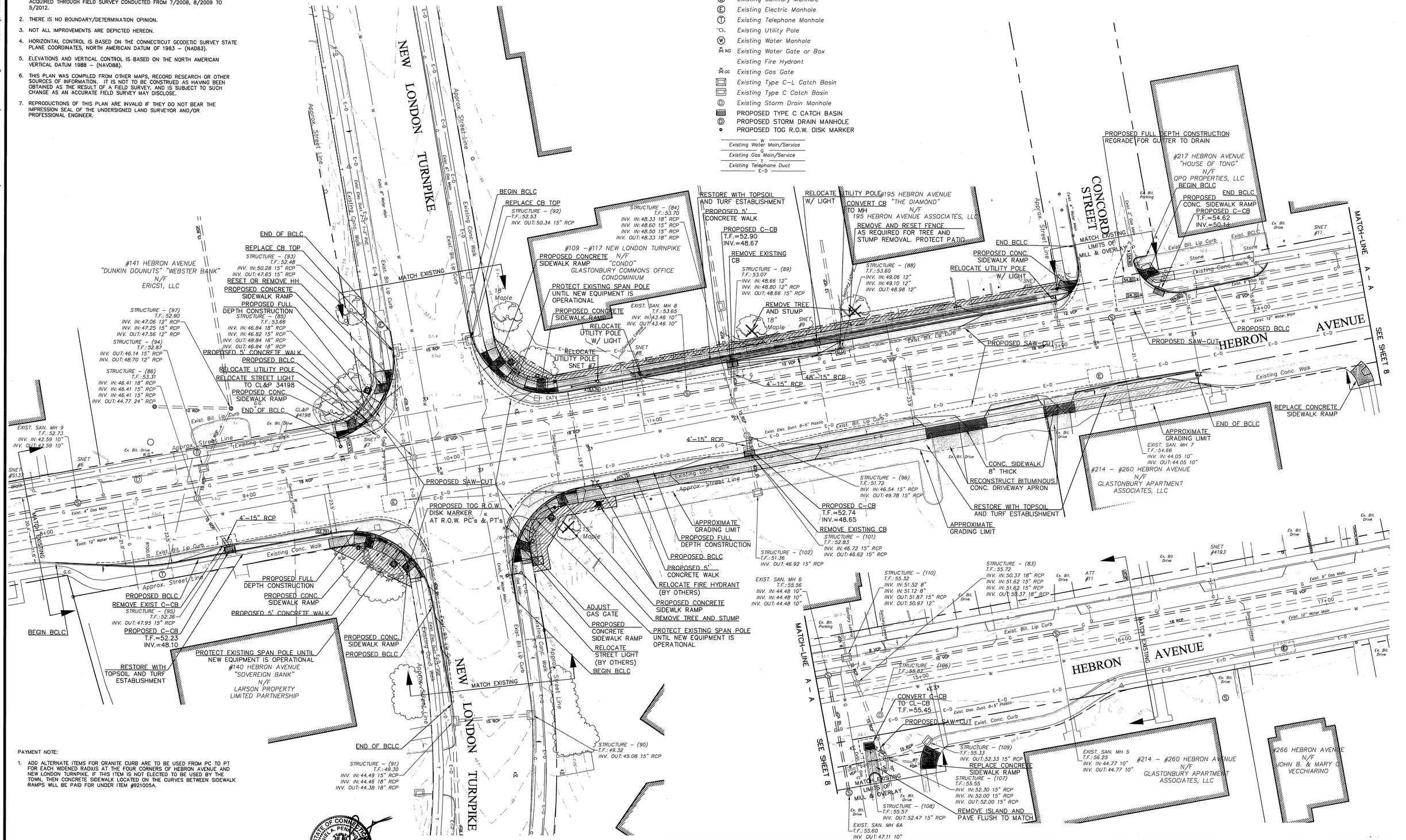
SURVEY NOTE:

1. LOCATION OF FEATURES AND CONTOUR DATA DEPICTED HEREON WHERE ACQUIRED THROUGH FIELD SURVEY CONDUCTED FROM 7/2008, 8/2009 TO 5/2012.
2. THERE IS NO BOUNDARY/DETERMINATION OPINION.
3. NOT ALL IMPROVEMENTS ARE DEPICTED HEREON.
4. HORIZONTAL CONTROL IS BASED ON THE CONNECTICUT GEODETIC SURVEY STATE PLANE COORDINATES, NORTH AMERICAN DATUM OF 1983 – (NAD83).
5. ELEVATIONS AND VERTICAL CONTROL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM 1988 – (NAVD88).
6. THIS PLAN WAS COMPILED FROM OTHER MAPS, RECORD RESEARCH OR OTHER SOURCES OF INFORMATION. IT IS NOT TO BE CONSTRUED AS HAVING BEEN OBTAINED AS THE RESULT OF A FIELD SURVEY, AND IS SUBJECT TO SUCH CHANGE AS AN ACCURATE FIELD SURVEY MAY DISCLOSE.
7. REPRODUCTIONS OF THIS PLAN ARE INVALID IF THEY DO NOT BEAR THE IMPRESSION SEAL OF THE UNDERSIGNED LAND SURVEYOR AND/OR PROFESSIONAL ENGINEER.

LEGEND

- Existing Sanitary Manhole
- Existing Electric Manhole
- Existing Telephone Manhole
- Existing Utility Pole
- Existing Water Manhole
- Existing Water Gate or Box
- Existing Fire Hydrant
- Existing Gas Gate
- Existing Type C–L Catch Basin
- Existing Type C Catch Basin
- Existing Storm Drain Manhole
- PROPOSED TYPE C CATCH BASIN
- PROPOSED STORM DRAIN MANHOLE
- PROPOSED TOG R.O.W. DISK MARKER

W — Existing Water Main/Service
G — Existing Gas Main/Service
T — Existing Telephone Duct
E–D



PAYMENT NOTE:

1. ADD ALTERNATE ITEMS FOR GRANITE CURB ARE TO BE USED FROM PC TO PT FOR EACH WIDENED RADIUS AT THE FOUR CORNERS OF HEBRON AVENUE AND NEW LONDON TURNPIKE. IF THIS ITEM IS NOT ELECTED TO BE USED BY THE TOWN, THEN CONCRETE SIDEWALK LOCATED ON THE CURVES BETWEEN SIDEWALK RAMPS WILL BE PAID FOR UNDER ITEM #921005A.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

IF SCALING FROM THIS PLAN, VERIFY SCALE WITH THE GRAPHIC SCALE PROVIDED ABOVE.

THE LOCATION OF UNDERGROUND UTILITIES DEPICTED HEREON ARE BASED ON FIELD LOCATIONS AND BY INFORMATION PROVIDED BY OTHERS. THEIR TRUE LOCATIONS MAY VARY FROM THOSE INDICATED, AND ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN. IF APPLICABLE UTILIZE THE "CALL BEFORE YOU DIG" NUMBER (1–800–922–4455), TO VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES, AND RESOLVE CONFLICTS PRIOR TO STARTING CONSTRUCTION, REPAIR OR DESIGN.

MANUAL REVISIONS TO THIS DOCUMENT ARE PROHIBITED.
ALL REVISIONS MUST BE PERFORMED ON CADD FILE:
H:\DWG\Streets\Hebron Ave\PW-1205 Hebron Av-New Lndn Tpk Intrsct\Hebron Av – New London Tpke Intersection.dwg

DRAWING ISSUE STATUS		
2.	REMOVE MILL & OVERLAY	2/10/2014
1.	ISSUED FOR CONSTRUCTION	5/30/2013
NO.	DESCRIPTION	DATE

PW-1205

TOWN OF GLASTONBURY ENGINEERING CAD

SCALE: AS SHOWN	DATE:
DRAWN BY: C.F.S.	8/24/2012
CHECKED BY: S.M.B.	5/30/2013
APPROVED BY: D.A.P.	5/30/2013
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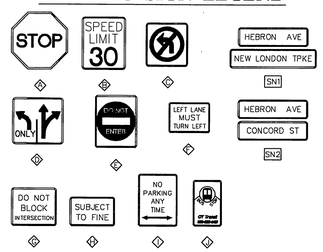
GRID NORTH

TOWN OF GLASTONBURY INCORPORATED 1693 CONNECTICUT

SITE PLAN DEPICTING
ROADWAY IMPROVEMENTS
at the Intersection of
HEBRON AVENUE
and
NEW LONDON TURNPIKE
GLASTONBURY, CONNECTICUT

SHEET NO. 3 OF 25

EXISTING SIGN LEGEND



NOTE:
CONTRACTOR SHALL REMOVE ALL EXISTING SIGNS THAT CONFLICT WITH PROPOSED SIGNS.

LEGEND

- (S) Existing Sanitary Manhole
- (E) Existing Electric Manhole
- (T) Existing Telephone Manhole
- Existing Utility Pole
- (W) Existing Water Manhole
- WG Existing Water Gate or Box
- Existing Fire Hydrant
- GG Existing Gas Gate
- Existing Type C–L Catch Basin
- Existing Type C Catch Basin
- (D) Existing Storm Drain Manhole
- PROPOSED TYPE C CATCH BASIN
- (D) PROPOSED STORM DRAIN MANHOLE
- PROPOSED TOG R.O.W. DISK MARKER

CONSTRUCTION NOTE:

1. REMOVE ALL EXISTING PAVEMENT MARKINGS WITHIN THE PROJECT LIMITS. INSTALL NEW EPOXY RESIN MARKINGS AS SHOWN ON THIS PLAN.

PAVEMENT MARKING ABBREVIATIONS:

DYCL = DOUBLE YELLOW CENTERLINE
SWEL = SOLID WHITE EDGE LINE
SWLL = SOLID WHITE LANE LINE
BWLL = BROKEN WHITE LANE LINE
SYL = SINGLE YELLOW LINE

STATE OF CONNECTICUT — DANIEL A. PENNINGTON — No. 20101 — LICENSED PROFESSIONAL ENGINEER

GRAPHIC SCALE

20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.
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DRAWING ISSUE STATUS		
2.	REMOVE MILL & OVERLAY	2/10/2014
1.	ISSUED FOR CONSTRUCTION	5/30/2013
NO.	DESCRIPTION	DATE

PW-1205

TOWN OF GLASTONBURY — CAD — ENGINEERING

SCALE: AS SHOWN	DATE:
DRAWN BY: C.F.S.	8/24/2012
CHECKED BY: S.M.B.	5/30/2013
APPROVED BY: D.A.P.	5/30/2013
ST. FILE:	

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GRID NORTH

INCORPORATED 1693 — SEAL — GLASTONBURY CONNECTICUT

PAVEMENT MARKING AND SIGNING
INTERSECTION IMPROVEMENTS
at the Intersection of
HEBRON AVENUE
and
NEW LONDON TURNPIKE
GLASTONBURY, CONNECTICUT

SHEET NO. 4 OF 25

		MOVEMENT DIAGRAM								
NONE										
NTOR		PHASE 1	PHASE 2 (PRE-EMPT 2)	PHASE 3	PHASE 4 (PRE-EMPT 1)	PHASE 5	PHASE 6 (PRE-EMPT 2)	PHASE 7	PHASE 8 (PRE-EMPT 1)	PED PHASE

FACE #	FLASH	Ph1 GRN	Ph1 CL	Ph1 CL	Ph2 GRN	Ph2 CL	Ph2 CL	Ph3 GRN	Ph3 CL	Ph3 CL
1	R	← R	◄Y R	R	R	R	R	R	R	R
2	R	R	R	R	G	Y	R	R	R	R
3	R	R	R	R	R	R	R	← R	◄Y R	R
4	R	R	R	R	R	R	R	R	R	R
5	R	R	R	R	G	Y	R	R	R	R
6	R	R	R	R	R	R	R	R	R	R
7	R	R	R	R	R	R	R	R	R	R
9	R	R →	R Y►	R	R	R	R	R	R	R
P	OFF	← DW								
MIN.		5	3	1	7	3	1	5	3	1
MAX.		25	5	3	40	5	3	20	5	3

FACE #	Ph4 GRN	Ph4 CL	Ph4 CL	Ph5 GRN	Ph5 CL	Ph5 CL	Ph6 GRN	Ph6 CL	Ph6 CL
1	R	R	R	R	R	R	G	Y	R
2	R	R	R	R	R	R	R	R	R
3	R	R	R	R	R	R	R	R	R
4	G	Y	R	R	R	R	R	R	R
5	R	R	R	← R	◄Y R	R	R	R	R
6	R	R	R	R	R	R	G	Y	R
7	G	Y	R	R	R	R	R	R	R
9	R	R	R	R	R	R	R	R	R
P	DW								
MIN.	15	3	1	5	3	1	7	3	1
MAX.	50	5	3	20	5	3	50	5	3

FACE #	Ph7 GRN	Ph7 CL	Ph7 CL	Ph8 GRN	Ph8 CL	Ph8 CL	PED GRN	PED CL	PED CL
1	R	R	R	R	R	R	R	R	R
2	R	R	R	R	R	R	R	R	R
3	R	R	R	G	Y	R	R	R	R
4	R	R	R	R	R	R	R	R	R
5	R	R	R	R	R	R	R	R	R
6	R	R	R	R	R	R	R	R	R
7	← R	◄Y R	R	R	R	R	R	R	R
9	R	R	R	G	Y	R	R	R	R
P			→				WØ	← DW	→
MIN.	5	3	1	15	3	1	7/10	4	0.1
MAX.	20	5	3	50	5	3	10/15	4	0.1

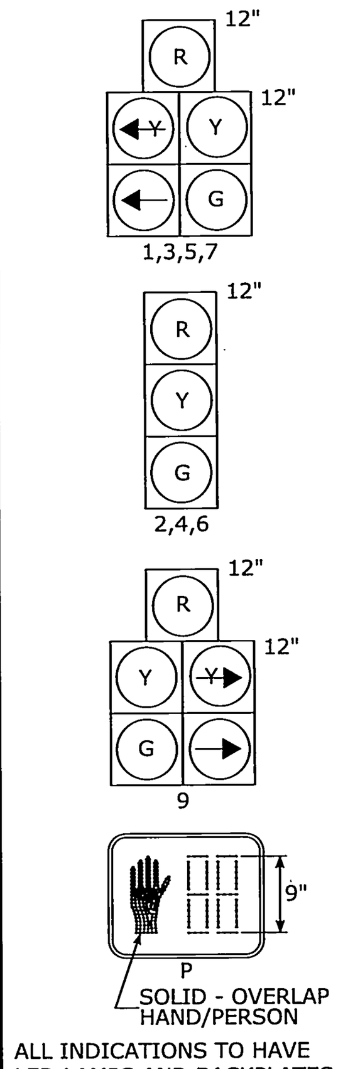
INTERVALS	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6	PHASE 7	PHASE 8	PED PHASE
MIN GRN	5	7	5	15	5	7	5	15	
WALK									7
PED CLR									10
VEH EXT	2	2	2	2	2	2	2	2	
MAX 1	18	26	7	33	5	39	5	35	
MAX 2	13	23	5	32	5	32	5	32	
YELLOW	3	3.6	3	3.6	3	3.6	3	3.6	4.0
RED	1	1	1	1	1	1	1	1	0.1
ADD INIT									
MAX INIT									
TBR									
TTR									
MIN GAP									
MODE	NON-LOCK	NON-LOCK	NON-LOCK	MIN. RECALL	NON-LOCK	NON-LOCK	NON-LOCK	MIN. RECALL	NON-LOCK
INT START				THIS PHASE				THIS PHASE	

ACCESSIBLE PEDESTRIAN SIGNAL

COUNTDOWN PEDESTRIAN SIGNAL

ENERGY BY TOWN	ADDRESS #	INTERSECTION #
MAINT LEVEL	SERVICE POLE #4198	
METERED SERVICE		

SIGNAL FACES



SOLID - OVERLAP HAND/PERSON

ALL INDICATIONS TO HAVE LED LAMPS AND BACKPLATES.

TOWN SIGNAL

OFFICE RECORD

REVISION #

OSTA # 053-1304-01
SIGNAL REVISED
SIGNAL REVISED, NEW EQUIPMENT INSTALLED AND ADDED ACCESSIBLE PEDESTRIAN SIGNAL.

TECHNICAL NOTES (CONTINUED)

PERCUSSIVE TONE ONLY DURING PEDESTRIAN WALK INTERVAL.
MANUAL AND INTERVAL ADVANCE TO BE DISCONNECTED DURING PHASE 9 PEDESTRIAN CLEARANCE INTERVAL.
*ALL ALT. PED. CLR. TIME MUST EQUAL ACTUAL PHASE PED. CLR. TIME.

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING & CONSTRUCTION
DIVISION OF TRAFFIC ENGINEERING

TRAFFIC CONTROL PLAN

TOWN OF GLASTONBURY

HEBRON AVENUE AT
NEW LONDON TURNPIKE

REV #

DETECTORS			
IDENT	SIZE (WXL)	TURNS	MODE
D1	6' X 34'	VIDEO	PRESENCE
D2	6' X 34'	VIDEO	PRESENCE
D3	6' X 34'	VIDEO	PRESENCE
D4	6' X 34'	VIDEO	PRESENCE
D5	6' X 34'	VIDEO	PRESENCE
D6	6' X 34'	VIDEO	PRESENCE
D7	6' X 34'	VIDEO	PRESENCE
D8	18' X 34'	VIDEO	PRESENCE

PROGRAM		
FUNCTION	TIME	DAYS
MAX 1	1100-1300 1500-1800	M-F
MAX 2	ALL OTHER TIMES	
FLASH	FUTURE	

COORDINATION TYPE - NONE												PERMIS PERIOD		SYSTEM LOC
CYCLE	OFFSET		PHASE SPLITS SEC / %											
	SEC	%	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8		Ø	SEC	MASTER

TECHNICAL NOTES

STANDARD OVERLAP SKIP FEATURES APPLY
COUNTDOWN ONLY DURING FLASHING PEDESTRIAN CLEARANCE INTERVAL.
PHASES 1 & 5 TO DRIVE FACES 1 & 5 ◄Y AND ← ONLY.
PHASES 2 & 6 TO DRIVE FACES 1 & 5 R, Y AND G.
PHASES 3 & 7 TO DRIVE FACES 3 & 7 ◄Y AND ← ONLY.
PHASES 4 & 8 TO DRIVE FACES 3 & 7 R, Y AND G.
PRE-EMPTION TO BE INOPERATIVE DURING FLASH OPERATION.
PHASE 2 ON TO OMIT PHASE 1.
PHASE 6 ON TO OMIT PHASE 5.
PHASE 4 ON TO OMIT PHASE 3.
PHASE 8 ON TO OMIT PHASE 7.

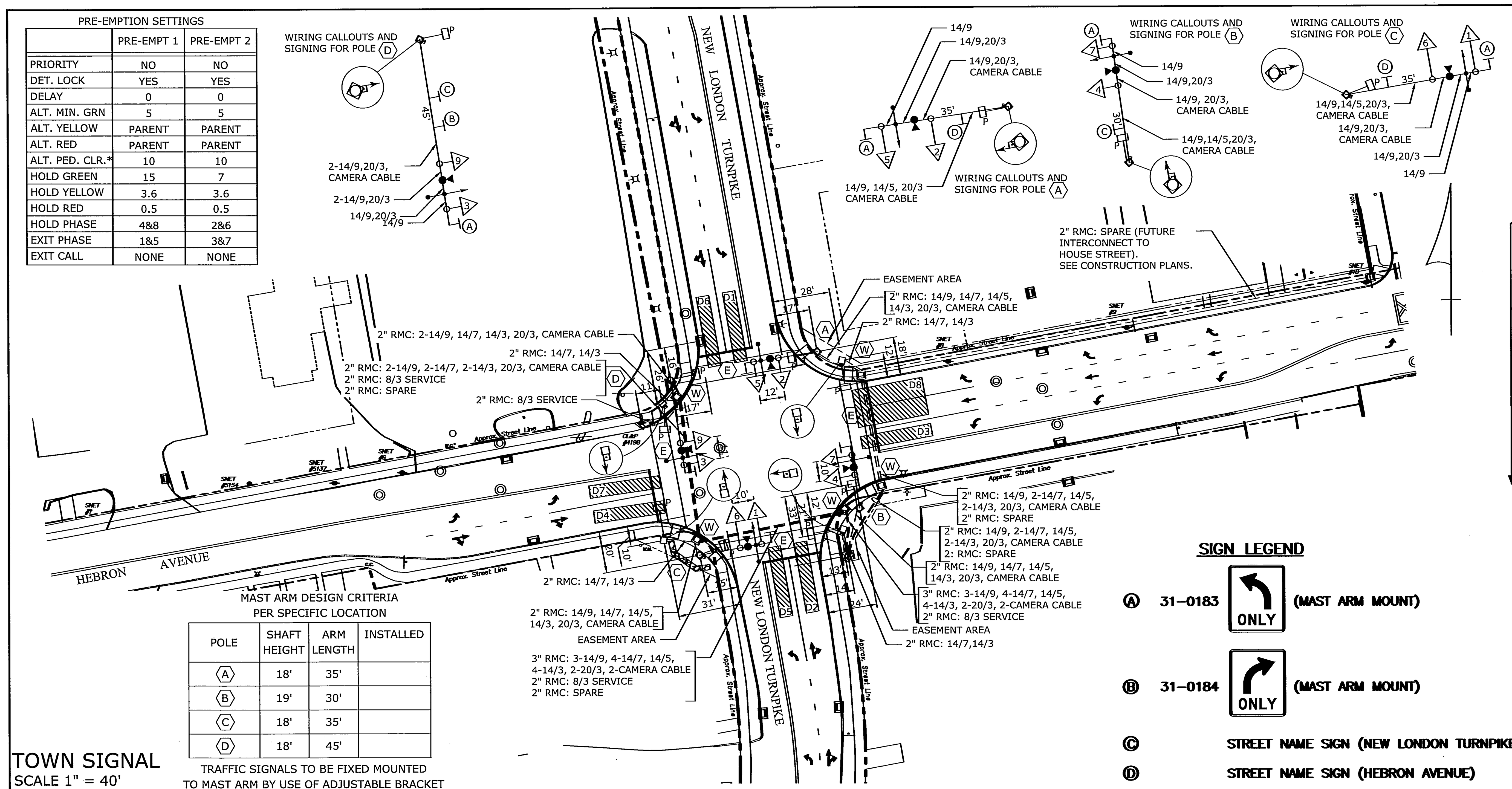
LEGEND:
R RED
Y YELLOW
G GREEN
FL. FLASHING
◄R RED ARROW
◄Y YELLOW ARROW
← GREEN ARROW
WØ WALK/ PED. CLR
D.W. DON'T WALK

STATE OF CONNECTICUT
TED J. DESANTOS
No. 20891
LICENSED PROFESSIONAL ENGINEER

FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

PRE-EMPTION SETTINGS

	PRE-EMPT 1	PRE-EMPT 2
PRIORITY	NO	NO
DET. LOCK	YES	YES
DELAY	0	0
ALT. MIN. GRN	5	5
ALT. YELLOW	PARENT	PARENT
ALT. RED	PARENT	PARENT
ALT. PED. CLR.*	10	10
HOLD GREEN	15	7
HOLD YELLOW	3.6	3.6
HOLD RED	0.5	0.5
HOLD PHASE	4&8	2&6
EXIT PHASE	1&5	3&7
EXIT CALL	NONE	NONE



MAST ARM DESIGN CRITERIA PER SPECIFIC LOCATION

POLE	SHAFT HEIGHT	ARM LENGTH	INSTALLED
⟨A⟩	18'	35'	
⟨B⟩	19'	30'	
⟨C⟩	18'	35'	
⟨D⟩	18'	45'	

TRAFFIC SIGNALS TO BE FIXED MOUNTED TO MAST ARM BY USE OF ADJUSTABLE BRACKET

TOWN SIGNAL

SCALE 1" = 40'

SIGN LEGEND

Ⓐ 31–0183 ONLY (MAST ARM MOUNT)

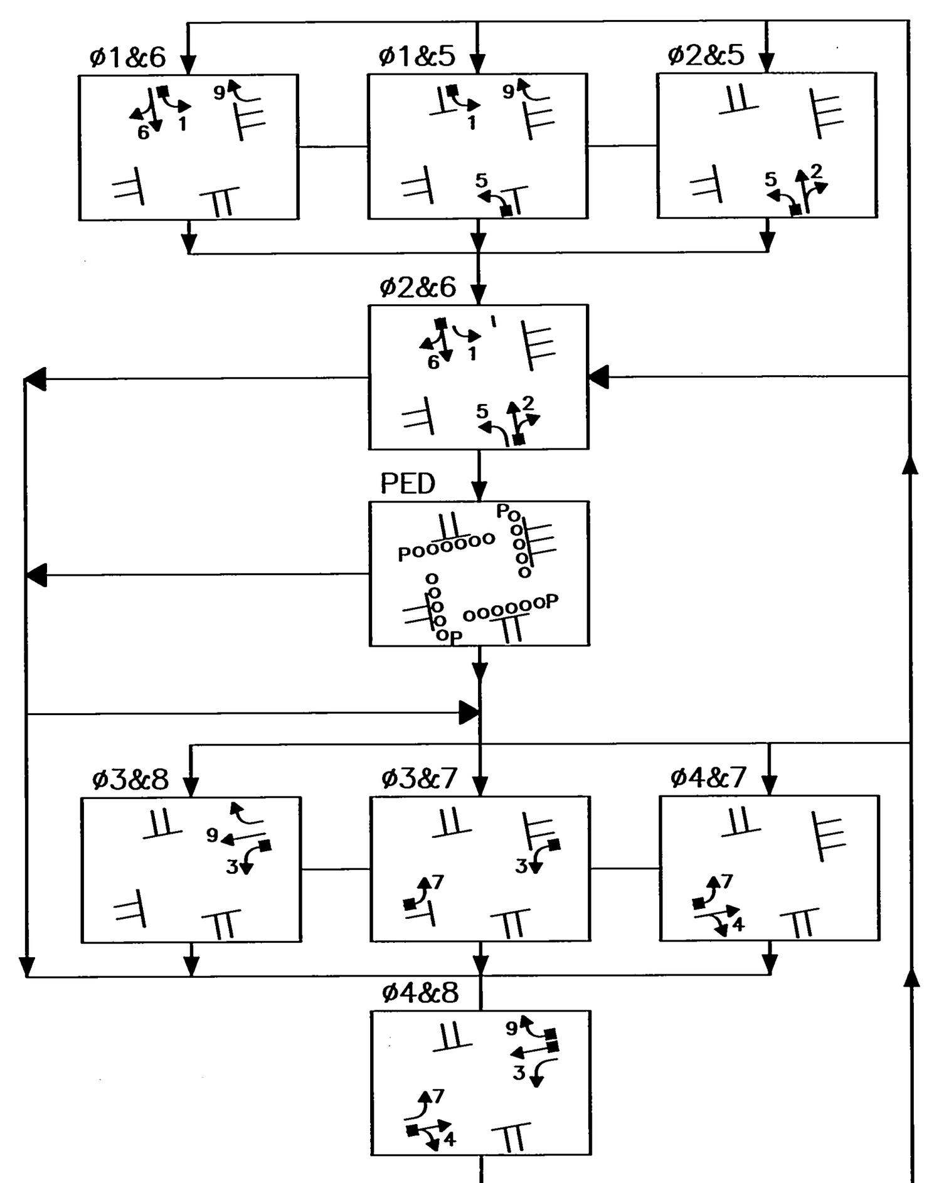
Ⓑ 31–0184 ONLY (MAST ARM MOUNT)

Ⓒ STREET NAME SIGN (NEW LONDON TURNPIKE)

Ⓓ STREET NAME SIGN (HEBRON AVENUE)

REV #	INTERSECTION #

PHASING SEQUENCE



NOTES:

SEE SEPARATE PLAN FOR ADDITIONAL SIGNAGE & PAVEMENT MARKINGS.

TOWN OF GLASTONBURY TO MAINTAIN ALL PAVEMENT MARKINGS, SIGNS, AND PAINT ON SIGNAL EQUIPMENT.

⟨E⟩ BAR TYPE CROSSWALK (16" - 16" X 8')

J:\DWG\P2006\1296\A26\Civil\Signal\20061296A27_TSP01.dwg

O PROPOSED WOOD SPAN POLE	PEDESTRIAN SIGNAL FACE	PROPOSED R.M.C. (RIGID METAL CONDUIT)	VIDEO DETECTOR	SIDEWALK RAMP
● EXISTING WOOD SPAN POLE	DIRECTIONAL ARW. FOR PUSH BUTTON	EXISTING R.M.C. (RIGID METAL CONDUIT)	OPTICAL DETECTOR	SONIC DETECTOR
PROPOSED STEEL SPAN POLE	PROPOSED CONTROLLER	DET. LEADS IN SAW CUT	SD SYSTEM DETECTOR	GUY WIRE
EXISTING STEEL SPAN POLE	TRAFFIC SIGNAL FACE	AUXILIARY TERMINATION CABINET	EXISTING CONTROLLER	LOOP DETECTOR
PROPOSED UTILITY POLE	PEDESTRIAN PUSH BUTTON & SIGN	AUXILIARY EQUIPMENT CABINET	PROPOSED HANDHOLE	MAGNETIC DETECTOR
EXISTING UTILITY POLE	PEDESTAL MOUNTING		EXISTING HANDHOLE	CABLE CLOSURE

DRAWN BY :
DESIGNED BY :
DATE PLOTTED : 8/6/2013

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

TOWN OF GLASTONBURY

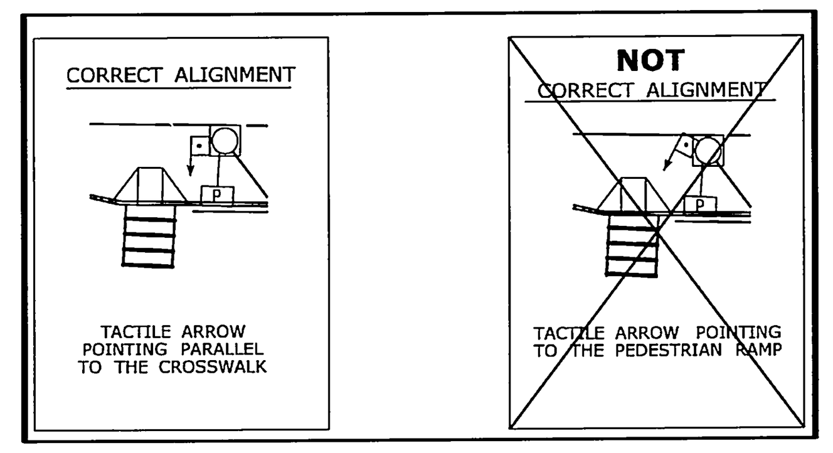
HEBRON AVENUE AT
NEW LONDON TURNPIKE

Border Version 11/08/10

CONSTRUCTION NOTES :

1. ALL TRAFFIC SIGNAL EQUIPMENT IS NEW EXCEPT AS NOTED.
2. ALL MATERIAL AND CONSTRUCTION METHODS SHALL CONFORM TO THE 2009 MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, TOWN OF GLASTONBURY STANDARDS AND THE FOLLOWING CURRENT DOT DOCUMENTS WHICH CAN BE ACCESSED ON THE DOT WEBSITE:
   STANDARD SPECIFICATIONS FOR ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION (FORM 816).
   SUPPLEMENTAL SPECIFICATIONS TO FORM 816.
   SPECIAL PROVISIONS TO FORM 816.
   STANDARD INSTALLATION AND GUIDE DETAIL SHEETS.
3. THE CONTRACTOR SHALL STAKE ALL RIGHT OF WAY AND EASEMENTS PRIOR TO EXCAVATION. ALL WORK, INCLUDING ALL FOUNDATIONS, SHALL BE WITHIN THE ROW OR TOWN ACQUIRED EASEMENTS.
4. UTILITY LOCATIONS ARE FOR INFORMATIONAL PURPOSES ONLY AND SHALL BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT 1–800–922–4455 PRIOR TO COMMENCING CONSTRUCTION. CONTRACTOR SHALL CONTACT UTILITY REPRESENTATIVES AND TOWN AGENCIES FOUR WEEKS PRIOR TO EXCAVATION.
5. THE CONTRACTOR SHALL REMOVE ALL ABANDONED TRAFFIC SIGNAL EQUIPMENT, INCLUDING, BUT NOT LIMITED TO, FOUNDATIONS, HANDHOLES, CONDUIT RISERS AND CABLE, SIGNAL HEADS, AND STEEL POLES. ALL SALVAGEABLE EQUIPMENT SHALL BE RETURNED TO THE TOWN OF GLASTONBURY.
6. THE CONTRACTOR SHALL CONTACT MR. DANIEL PENNINGTON, TOWN OF GLASTONBURY TOWN ENGINEER AT (860) 652–7736 PRIOR TO ANY EXCAVATION AND DELIVERY OF ALL SALVAGE MATERIAL.
7. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY TOWN PERMITS, INCLUDING BUT NOT LIMITED TO: SIDEWALK, CURB, AND ROAD OPENING.
8. ANY PROPOSED REVISIONS TO THE LOCATION OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE TOWN ENGINEER PRIOR TO INSTALLATION.
9. SIGNAL APPURTENANCES, WHEN IN OR ADJACENT TO SIDEWALK, SHALL BE FIELD LOCATED TO PROVIDE A FREE PATH OF NOT LESS THAN 4 FEET. IF A MINIMUM 4 FOOT FREE PATH IS UNAVAILABLE, THE CONTRACTOR MUST CONTACT THE TOWN ENGINEER.
10. ALL SIGNS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT HIS EXPENSE.
11. CONTRACTOR SHALL TRIM ALL NECESSARY BUSHES, SHRUBS, TREES, ETC. OBSTRUCTING ANY TRAFFIC SIGNAL EQUIPMENT OR VISIBILITY OF SIGNAL HEADS.
12. CONTRACTOR SHALL REMOVE ALL EXISTING SIGNS THAT CONFLICT WITH THE PROPOSED SIGNS.
13. OPTICAL DETECTOR LOCATIONS, VIDEO DETECTION CAMERA LOCATIONS, AND DETECTION ZONES ARE FOR ILLUSTRATION ONLY. EXACT LOCATIONS SHALL BE DETERMINED BY THE MANUFACTURER OR THEIR DESIGNATED REPRESENTATIVE. OPTICAL DETECTOR AND VIDEO CABLES ARE TO BE INSTALLED CONTINUOUS BETWEEN EACH VIDEO DETECTION CAMERA AND OPTICAL DETECTOR AND THE SIGNAL CONTROLLER.
14. THE CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS (CURBING, SIDEWALK, ETC.) ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT AND ALSO RECONSTRUCT ALL EXISTING HANDICAP RAMPS AS ADA COMPLIANT RAMPS AS SHOWN ON THE PLANS. SIDEWALKS TO BE REPLACED TO NEAREST JOINT. THE LIMIT OF WORK ASSOCIATED WITH CONSTRUCTION OF SIGNAL EQUIPMENT SHALL BE A MINIMUM OF TEN (10) FEET UNLESS OTHERWISE SPECIFIED.
15. A VERTICAL CLEARANCE OF 16 TO 18 FEET OVER ROADWAY PAVEMENT IS REQUIRED FOR ALL TRAFFIC SIGNAL HEADS.
16. CONTRACTOR TO PROVIDE FOUR SETS OF CABINET WIRING DIAGRAMS IN THE CABINET.
17. CONTRACTOR SHALL COORDINATE WITH UTILITY REPRESENTATIVES TO INSTALL 2" RMC RISER ON CL&P POLE #4198 FOR SERVICE TO THE SIGNAL CONTROLLER CABINET.
18. CABINET DOOR TO OPEN FIELD SIDE.
19. INSTALL CONCRETE SIDEWALK ON CABINET DOOR SIDE OF CONTROLLER FOUNDATION AS SHOWN ON TYPICAL INSTALLATION DETAIL SHEET.
20. CONTRACTOR SHALL MAINTAIN EXISTING SIGNALIZATION DURING CONSTRUCTION.
21. ALL MAST ARMS, SIGNAL HEADS, ATTACHMENT BRACKETS, PEDESTRIAN SIGNAL HEADS, PUSH BUTTON STATIONS, AND CONTROLLER CABINET SHALL BE PAINTED BLACK.
22. INSTALL PEDESTRIAN PUSHBUTTON SIGN NO. 31–0845 ON ALL PEDESTRIAN PUSH BUTTONS.
23. TACTILE ARROWS ON PEDESTRIAN PUSH BUTTONS SHALL BE POINTING PARALLEL TO THE CROSSWALK.
24. UTILITY ENGINEERS CONSULTED DURING DESIGN:
   AT&T: TERRY SHEA (860) 725–1276
   CL&P: JIM KING (860) 638–2320

⟨W⟩ ALL HANDHOLES TO BE TYPE I, 30" X 30".INSTALL HANDHOLES APPROX. 1' BEHIND CURB, UNLESS OTHERWISE SPECIFIED. HANDHOLES CONSTRUCTED IN SIDEWALK OR DRIVEWAY AREAS TO HAVE CAST IRON FRAMES AND COVERS.



NO.	DATE	INIT.	DESCRIPTION
REVISIONS			

REV #

INTERSECTION #

FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

TOWN: GLASTONBURY		PROJECT NO.
		DRAWING NO.
DRAWING TITLE: HEBRON AVENUE AT NEW LONDON TURNPIKE		SHEET NO. 8

ATTACHMENT D – LOCAL ROAD ACCIDENT REDUCTION PROGRAM APPLICATION MATERIALS

Town of Glastonbury

2155 MAIN STREET • P.O. BOX 6523 • GLASTONBURY, CT 06033-6523 • (860) 652-7500
FAX (860) 652-7505

Richard J. Johnson
Town Manager

June 29, 2015

Ms. Jennifer Carrier
Director of Transportation Planning
Capitol Region Council of Governments
241 Main Street
Hartford, CT 06106

Re: 2015 Local Road Accident Reduction Program

Dear Ms. Carrier:

Enclosed please find the Town of Glastonbury's application under the above-referenced program for your review and consideration. The Town is proposing design and construction of a modern round-about at the intersection of House Street and Hebron Avenue in order to eliminate a long-standing motor vehicle safety concern.

After numerous discussions with the Connecticut Department of Transportation and completion of a feasibility study, the Town is confident that implementation of this improvement will provide a measurable decrease in accident rates. Additionally, this proposal is supported by Town policymakers, the Connecticut Department of Transportation, and the local Traffic Authority.

Lastly, the Town understands that the cost of this project well exceeds the $500,000 maximum grant allocation associated with the Local Road Accident Reduction Program. Accordingly, the Town is prepared to fund 100% of project costs above any grant allocation received. The Town appreciates the opportunity to submit this application and looks forward to your evaluation of the proposal.

Please feel free to contact Town Engineer Daniel Pennington at (860) 652-7736 or by email at daniel.pennington@glastonbury-ct.gov should you require any clarification concerning materials submitted.

Sincerely,

Richard J. Johnson
Town Manager

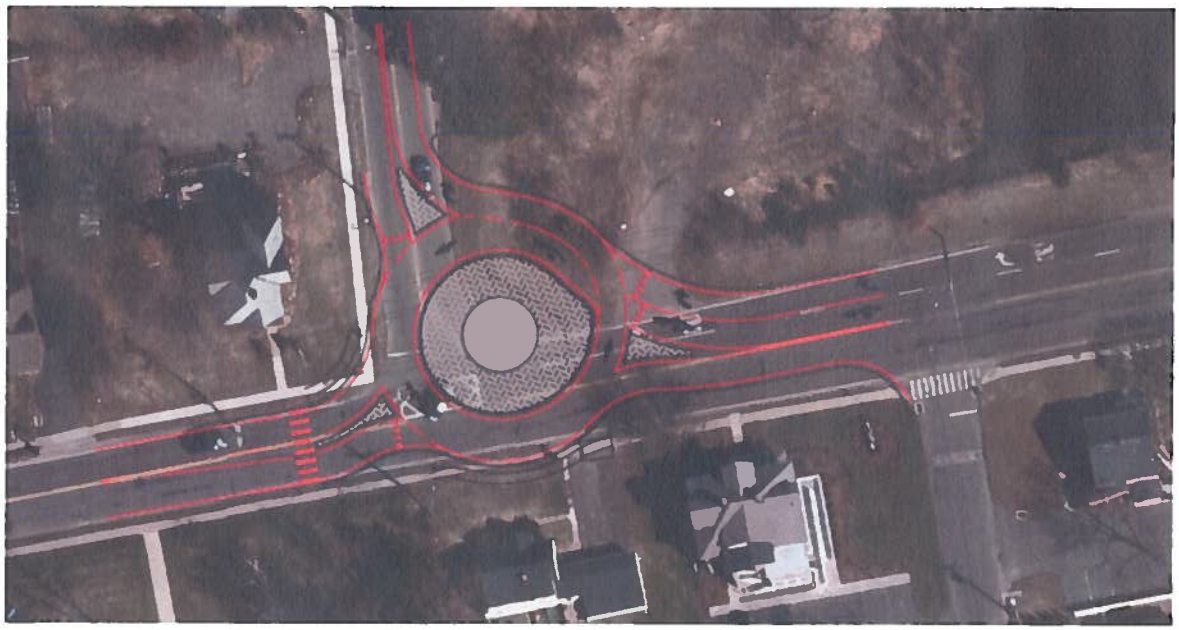
RJJ/ce

Enclosure

cc: Daniel A. Pennington, Town Engineer/Manager of Physical Services

Local Road Accident

Reduction Program



Roundabout at the Intersection of Hebron Avenue

and House Street, Glastonbury , CT

Submitted to:

Capitol Region Council

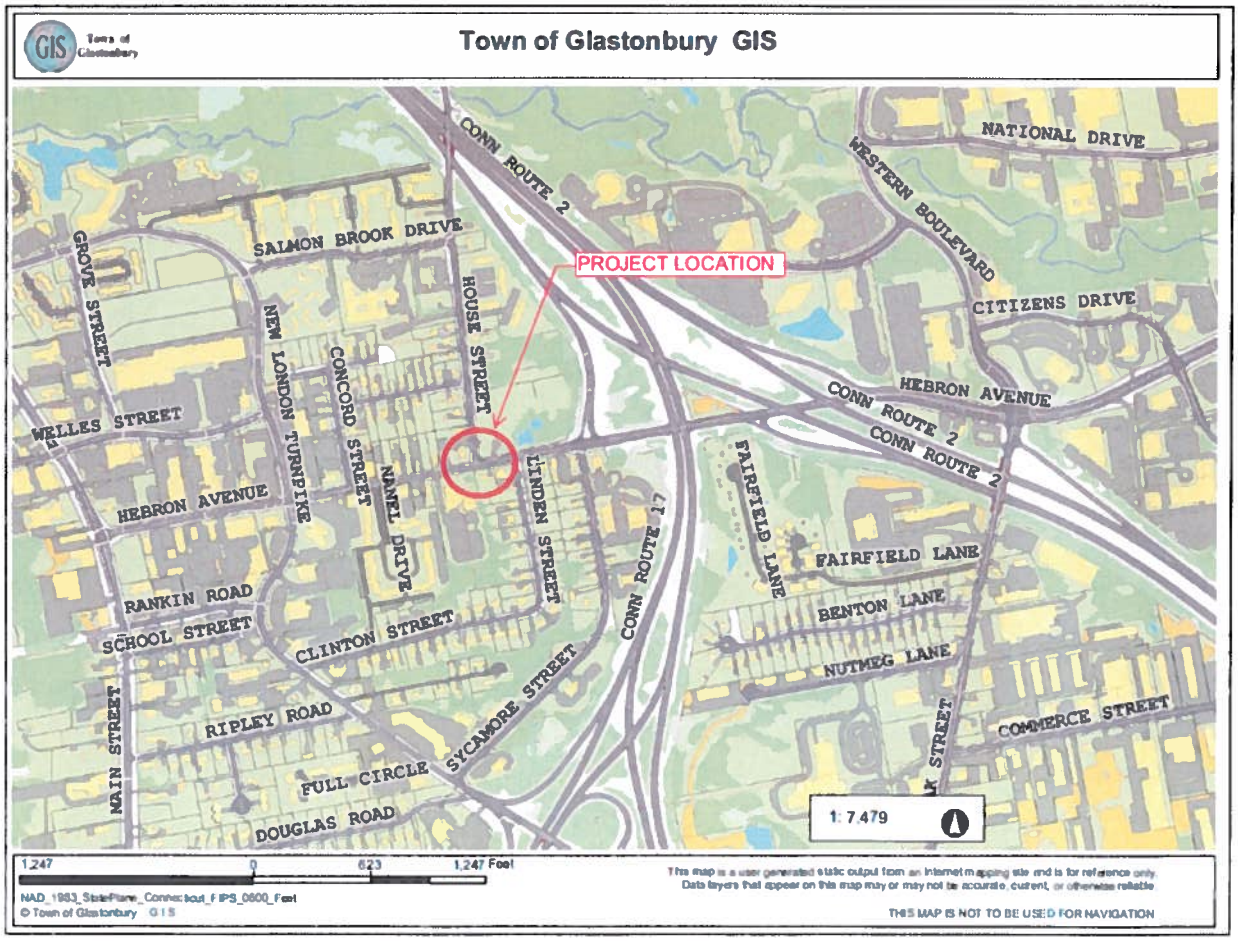
Of Governments by the

Town of Glastonbury

June 2015

1. Introduction

The documentation provided herein is intended to serve as application by the Town of Glastonbury for grant funding consideration under the Connecticut Local Road Accident Reduction Program. The Town's proposal consists of construction of a modern roundabout at the Hebron Avenue/House Street intersection. Motor vehicle accident history at this location clearly demonstrates the existence of a safety problem and the Town's Legal Traffic Authority has deemed resolution to be a high priority. This intersection essentially acts as a gateway to the Town's commercial and retail center from Route 2 and from Route 94. Implementation of the recommended solution is considered essential to motorist safety as commercial development and redevelopment continues to increase west of the intersection.



2. Existing Conditions

The Hebron Avenue/House Street intersection is a non-signalized intersection. Hebron Avenue is classified locally as an urban arterial road with average daily traffic approaching 19,000 vehicles. The intersection is located within 500' of the point at which Hebron Avenue becomes

State Route 94 and is within 600' of the signalized Route 2 east Exit 8 off-ramp interchange. House Street is a local collector roadway with average daily traffic of approximately 4,400 vehicles in the vicinity of the intersection. Left turns from House Street onto Hebron Avenue are of particular concern and collisions involving this movement comprise the majority of accidents. 2014 Peak PM hour left-turn movements number 86 and are opposed by 1,359 vehicles combined in the east and westbound directions on Hebron Avenue. The recent approval of a 145-unit Apartment complex at the northeast corner of the intersection will introduce additional trip generation into each corridor. The westbound Hebron Avenue approach to the intersection is comprised of a two-lane section with one lane dedicated to right-turning vehicles. All other intersectional approaches consist of a single lane.

Looking west on Hebron Ave at House St intersection during peak period

Diagrams depicting traffic volumes at this location and other intersections in the vicinity are provided, along with intersection capacity analysis worksheets in Appendix A. Most significantly, the southbound left-turn movement onto Hebron Avenue operates at a Level of Service E in both the 2016 AM and PM peak period background conditions.

Looking east on Hebron Ave at the House St intersection. Off peak period

The Town is in the process of finalizing plans for a series of improvements that will vastly improve safety and reduce congestion in the Hebron Avenue Corridor. In addition to the roundabout proposal described herein, the Town will be constructing major improvements to the Hebron Avenue/New London Turnpike intersection to the west and will be milling and paving the entire Town-owned portion of Hebron Avenue. Aesthetic streetscape improvements to the western portion of the corridor are also being contemplated.

3. Crash Data and Analysis

Crash data was gathered from the Glastonbury Police Department for the subject intersection. Data was gathered for the past 3+ calendar years (2012-June 2015). The intersection experienced a total of 45 accidents over the past three years. Of these 45 accidents, 20 crashes consisted of right-angle collisions involving vehicles attempting to turn left from House Street onto Hebron Avenue. Copies of relevant accident reports are included in Appendix C.

In previous years, the Town has made several inquiries to the Connecticut Department of Transportation (CONNDOT) regarding signalization of the subject intersection. Most recent discussions of this nature occurred in 2014. CONNDOT has been consistent in its opposition to signal installation at this intersection. All traffic signal installation in the State of Connecticut requires consent of the Office of the State Traffic Administration (OSTA). CONNDOT concerns regarding signal installation center on the belief that said installation will adversely impact the existing State-owned signal to the east at the Route 2 off-ramp/Route 94/Sycamore Street intersection. The distance between intersections is approximately 600'. Conversely, CONNDOT has provided preliminary review and analysis of a roundabout installation at the House Street/Hebron Avenue intersection and has concluded that a roundabout would not interfere with the signal installation and vice versa.

In order to verify the desired operational efficiency and its potential for positive effect on motorist safety, the Town retained the firm of Tighe and Bond to study and model roundabout installation at this intersection and at the Hebron Avenue/New London Turnpike intersection to the west. This report is provided in Appendix B.

4. Proposed Solution and Conclusions

Appendix D includes a conceptual roundabout plan for the subject intersection, along with an associated cost estimate. It is noted that construction of this improvement would require acquisition of a portion of the parcel located on the northeast corner of the intersection. Recent Town Plan and Zoning Commission approval of the development proposal for this parcel included a condition of approval that requires conveyance to the Town the area necessary for construction. The Developer has agreed to this condition and the conveyance is expected to be executed shortly.

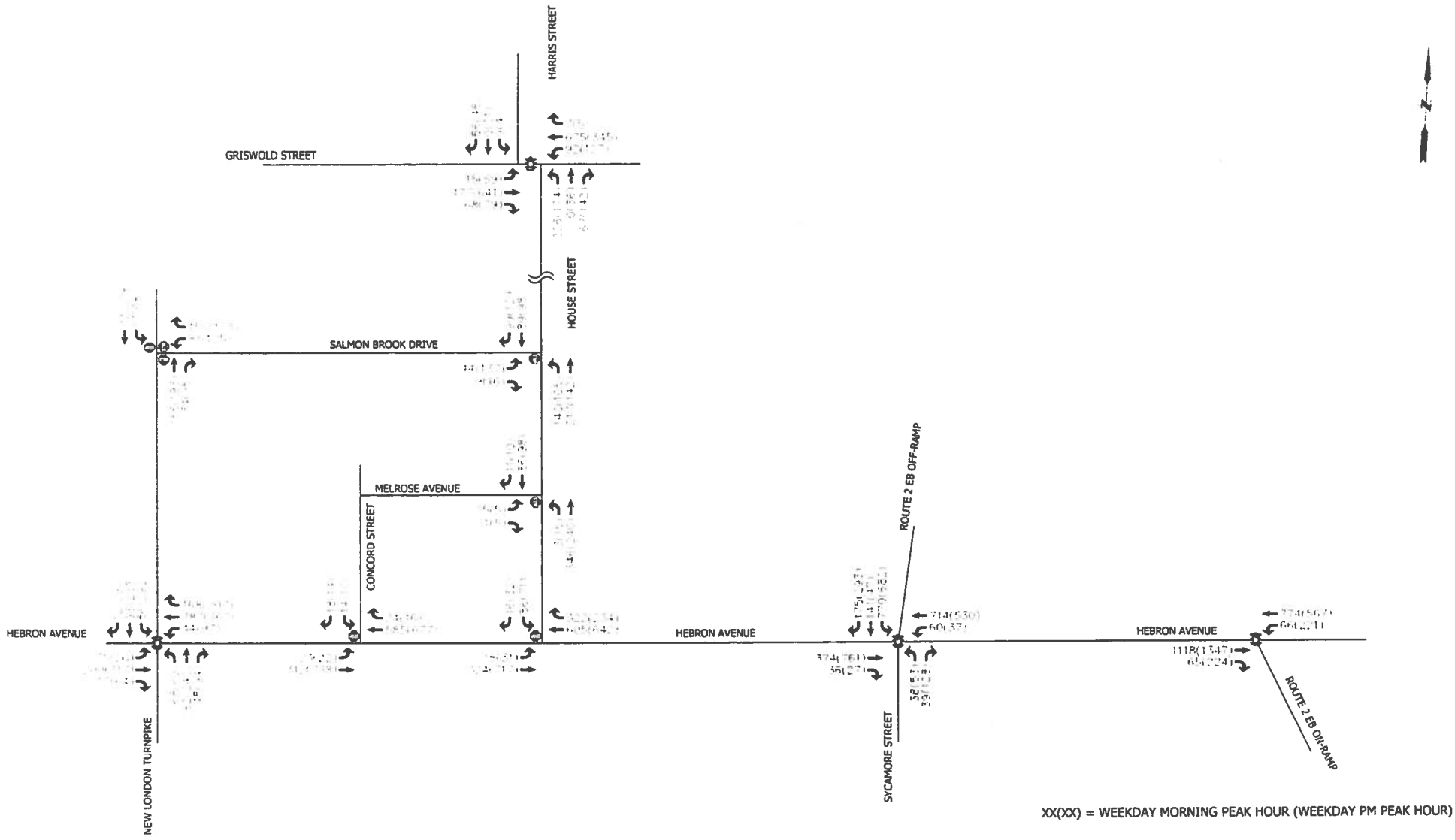
The recommended roundabout solution consists of single-lane approaches in the southbound and eastbound directions. A two-lane approach with a dedicated right-turn lane is proposed for the westbound approach due to high right-turn volumes and in order to ensure that westbound queues do not extend to the Route 2 off-ramp/Route 94 intersection to the east. Industry standard models were used to calculate resulting levels of service and peak hour queue lengths. An inscribed circle diameter of 116' is proposed, with a mountable center apron that will accommodate WB-62 type trucks.

Numerous Federal Highway Administration and Institute for Highway Safety studies have concluded that roundabouts dramatically reduce motor vehicle accidents as compared to signalized intersections. In this instance, the subject intersection does not have the benefit of a traffic signal. Thus, intersectional safety would be expected to improve to an even greater degree. In addition, roundabouts have been shown to also dramatically reduce the number and severity of vehicle vs. pedestrian collisions, and this type of traffic management device essentially eliminates pedestrian fatalities. These facts are of considerable importance given the

recent local regulatory approval of the 145-unit residential apartment complex located on the northeast corner of the intersection. The Town is confident that the proposed roundabout solution will resolve long-standing motor vehicle accident problems while simultaneously providing for pedestrian safety.

Appendix A

Traffic Volumes and Capacity Analysis



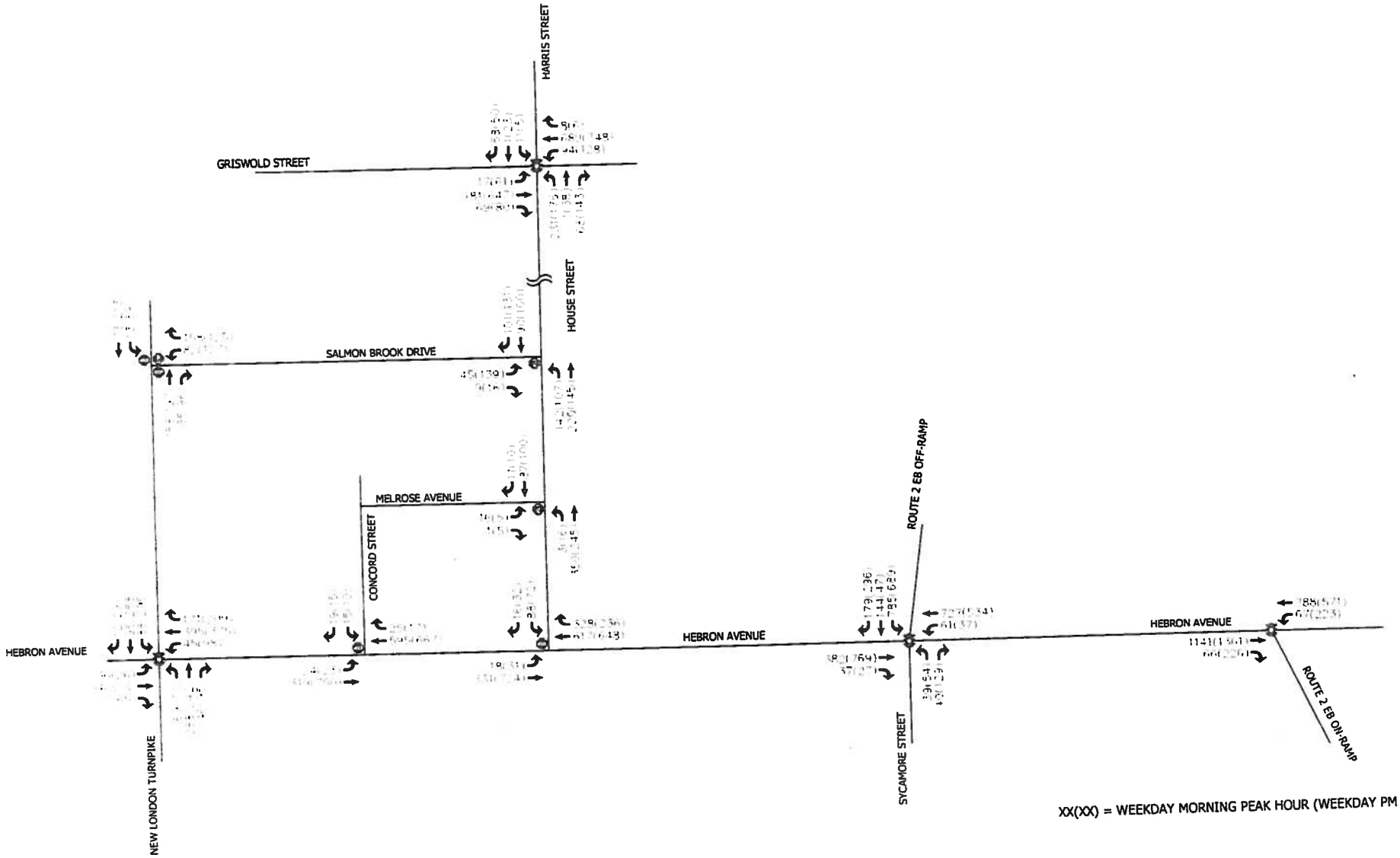
FUSS & O'NEILL

FIGURE 2: 2014 EXISTING CONDITION

PROJ. NO: 20140114.A10

GLASTONBURY MEWS

MAY 2015



FUSS & O'NEILL

FIGURE 3: BACKGROUND 2016 CONDITIONS

PROJ. NO: 20140114.A10

GLASTONBURY MEWS

MAY 2

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	31	724	648	236	72	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.959	
Flt Protected		0.998			0.966	
Satd. Flow (prot)	0	1859	1863	1583	1726	0
Flt Permitted		0.998			0.966	
Satd. Flow (perm)	0	1859	1863	1583	1726	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		681	599		365	
Travel Time (s)		15.5	13.6		8.3	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.86	0.86
Adj. Flow (vph)	35	823	704	257	84	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	858	704	257	121	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 75.9% ICU Level of Service D
Analysis Period (min) 15

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	31	724	648	236	72	32
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.86	0.86
Hourly flow rate (vph)	35	823	704	257	84	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		997	599			
pX, platoon unblocked	0.82				0.83	0.82
vC, conflicting volume	961				1598	704
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	844				1137	532
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				52	92
cM capacity (veh/h)	651				176	450

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	858	704	257	121
Volume Left	35	0	0	84
Volume Right	0	0	257	37
cSH	651	1700	1700	216
Volume to Capacity	0.05	0.41	0.15	0.56
Queue Length 95th (ft)	4	0	0	76
Control Delay (s)	1.5	0.0	0.0	40.9
Lane LOS	A			E
Approach Delay (s)	1.5	0.0		40.9
Approach LOS				E

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	18	331	617	328	88	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850	0.979	
Flt Protected		0.997			0.959	
Satd. Flow (prot)	0	1857	1863	1583	1749	0
Flt Permitted		0.997			0.959	
Satd. Flow (perm)	0	1857	1863	1583	1749	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		681	599		393	
Travel Time (s)		15.5	13.6		8.9	
Peak Hour Factor	0.95	0.95	0.84	0.84	0.95	0.95
Adj. Flow (vph)	19	348	735	390	93	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	367	735	390	110	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 45.4% ICU Level of Service A
Analysis Period (min) 15

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	331	617	328	88	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.84	0.84	0.95	0.95
Hourly flow rate (vph)	19	348	735	390	93	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		997	599			
pX, platoon unblocked	0.74				0.74	0.74
vC, conflicting volume	1125				1121	735
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	996				990	470
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				53	96
cM capacity (veh/h)	517				196	441

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	367	735	390	109
Volume Left	19	0	0	93
Volume Right	0	0	390	17
cSH	517	1700	1700	214
Volume to Capacity	0.04	0.43	0.23	0.51
Queue Length 95th (ft)	3	0	0	65
Control Delay (s)	1.2	0.0	0.0	38.2
Lane LOS	A			E
Approach Delay (s)	1.2	0.0		38.2
Approach LOS				E

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

Concept Plan and Cost Estimate

6/9/2015

Proposed Roundabout
at Hebron Avenue / House Street Intersection
Conceptual Cost Estimate

Line No.	ITEM DESCRIPTION	UNIT	EST QTY	ITEM PRICE	EXT
1	Earth Excavation	CY	5,500	$ 20.00	$ 110,000.00
2	Formation of Subgrade	SY	2,000	$ 2.00	$ 4,000.00
3	Processed Stone Base	CY	560	$ 35.00	$ 19,600.00
4	HMA S0.50	TN	345	$ 115.00	$ 39,675.00
5	HMA S1.0	TN	690	$ 120.00	$ 82,800.00
6	Material for Tackcoat	Gal	200	$ 7.50	$ 1,500.00
7	Fine Milling (0-4")	SY	400	$ 8.00	$ 3,200.00
8	15" R.C. Pipe	LF	570	$ 70.00	$ 39,900.00
9	Type "C" Catch Basin	EA	6	$ 3,000.00	$ 18,000.00
10	Storm Manhole	EA	1	$ 3,000.00	$ 3,000.00
11	Replace Catch Basin Top	EA	2	$ 750.00	$ 1,500.00
12	Reset Manhole Top	EA	2	$ 750.00	$ 1,500.00
13	Curved Granite Stone Curbing (6" x 18")	LF	1,200	$ 75.00	$ 90,000.00
14	Bit Conc Lip Curb	LF	200	$ 6.00	$ 1,200.00
15	Concrete Sidewalk	SF	1,000	$ 10.00	$ 10,000.00
16	Concrete Sidewalk - 8" Thick	SF	200	$ 12.00	$ 2,400.00
17	Concrete Sidewalk Ramp	EA	4	$ 1,500.00	$ 6,000.00
18	Stamped Concrete Island	SF	3,100	$ 30.00	$ 93,000.00
19	Segmental Retaining Wall	SF	420	$ 50.00	$ 21,000.00
20	Bituminous Concrete Driveway	SY	100	$ 40.00	$ 4,000.00
21	Grading and Topsoiling	SY	1,200	$ 6.00	$ 7,200.00
22	Turf Establishment	SY	1,200	$ 2.00	$ 2,400.00
23	4" White Epoxy Resin Pavement Markings	LF	3,000	$ 1.50	$ 4,500.00
24	4" Yellow Epoxy Resin Pavement Marking	LF	3,000	$ 1.50	$ 4,500.00
25	Epoxy Resin Pavement Marking Sym. & Legends	SF	800	$ 4.00	$ 3,200.00
26	Sign Face Sheet Aluminum Type 3 Refl Sheeting	SF	600	$ 50.00	$ 30,000.00
27	Construction Signs Bright Flourescent Sheeting	SF	500	$ 25.00	$ 12,500.00
	SUBTOTAL OF ITEMS				$ 616,575
	LUMP SUM ITEMS				
28	Clearing and Grubbing	LS	1	5.0%	$ 30,829
29	Maintenance and Protection of Traffic	LS	1	6.0%	$ 36,995
30	Trafficperson (Flagger or Police)	HR	2800	$ 65.00	$ 182,000
31	Construction Staking	LS	1	3.0%	$ 18,497
32	Mobilization	LS	1	7.0%	$ 43,160
33	Minor Items	LS	1	25.0%	$ 154,144
	SUBTOTAL OF LUMP ITEMS				$ 465,625
	SUBTOTAL				$ 1,082,000
	CONTINGENCIES			10%	$ 108,000
	INCIDENTALS			30%	$ 325,000
	CONSTRUCTION TOTAL				$ 1,515,000