

DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY MEETING

Meeting Location – Community Services Center

2074 Aurelius Road, Holt, MI

Tuesday, April 24, 2018

7:00 p.m.

AGENDA

Call to Order

Pledge of Allegiance

Roll Call

Comments from the Public

ANYONE WISHING TO COMMENT ON ANY MATTER NOT ON THE AGENDA MAY DO SO AT THIS TIME. PERSONS ADDRESSING THE BOARD MUST STATE THEIR NAME AND ADDRESS FOR THE RECORD AND WILL BE GIVEN FOUR (4) MINUTES.

Set/Adjust Agenda

Approval of Minutes: Regular Meeting of March 27, 2018

Business

1. Realize Cedar Inter-Agency Agreement
2. Bid Results and Recommendation: Realize Cedar Construction
3. HRC Proposal for Professional Engineering Services – Cedar Street: Aurelius to Willoughby
4. Resolution No. 2018-002: Sale of 2313 Cedar Street
5. Reimburse Costs of Improvement – Esker Square
6. 2017 Holt Farmers Market Annual Report

Late Agenda Item

7.

Reports

8. Executive Director
9. Farmers Market
10. Marketing Committee
11. Planning Commission
12. Supervisor
13. Treasurer
14. Members

Limited Comments

MEMBERS OF THE PUBLIC MAY TAKE THE OPPORTUNITY TO ADDRESS THE BOARD REGARDING ANY ITEM ON THE AGENDA AT THE TIME SUCH ITEM IS OPEN FOR DISCUSSION BY THE BOARD. ANYONE WISHING TO COMMENT ON ANY MATTER NOT ON THE AGENDA MAY DO SO AT THIS TIME.

Adjournment

**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY BOARD
MINUTES OF REGULAR MEETING HELD ON MARCH 27, 2018**

The Downtown Development Authority met Tuesday, March 27, 2018 in a regular meeting at the Community Services Center, 2074 Aurelius Road, Holt, Michigan. Chairperson Leighton called the meeting to order at 7:00 p.m. The Pledge of Allegiance was recited.

MEMBERS PRESENT: Tim Fauser, John Hayhoe, Brian Houser, David Leighton, Steven L. Marvin, Nanette Miller, Tonia Olson

MEMBERS ABSENT: Harry Ammon, Kim Cosgrove

OTHERS PRESENT: Lori Underhill, DDA Deputy Director

PUBLIC COMMENT: Mike Hamilton, 4541 Sycamore, spoke about adding streetlights to Cedar Street between Aurelius and Willoughby Roads.

SET/ADJUST AGENDA

Late Agenda Item Added: 4410 Holt Road HVAC Proposal

APPROVAL OF MINUTES

Miller moved, Fauser supported, to approve the regular meeting minutes of February 20, 2018.

A Voice Poll Vote was recorded as follows: All Ayes
Absent: Ammon, Cosgrove, Olson

MOTION CARRIED

Tonia Olson entered the meeting at 7:06 p.m.

BUSINESS

HRC REALIZE CEDAR CORRIDOR REDESIGN PHASE II ENGINEERING PROPOSAL – AMENDMENT 1

Fauser moved, Leighton supported, to approve Amendment 1 to the Proposal for Professional Engineering Services for the Realize Cedar Street Corridor Redesign Phase II from Hubbell, Roth & Clark, Inc. in the amount of \$52,000.

Todd Sneathen, Project Manager for Realize Cedar, Hubbell, Roth & Clark, Inc. was present to explain the need to amend the Phase II Redesign Proposal. He also informed the Board that the Ingham County Road Department would be providing funding to repave an additional section of Cedar Street (Aurelius to Willoughby Roads) at no cost to the Township. This announcement resulted in a short delay to the bid award for the Realize Cedar project, as they will be conducted concurrently.

A Roll Call Vote was recorded as:

Ayes: Fauser, Hayhoe, Houser, Leighton, Marvin, Miller

Abstain: Olson

Absent: Ammon, Cosgrove

MOTION CARRIED

SUBJECT TO APPROVAL

**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY BOARD
MINUTES OF REGULAR MEETING HELD ON MARCH 27, 2018**

HRC REALIZE CEDAR CONSTRUCTION ENGINEERING SERVICES PROPOSAL

Leighton moved, Olson supported, to approve the Proposal for Construction Engineering Services for the Realize Cedar Project from Hubbell, Roth & Clark, Inc. in the amount of \$738,000.

Mr. Sneathen, Hubbell, Roth & Clark, Inc. reviewed the highlights of the proposal. \$738,000 represents approximately 14% of an estimated \$5.5M construction budget. The bid opening is scheduled for April 13, 2018 and will be awarded at the April 24, 2018 DDA Board meeting. Ms. Miller asked how residents and business owners would be informed about the construction project and lane closures. Mr. Sneathen replied that this project will utilize multiple forms of communication with residents and business owners – individual mailings, signage, website, and social media. Everyone is encouraged to seek out www.realizecedar.com in addition to the Realize Cedar Facebook and Instagram pages for up to the minute construction information.

A Roll Call Vote was recorded as:

Ayes: Fauser, Hayhoe, Houser, Leighton, Marvin, Miller, Olson

Absent: Ammon, Cosgrove

MOTION CARRIED

LATE AGENDA ITEM: 4410 HOLT ROAD HVAC

Fauser moved, Leighton supported, to approve the proposal for replacing the heating and cooling system for 4410 Holt Road from Doty Mechanical, Inc. in the amount of \$29,635.00.

Deputy Director Lori Underhill reviewed her memorandum dated March 26, 2018 detailing the need to replace the current HVAC system.

A Roll Call Vote was recorded as:

Ayes: Fauser, Hayhoe, Houser, Leighton, Marvin, Miller, Olson

Absent: Ammon, Cosgrove

MOTION CARRIED

REPORTS

Deputy Director

Ms. Underhill reported that the DDA has verbally accepted an offer on 2313 Cedar Street. The Purchase Agreement and Resolution will be presented at the April meeting. A potential user is looking at 2361 Cedar. There is also renewed interest in the acreage at Holt and Holloway Drive. In each instance, the users will return the properties to the tax roll and address environmental concerns, where indicated. Board members are invited to attend a Press Conference for the Realize Cedar Project on Thursday, March 29 at 10:00 a.m. at Township Hall. Construction is progressing nicely at 4410 Holt Road. The Realize Cedar website (www.realizecedar.com) and Facebook page are up and running. Everyone is encouraged to check in for construction updates. A Michigan Department of Environmental Quality grant application was submitted for the Esker Square property.

**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY BOARD
MINUTES OF REGULAR MEETING HELD ON MARCH 27, 2018**

Farmers Market

Ms. Underhill reported that the Farmers Market applied for a Community Foundation Impact Grant to construct a commercial kitchen. We were invited to submit our application in the final round. The Holt Lions Club will be selling Easter flowers at the Market this weekend. A Customer Appreciation Day is scheduled for April 21st, commemorating the 10th Anniversary of Holt Farmers Market.

Advertising & Marketing Committee

There was no report.

Planning Commission

Ms. Olson reported that the Planning Commission met to discuss the DNR building on Legacy Parkway.

Supervisor

Supervisor Hayhoe reported on various ribbon cutting ceremonies for local businesses. He also reported on the Aspen Lakes, Willoughby Estates, and Prestwick Village construction.

Treasurer

There was no report.

Members

None.

Limited Comments

Mike Hamilton, 4541 Sycamore, commented that the Township website needed updating with regards to the Realize Cedar project.

ADJOURNMENT

The meeting was adjourned at 7:46 p.m.

Nanette Miller, Secretary

/lau

SUBJECT TO APPROVAL



**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**
2045 NORTH CEDAR STREET, SUITE 2
TELEPHONE (517) 699-3866
FACSIMILE (517) 699-3878
www.delhidda.com

Date: April 18, 2018

To: DDA Board Members

From: C. Howard Haas, Executive Director

Re: Realize Cedar Inter-Agency Agreement

At its April 17, 2018 meeting, the Delhi Township Board of Trustees approved an Inter-Agency Agreement for Realize Cedar Street Project Holt to Aurelius Roads. Realize Cedar differs from other road construction projects due to its additional improvements such as sidewalks, landscaping, street furniture, trees, and on-street parking places. This Agreement stipulates that the Ingham County Road Department will maintain the road itself and the Township, through the DDA, will maintain the non-road amenities. The Township Attorney has worked with Ingham County to draft the attached Agreement in a manner that accurately captures our shared intent. I therefore offer the following motion:

I move to approve the Inter-Agency Agreement for Realize Cedar Street Project, Holt to Aurelius Roads, between Delhi Charter Township, the Delhi Downtown Development Authority and the Ingham County Road Department.



MEMORANDUM

TO: John B. Elsinga, Township Manager

FROM: Tracy L.C. Miller, Director of Community Development

DATE: April 13, 2018

RE: Inter-Agency Agreement

One of the final steps before beginning full implementation of the Realize Cedar project is the approval and execution of an Inter-Agency Agreement between the Ingham County Road Department (ICRD), Delhi Township and our Downtown Development Authority (DDA). We commonly enter into inter-agency agreements with the ICRD. This typically occurs when we do projects within the road right-of-way, or when the ICRD is acting in its capacity as the authorized public agency to facilitate our use of grant funds.

In this case, the inter-agency agreement pertains to the Realize Cedar project. The agreement has already been approved by the County and is now ready for our signatures. They have asked that, because funding for the Realize Cedar project will come from the DDA, that the DDA be party to the agreement also. The DDA Board will take action on the agreement at their April 24th meeting.

This agreement is necessary because we will be working within the ICRD's road right-of-way and installing improvements there. It authorizes the work the DDA will be doing and outlines each entities' responsibilities. You will recall from previous discussions that, while they are willing to permit it, the ICRD does not want responsibility for maintaining the "non-road" improvements such as sidewalks, landscaping, street furniture, trees and on street parking spaces. This is a reasonable and fair expectation since these improvements are outside of their normal operations and responsibilities. The inter-agency agreement stipulates that they will maintain the road itself, but that the Township (through our DDA) will be responsible for maintenance of the "non-road" amenities. The agreement also memorializes that the DDA will complete all the construction work and that qualified engineers and construction contractors will be engaged for the work.

Over the past several months, our Township Attorney has worked with the County to draft this agreement in a manner that accurately captures our shared intent. I've attached a letter from Mr. Revore for your information. If you have any questions or need additional details, please don't hesitate to ask. Otherwise, I would ask that you forward this to the Township Board for their action on April 17th. The Township Board should authorize you to sign on behalf of the Township. This agreement must be executed quickly to ensure an on-time project start and avoid delays. Thank you in advance.

Recommended Motion on Next Page.

Recommended Motion:

To approve the Inter-Agency Agreement for Realize Cedar Street Project, Holt to Aurelius Roads, between Delhi Charter Township, the Delhi Downtown Development Authority and the Ingham County Road Department.

BAUCKHAM, SPARKS, THALL, SEEGER & KAUFMAN, P.C.
ATTORNEYS AT LAW
836 CENTENNIAL WAY, SUITE 170
LANSING, MICHIGAN 48917

TELEPHONE (517) 993-6686
FAX (517) 993-5628
www.michigantownshiplaw.com

ROBERT E. THALL
ROXANNE C. SEEGER
CATHERINE P. KAUFMAN
DAVID M. REVORE
T. SETH KOCHES
LORI COATES HAY
ROBERT J. ROBINSON
AMANDA K. TOMICH

JOHN H. BAUCKHAM
1923 – 2015

HARRY F. SMITH
1906 – 1972

OF COUNSEL
KENNETH C. SPARKS
MICHAEL D. SCHLACK

April 12, 2018

Tracy L.C. Miller, Director
Department of Community Development
Delhi Charter Township
2074 Aurelius Rd.
Holt MI 48842

Via email delivery only:
Tracy.Miller@delhitownship.com

**Re: INTER-AGENCY AGREEMENT FOR REALIZE CEDAR STREET PROJECT
HOLT TO AURELIUS ROADS
(a.k.a. Delhi Charter Township and Ingham County Road Department
Agreement (“Agreement”) for Realize Cedar Street Project (the “PROJECT”))**

Dear Tracy:

I write to provide information about the Project Agreement. Briefly, the Project is the redevelopment of the Holt central business district with reconstruction of Cedar Street, between Holt and Aurelius Roads, to include on-street parallel parking, bicycle lanes, mid-block cross-walks, sidewalk reconstruction with Americans with Disability Act (ADA) required upgrades, new public lighting, street trees and other plantings, and other street furnishings and amenities within the affected public road rights of way (“ROW”); this is known as the “Realize Cedar Street Project” (the “PROJECT”).

The Project requires a permit(s) from the Ingham County Road Commission (“ICRD”). The permit process required extensive ICRD review of the Project plans and specifications. As part of this process, ICRD requires an agreement between relevant Project municipal entities distinguishing the Project’s responsibilities and jurisdiction per entity. Parties include Delhi Charter Township and the Downtown Development Authority (collectively, “Delhi”) and the County of Ingham (collectively the “Parties”).

Accordingly, representatives from Delhi Charter Township and ICRD, and their respective counsel, met on January 25, 2018 and April 4, 2018, to discuss and prepare terms for an agreement. After discussion and negotiation, on Thursday, April 12, 2018, a proposed “final draft” was received from the ICRD attorney, who also advised that the County had approved the Agreement (in substantial form). Now, the County seeks approval from Delhi.

Tracy L.C. Miller, Director
April 12, 2018
Page 2 of 2

The Agreement provides for a brief overview of the Project, and includes the terms of the Parties' responsibilities, including construction, maintenance, and compliance with Project documents, jurisdiction and permits, and liability, among other terms. (See enclosed Agreement.¹) Delhi agrees to fund the Project and provide maintenance for parking and non-road amenities, ensure qualified contractors, and appoint a licensed professional Engineer for the Project.

Due to the length of the Agreement, seven pages, I will not repeat the terms, but enclose for review; and acceptance if no further revisions are desired.

Thank you for allowing us to serve the Charter Township of Delhi and the Downtown Development Authority.

Very truly yours,

**BAUCKHAM SPARKS, THALL, SEEGER &
KAUFMAN, P.C.**

David M. Revore

DMR
Enclosures

¹ The Agreement incorporates Realize Cedar Planning Documents (Agreement, Attachment A) and the Cedar Street Traffic Analysis, prepared by Hubbell, Roth & Clark, Inc., (Agreement, Attachment B). Due to the size of the Agreement's Attachments, such are referenced and included in our email delivery.

**INTER-AGENCY AGREEMENT
FOR
REALIZE CEDAR STREET PROJECT
HOLT TO AURELIUS ROADS**

THIS AGREEMENT is made and entered into this ____ day of _____, 2018 between the **CHARTER TOWNSHIP OF DELHI**, Ingham County, Michigan (the “TOWNSHIP”) a municipal corporation organized and existing under the laws of the State of Michigan, the **DELHI DOWNTOWN DEVELOPMENT AUTHORITY** (the “DDA”) (collectively the TOWNSHIP and DDA will be referred to as “DELHI”) and the **COUNTY OF INGHAM**, a municipal corporation and political subdivision of the State of Michigan (the “COUNTY”) acting on behalf of the **INGHAM COUNTY ROAD DEPARTMENT** (the “ROAD DEPARTMENT”).

W I T N E S S E T H

WHEREAS, DELHI having conducted an extensive public input process desires to redevelop its Holt central business district and to support this redevelopment with reconstruction of Cedar Street, between Holt and Aurelius Roads, to include on-street parallel parking, bicycle lanes, mid-block cross-walks, sidewalk reconstruction with Americans with Disability Act (ADA) required upgrades, new public lighting, street trees and other plantings, and other street furnishings and amenities within the affected public road rights of way (“ROW”), known as the Realize Cedar Street Project (the “PROJECT”);

WHEREAS, DELHI, using their personnel and that of their design and construction consultant, Hubbell, Roth & Clark, Inc., desires to design, construct, and maintain certain parts of the reconstructed Cedar Street, between Holt and Aurelius Roads, entirely at DELHI’s cost, for use by the general public; and

WHEREAS, the parties hereto desire to enter into this Agreement to delineate the responsibilities for construction and maintenance for the PROJECT.

NOW, THEREFORE, FOR AND IN CONSIDERATION OF THE MUTUAL COVENANTS HEREINAFTER CONTAINED, IT IS AGREED AS FOLLOWS:

1. DELHI’S PROJECT RESPONSIBILITIES.

DELHI agrees to fund the entire cost of PROJECT and to perform, or cause to be performed, each of the following at DELHI’s expense:

- A. PROJECT Plans, Cost Estimates and Specifications. A description of the PROJECT is set forth in Chapter 3 of the Realize Cedar Planning Document prepared by DELHI’s planning consultant McKenna Associates (**Attachment A**), and justification of the roadway cross-section redesign is set forth in the Cedar Street Traffic Analysis prepared by Hubbell, Roth &

Clark, Inc., (**Attachment B**) copies of which are attached and incorporated by reference into this Agreement and made a part of this Agreement. DELHI shall prepare the construction plans, cost estimates, and specifications governing the construction of the PROJECT, which must be reviewed by the ROAD DEPARTMENT.

- B. Project Engineer. DELHI shall appoint a licensed professional Project Engineer for the PROJECT, and said Project Engineer shall act as the engineer of record for the design and construction of the PROJECT.
- C. Construction Responsibilities. DELHI shall employ a qualified Contractor as required for the PROJECT specifications for the type and scope of work to be performed on the PROJECT. Upon receipt of written Permit from the ROAD DEPARTMENT, DELHI shall cause the Contractor to commence and complete the construction of the PROJECT within a reasonable amount of time reflective of the PROJECT scope as required by the Permit. DELHI shall be responsible for ensuring that the PROJECT's contractor provides all labor, materials, machinery, tools, debris removal, water, heat, utilities, transportation and other facilities and services for the proper execution and completion of the PROJECT. All work and materials shall be in substantial compliance with the plans and specifications reviewed by the ROAD DEPARTMENT, and shall be of good quality and workmanship. DELHI shall, if required by the ROAD DEPARTMENT, furnish satisfactory evidence as to kind and quality of materials.
- D. Compliance With Hubbell, Roth & Clark, Inc., Plan and Construction Specifications. DELHI shall comply with all applicable and appropriate MDOT, FHWA, ADA, NACTO and AASHTO standards, and federal and state statutes, rules and regulations, as specified within the Hubbell, Roth & Clark, Inc., Plan and construction documents.
- E. Construction Administration. DELHI shall fully administer and be responsible for the construction of the PROJECT, complying with all ROAD DEPARTMENT requirements. General duties of DELHI shall include, but are not limited to:
 - 1.) Fulfill all requirements of this Agreement;
 - 2.) Provide qualified full time inspection of the PROJECT construction work;
 - 3.) Arrange and obtain all required materials testing for the PROJECT;
 - 4.) Record the work, including force account quantities, on the appropriate inspectors' daily reports;
 - 5.) Prepare pay estimates, contract modifications and support documents; and

- 6.) Provide all close-out material and support at PROJECT's completion including complete and accurate 22" x 34" reproducible as-built drawings and electronic files thereof as required by the ROAD DEPARTMENT.

F. PROJECT Maintenance and Operation. DELHI shall maintain those items of the PROJECT under its jurisdiction and/or that DELHI has agreed to maintain, such as on-street parallel parking, bicycle lanes, sidewalks, new public lighting, street trees and other plantings, keeping these items reasonably safe, clean, esthetically pleasing, operational and in good condition, including if ever necessary, removal and/or replacement of the PROJECT's on-street parallel parking bays, sidewalks, roadside plantings, roadside lighting, furnishings and amenities. Mid-block cross-walk(s) and related signs, markings, and active warning devices will be maintained by ROAD DEPARTMENT with costs to be paid by DELHI. DELHI also agrees that it shall be solely responsible for any and all energy and maintenance costs of the mid-block cross-walk active warning devices and roadside lighting. DELHI also agrees to perform all necessary winter maintenance and debris removal (routine maintenance) for the aforementioned PROJECT parking bays, sidewalks, and roadside amenities, as requested by the ROAD DEPARTMENT. DELHI also understands that it shall be solely responsible for any future reconstruction, rehabilitation, and/or heavy maintenance of the aforementioned PROJECT parking bays, sidewalks, and roadside amenities, that are at any time deemed ineligible for federal and/or state funding or aid.

The ROAD DEPARTMENT, by the COUNTY's executing this Agreement, and the ROAD DEPARTMENT's rendering service pursuant to this Agreement, has not and does not assume jurisdiction over the PROJECT's on-street parallel parking bays, sidewalks, other roadside plantings, furnishings, lighting, and amenities. Mid-block cross-walk and related signs and active warning devices will be maintained by the ROAD DEPARTMENT with costs to be paid by DELHI. Exclusive jurisdiction for the maintenance and use of the items listed above, for the purposes defined under Michigan Law for a highway rests solely with DELHI. DELHI shall be responsible for all costs and future maintenance, including if ever necessary, removal and/or replacement, of the PROJECT items, identified as on-street parallel parking, bicycle lanes, sidewalks, new public lighting, street trees and other plantings, and other street furnishings and amenities within the affected public road rights of way; unless the COUNTY or ROAD DEPARTMENT receives federal or state funding that would include maintenance and/or upgrades to these PROJECT items.

- G. Payment of Fines. DELHI and/or their Project Engineer, and/or Contractor, as applicable, will be responsible for any and all fines that may be levied by any regulatory agencies relating to the PROJECT's construction activities.
- H. Responsibility for Costs Associated with Removal and Relocation of Enhancements. Should safety concerns and/or road improvements require removal and/or relocation of some or all the PROJECTS items identified as on-street parallel parking, bicycle lanes, sidewalks, new public lighting, street trees and other plantings, and other street furnishings and amenities within the affected public road rights of way constructed within the ROAD DEPARTMENT's public road right-of-way, DELHI shall pay all costs associated with said removal and relocation.
- I. Insurance. DELHI shall maintain appropriate general liability insurance, workers' compensation insurance, automobile insurance, and professional liability insurance for the duration of this Agreement and will provide a copy of the policy limits and certificates of insurance upon request of the ROAD DEPARTMENT.

2. RESPONSIBILITIES OF ROAD DEPARTMENT.

- A. Project Permit Administration and Oversight. The ROAD DEPARTMENT shall generally oversee the Contractor permit and related activities, as is typical of all ROAD DEPARTMENT permits.
- B. Exclusive jurisdiction for the use of the highway or public right-of-way within the PROJECT, for the purposes defined under Michigan Law for a highway remains with the ROAD DEPARTMENT.

3. JURISDICTION OVER PROJECT. Any and all reviews of and recommendations regarding contracts, agreements, permits, plans, specifications or documents, of any nature, or any inspections of work by the ROAD DEPARTMENT and its agents pursuant to the terms of this Agreement are done to assist DELHI in meeting applicable guidelines. Such reviews, inspections and recommendations by the ROAD DEPARTMENT and its agents shall not relieve DELHI of its ultimate control and responsibility for the PROJECT and shall not be construed as a warranty of its propriety or that the ROAD DEPARTMENT is assuming any liability, control or jurisdiction of any portion of the PROJECT under DELHI'S control.

When providing reviews and recommendations under this Agreement, the ROAD DEPARTMENT is performing a governmental function, as that term is defined in MCL 691.1401; MSA 3.996(101), which is incidental to the completion of the PROJECT.

4. PERMITS. DELHI's Contractor shall obtain a permit from the ROAD DEPARTMENT for, and prior to starting work on, this PROJECT. The ROAD DEPARTMENT

will issue a permit to construct within the public road right-of-way, based on DELHI's prepared and ROAD DEPARTMENT reviewed drawings.

5. CIVIL RIGHTS. The parties mutually agree to adhere to all applicable Federal, State and local laws and regulations prohibiting discrimination. The parties further agree that they shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms and conditions or privileges of employment, or a matter directly or indirectly related to employment because of race, color, religion, national origin, age, sex, sexual orientation, gender identity, political affiliation or beliefs, disability which is unrelated to the individual's ability to perform the duties of a particular job or position, height, weight or marital status. A breach of this covenant shall be regarded as a material breach of this Agreement.

6. LIABILITY.

- A. All liability to third parties, loss or damage as a result of claims, demands, costs, or judgments arising out of activities to be carried out by DELHI in the performance of this Agreement shall be the responsibility of DELHI, and not the responsibility of the COUNTY or ROAD DEPARTMENT, if the liability, loss, or damage is caused by, or arises out of, the actions or failure to act on the part of DELHI, anyone directly or indirectly employed by DELHI, provided that nothing herein shall be construed as a waiver of any governmental immunity that has been provided to DELHI or its employees by statutes or court decisions.
- B. All liability to third parties, loss or damage as a result of claims, demands, costs, or judgments arising out of activities to be carried out by the ROAD DEPARTMENT in the performance of this Agreement shall be the responsibility of the COUNTY and not the responsibility of DELHI if the liability, loss, or damage is caused by, or arises out of, the action or failure to act on the part of any COUNTY employee or agent, provided that nothing herein shall be construed as a waiver of any governmental immunity by the COUNTY and ROAD DEPARTMENT or the COUNTY's employees as provided by statutes or court decisions.
- C. In the event that liability to third parties, loss or damage arises as a result of activities conducted jointly by the ROAD DEPARTMENT and DELHI in fulfillment of their responsibilities under this Agreement, such liability, loss, or damage shall be borne by the COUNTY and DELHI in relation to each party's responsibilities under these joint activities provided that nothing herein shall be construed as a waiver of any governmental immunity by the COUNTY, the ROAD DEPARTMENT, DELHI or their employees, respectively, as provided by statutes or court decisions.

7. WORKERS' COMPENSATION INSURANCE. Both the COUNTY and DELHI shall carry Workers' Compensation Insurance coverage for their employees, as required

by law, and DELHI shall require any and all consultants, contractors or sub-contractors working on the PROJECT to do the same.

8. WAIVERS. No failure or delay on the part of either of the parties to this Agreement in exercising any right, power or privilege hereunder shall operate as a waiver thereof, nor shall a single or partial exercise of any right, power or privilege preclude any other or further exercise of any other right, power or privilege.

9. AMENDMENTS. All modifications to this Agreement must be in writing, mutually agreed upon by DELHI and the COUNTY, and signed by their duly authorized representatives.

10. TERM OF AGREEMENT. This Agreement shall become effective on the date in which it has been fully executed by the authorized representatives of both the COUNTY and DELHI. DELHI shall not commence the construction phase of the PROJECT until it has received a proper right-of-way permit for the PROJECT's construction from the ROAD DEPARTMENT. This Agreement, unless terminated as set forth in Section 11, shall remain in effect until the completion of the PROJECT, or in perpetuity as applicable per sections 1.F, 1.H, 2.B, 3, 6, and 8.

11. TERMINATION OF AGREEMENT. This Agreement may be terminated by the COUNTY for cause if DELHI breaches any of the terms of this Agreement and fails to cure said breach within thirty (30) days after receipt of notice thereof from the ROAD DEPARTMENT. However Sections 1.F, 1.H, 2.B, 3, 6, and 8 of this Agreement will remain in effect for perpetuity should the applicable items of the PROJECT be completed.

12. PURPOSE OF SECTION TITLES. The titles of the sections set forth in this Agreement are inserted for the convenience of reference only and shall be disregarded when construing or interpreting any of the provisions of this Agreement.

13. COMPLETE AGREEMENT. This Agreement and its Attachments A and B contain all of the terms and conditions agreed upon by the parties hereto and no other agreements, oral or otherwise, regarding the subject matter of this Agreement or any part thereof shall have any validity or bind any of the parties hereto.

14. NON-BENEFICIARY CONTRACT. This Agreement is not intended to be a third party beneficiary contract and confers no rights on anyone other than the parties hereto.

15. SURVIVAL CLAUSE. All rights, duties, and responsibilities of any of the parties to this Agreement that either expressly or by their nature extend into the future, including, but not limited to, maintenance of the PROJECT after all construction work has been completed and Section 6, Liability, shall extend beyond and survive the end of the term or termination of this Agreement.

16. SEVERABILITY. If any part of this Agreement is found by a Court or Tribunal of competent jurisdiction to be invalid, unconstitutional or beyond the authority of either party to

enter into or carry out, such part shall be deemed deleted and shall not affect the validity of the remainder of this Agreement which shall continue in full force and effect. If the removal of such provision would result in the illegality and/or unenforceability of this Agreement, this Agreement shall terminate as of the date in which the provision was found invalid, unconstitutional or beyond the authority of the parties.

17. CERTIFICATION OF AUTHORITY TO SIGN AGREEMENT. The people signing this Agreement on behalf of the parties hereto certify by their signatures that they are duly authorized to sign on behalf of said parties and that this Agreement has been authorized by said parties.

THE AUTHORIZED REPRESENTATIVES OF THE PARTIES HAVE FULLY EXECUTED THIS INTER-AGENCY AGREEMENT FOR THE DELHI CHARTER TOWNSHIP DDA REALIZE CEDAR STREET PROJECT ON THE DAY AND YEAR FIRST ABOVE WRITTEN.

COUNTY OF INGHAM

By: _____
Carol Koenig, Chairperson
County Board of Commissioners

_____ Date

CHARTER TOWNSHIP OF DELHI

By: _____
John Elsinga, Township Manager

_____ Date

**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**

By: _____
C. Howard Hass, Executive Director

_____ Date

APPROVED AS TO FORM
FOR COUNTY OF INGHAM
COHL, STOKER & TOSKEY, P.C.

By: _____
Mattis D. Nordfjord, Esq.

ATTACHMENT A

Connectivity Framework

REALIZE **CED**R URBAN DESIGN FRAMEWORK

3

Acknowledgments

Steering Committee

Tracy Miller — Delhi Township Community Development Director
Howard Haas — Delhi Township DDA Executive Director
Jon Harmon — Delhi Township Board Trustee
Evan Hope — Delhi Township Clerk
David Leighton — DDA, Leightronix
Steve Warfield — Cedar Street Resident
Jamie Burton, PE — Hubbell, Roth, & Clark

Board of Trustees

C.J. Davis — Supervisor
Evan Hope — Clerk
Roy Sweet — Treasurer
Jon Harmon — Trustee
John Hayhoe — Trustee
Megan Ketchum — Trustee
DiAnne Warfield — Trustee
John Elsinga — Township Manager

Planning Commission

Ken O'Hara — Chairperson
Matthew Lincoln — Vice Chairperson
Tonia Olson — Secretary
Jon Harmon — Township Board Liaison
Kimberly Berry-Smokoski
Rita Craig
Michael Goodall
Donald Leaf
Elizabeth Zietlow

Downtown Development Authority

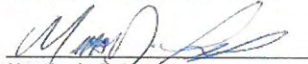
C.J. Davis — Township Supervisor
Harry Ammon
Kimberlyn Cosgrove
Hugh (Tim) Fauser
Brian Houser
David Leighton
Steven L. Marvin
Nanette Miller
Tonia Olson

Consultant Team

Phillip C. McKenna, AICP — President, McKenna Associates
John R. Jackson, AICP — Executive Vice President
Paul Lippens, AICP — Principal Planner, Project Manager
Steven Wiltse, AICP — Associate Planner
Stephen Hannon — Assistant Planner
Sabah Aboody-Keer — GIS Designer
Carrie Leitner — Graphic Designer
Kacy Smith — Administrative Assistant

Marc R. Russell, LLA — Principal Landscape Architect
Maudie Smith — Landscape Architect
Michael A. Campbell, RA, PLC — Architect

*This Plan Approved by the Delhi Charter Township
Planning Commission on October 24, 2016.*



*Matt Lincoln, Chairperson
Delhi Charter Township Planning Commission*



*Kimberly Berry-Smokoski, Secretary
Delhi Charter Township Planning Commission*

3

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3.1 Complete Streets

Complete Streets are designed and operated to improve safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a Complete Street.

On June 19, 2012 the Township adopted a Complete Streets Ordinance. The Complete Streets Ordinance demonstrates that elected officials and decision makers are dedicated to improving multimodal access to all residents. Creating the Ordinance required the coordination and input of multiple jurisdictions, including the Ingham County Road Department, as well as the dedication of Township planning and engineering staff.

The recommendations to increase connectivity along Cedar Street are consistent with the Township's Complete Streets Ordinance, as follows.

- **Public Process:** Significant public engagement was conducted and substantial need for pedestrian and bicycle improvements was expressed. This need will be addressed through reconfiguring the Cedar Street roadway to support new development, a 4-3 lane conversion, and an enhanced streetscape.
- **Evaluation:** Data collected, including 2016 traffic counts for Cedar Street of 10,550 cars per day, indicate that vehicle impacts, if any, can be mitigated with signal timing improvements or use of alternate routes. Pedestrian and bicycle accommodations and safety will be significantly improved.
- **Exceptions Not Warranted:** Cedar Street does not qualify for an exception to the Complete Streets Ordinance. The modifications recommended in the Realize Cedar Urban Design Framework will be financially, geometrically, operationally, and physically feasible.

The Realize Cedar Urban Design Framework, is an adopted subcomponent of the Township Master Plan and the non-motorized recommendations supplant the Township Non-Motorized Plan.

Resolution of Support

The Delhi Township Planning Commission, in recommending the adoption of this plan, effectively passes a resolution of support for a roadway reconfiguration project on Cedar Street and the creation of an active and walkable district. This action is consistent with the Federal Highway Administration's (FHWA) recommended best practices for the implementation of Road Diets.

Pedestrian First Mode Hierarchy

The Realize Cedar Urban Design Framework adopts a pedestrian-first mode hierarchy. This mode hierarchy shall be used to evaluate design objectives throughout project design, construction, and maintenance and shall take precedence in the consideration of geometric optimization and traffic operations.

Unless otherwise noted, the mode hierarchy assignment shall be pedestrian > bicycle > vehicle > transit, to inform a continuum of design considerations. All modes should be considered to ensure Cedar is a Complete Street. However, reconfiguration may force trade-offs between competing priorities.

Mode Hierarchy

Mode hierarchy shows how a community chooses which users of the road take precedence when designing a roadway and a complete network prioritizes the safety of vulnerable road users





3.2 Street Typology

The design of Cedar Street's roadway and streetscape—the public realm—utilizes a roadway's design context approach to integrating user needs with land use transitions, called *Street Typology*. A focus on roadway characteristics, such as traffic volume, speed and functional classification, is less effective at achieving a complete network than a contextual approach based on people and places.

Each Street Typology noted below has its own particular feel and role to play within the transportation and land use systems. Currently, the corridor has developed haphazardly and without a cohesive vision and areas blend together without intentional urban design. However, there are common elements between segments to build upon, like the Township's standard street lamp, similarity of building types and setbacks, and consistency in the desired land use patterns.

Exceptions to the desired land form in each area can detract from the overall user experience. To address this, key places along the corridor are prioritized for reinvestment and design transitions between street types. While elements like landscaping and identity signs are recommended to be consistently utilized along Cedar Street, areas like the Farmer's Market Node and the Downtown Node are recommended for more substantial investments in on-street parking, hardscaping, street furniture and off-street parking. In the minds of visitors and residents alike Cedar Street will have entrances to each distinct area, a central district, and a unified character.

Street Typologies

The Street types recommended are Core Street, Cottage Retail Street, Community Avenue, Commercial Boulevard, and Commercial Parkway.

- **Core Street:** Corresponds to locations intended to become the central places in Delhi Township, centered on the Farmer's Market and Downtown Holt nodes.
- **Cottage Retail Street:** Corresponds to the area between the two Core Street areas, centering on Veterans Memorial Gardens and the Sam Corey Senior Center.
- **Community Avenue:** The Community Avenue is a transitional typology between the two Commercial Boulevard Areas located to the north and south of the Community Activity Center Future Land Use designation. The Community Avenue is designed to become the entrance to the proposed three-lane segment of Cedar.
- **Commercial Boulevard:** The area north of Fay Street and south of Dallas, which will be designed to continue support of vehicle-oriented commercial business, but with aesthetic enhancements and complete streets elements.
- **Commercial Parkway:** Corresponds to the area south of the Holbrook roundabout, which is largely rural and industrial in character. Identity enhancements and landscaping to unify the Cedar Street corridor are recommended.









Transition Elements

Transitions elements are recommended to be installed at changes in the street typologies. These locations are important places to provide visual cues to denote the change in roadway context. These locations are noted on the *Street Typology Map* as Nodes, Gateways and Transitions.

- **Nodes:** Corresponds to the Core Street typology and the Community Core Future Land Use area. Pedestrian priority should be established through traffic calming, frequent and safe crosswalks and midblock crossings.
- **Gateways:** Located at the entrances to the Community Activity Center Future Land Use area and the entrance to the Community Avenue typology from the south and the north. Prominent gateway features, public art, lane narrowing and bump outs are recommended to begin the transition to a three lane roadway profile.
- **Transitions:** Spaced every ¼ mile to ½ mile throughout the Commercial Boulevard, Community Avenue, Core Street and Cottage Retail typologies. Landscaping, identity features and public art are appropriate design treatments.

The design palettes included in *Design Framework (Book 4)* contain guidelines for installing traffic calming, landscaping, street furnishing, wayfinding, and identity features in these locations to enhance the user experience and operations of Cedar Street.

Map 3A:
Street Typology
 Delhi Township, Michigan

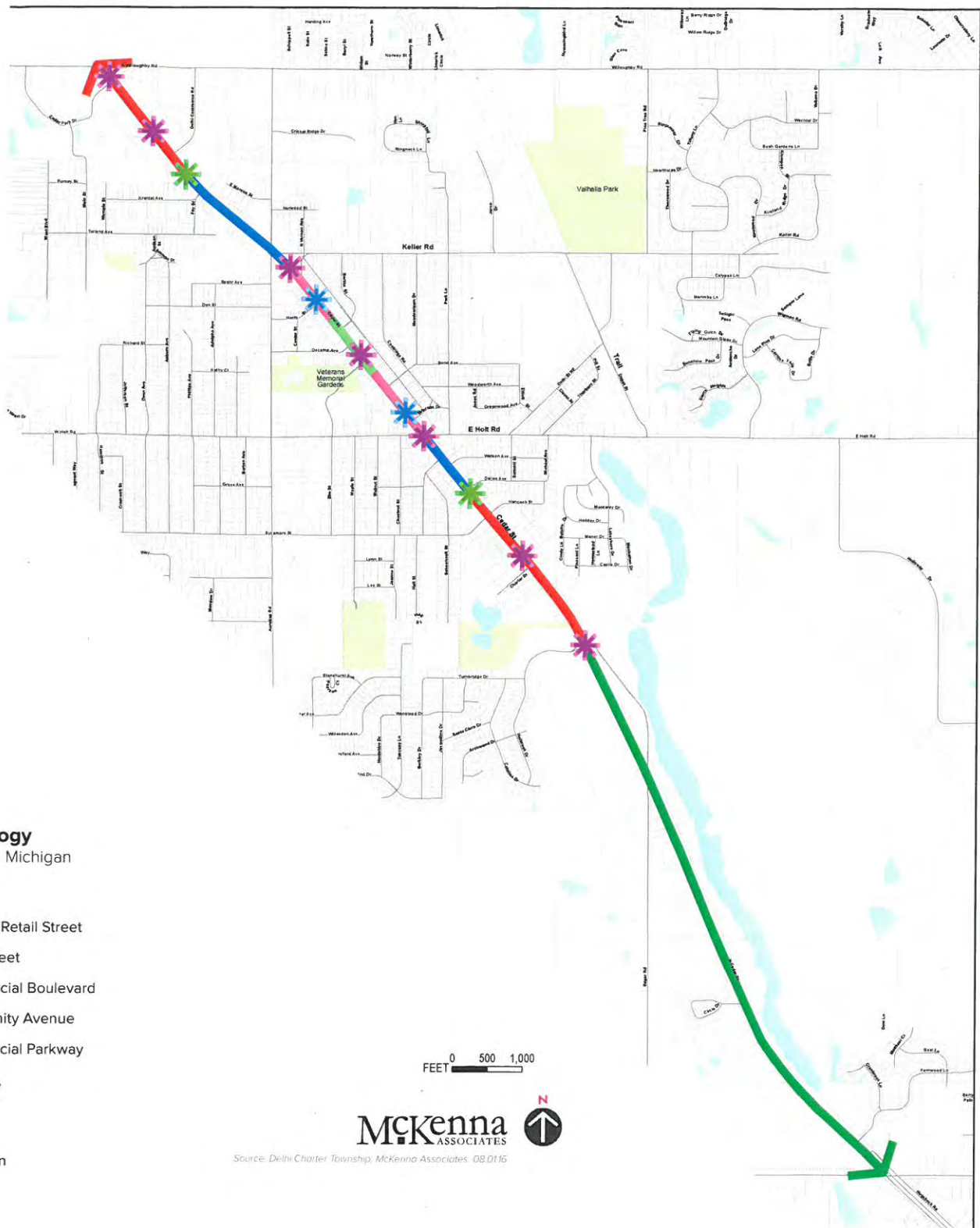
-  Cottage Retail Street
-  Core Street
-  Commercial Boulevard
-  Community Avenue
-  Commercial Parkway
-  Gateway
-  Node
-  Transition

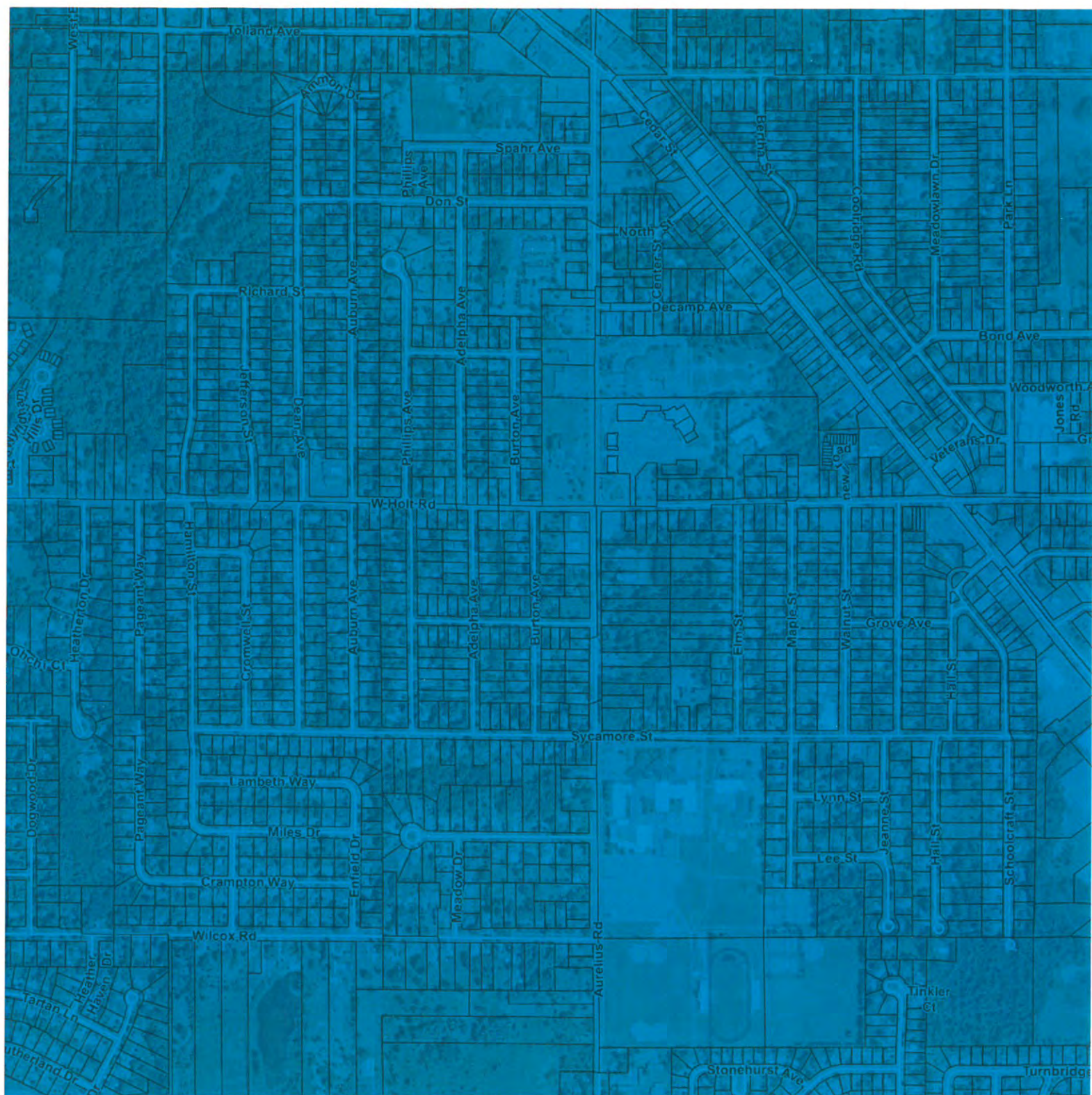
0 500 1,000
 FEET

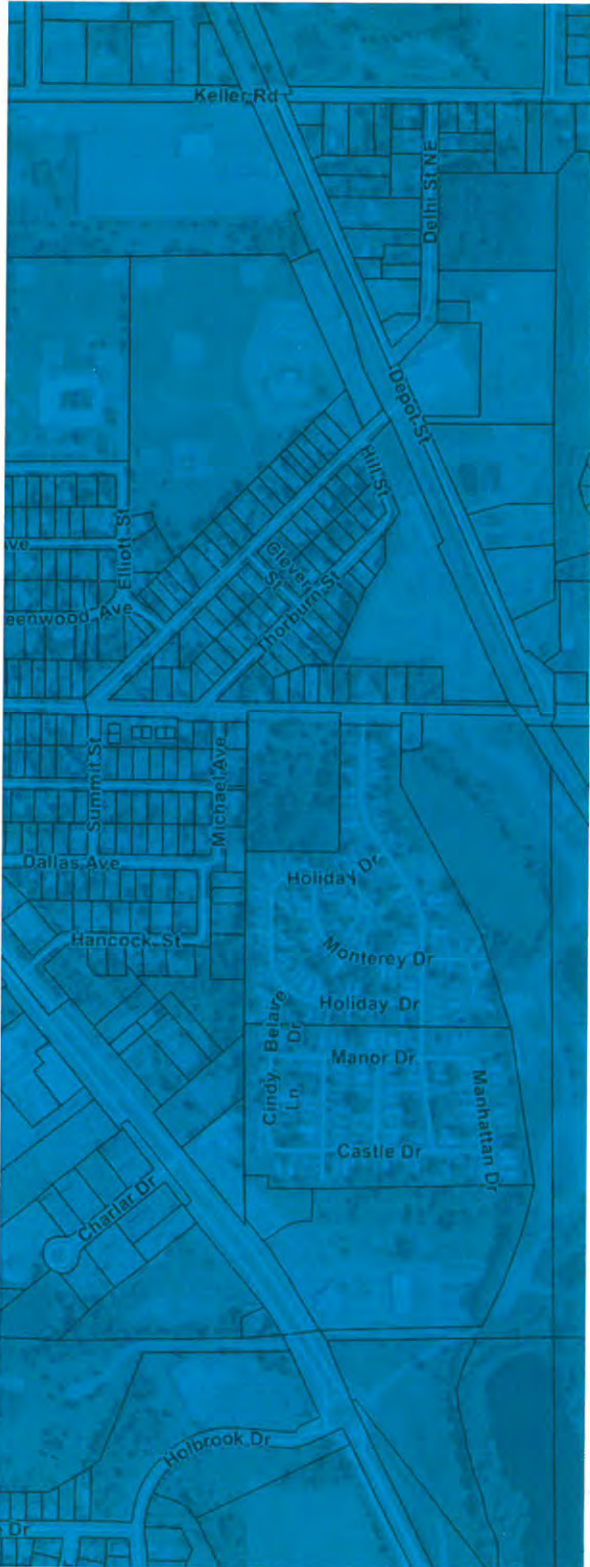
McKenna
 ASSOCIATES



Source: Delhi Charter Township, McKenna Associates, 08.0116







3.3 Reconfiguration

The character of the Cedar Street corridor in Delhi Township changes context from one end to the other. This section identifies specific points where changes in existing infrastructure or land use types are planned to occur. At these points, gateways or speed control elements will be utilized to effectively divide the corridor into the character segments.

The opportunity to implement a unified vision for Cedar Street that enhances and defines its character segments will require a concentrated approach to address urban design inconsistencies in both the private and public realms. Cedar Street has many outstanding features to enhance with design improvements as well as places to preserve. Future development should enhance rather than further obscure the sense of place.



Commercial Boulevard 1: Location
(Above) Cedar Street from
Willoughby Road to Fay Street
(Right) Aerial view

Commercial Boulevard 1: Willoughby Road to Fay Street

This character segment is zoned for General Business and Highway Service and is characterized by commercial enterprises that are designed to be accessed by private vehicle. This development pattern is desirable and many residents want to see newer chain restaurants and shopping area reinvestments along this segment of the corridor. The challenge is to improve the aesthetic and safety of this stretch of Cedar Street and turn it into a vital entryway to Delhi Township from the north.

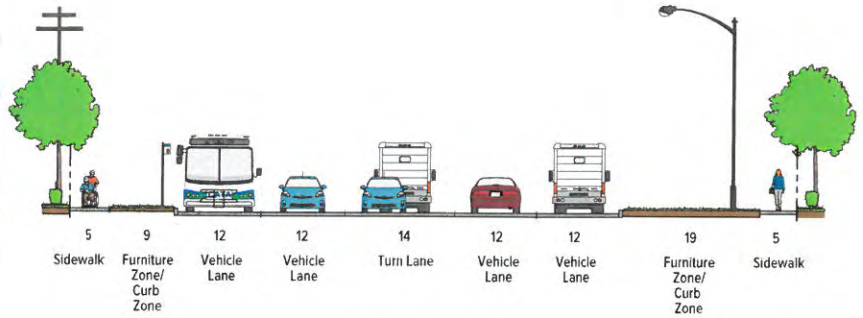
This segment of Cedar Street contains a "Welcome to Delhi Township" sign that greets motorists and passengers coming from Lansing or the nearby I-96 freeway interchange, and therefore acts as the face of the Township. There are prominent redevelopment sites in this segment that could include new housing, including the site at the corner of Cedar Street and Cedar Park Drive. Delhi Village Square, at the corner of Cedar Street and Delhi Commerce Drive, is an underutilized shopping at the south end of this segment.

Improvements can be made to encourage walking, biking, and the use of transit on the corridor to while maintaining the form and function of a commercial boulevard. While walking is not necessarily promoted in this area by the current development pattern, there are sidewalks and bus service, which can be enhanced with landscaping, shared used paths, medians and improved business signing. Additionally, public art could be used to enhance the character of the entrance corridor to Delhi Township.

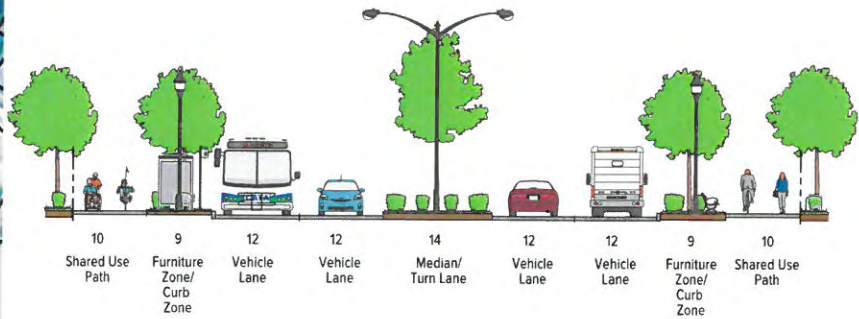
Parking should remain off-street but driveways should be consolidated. Rear access drives should be developed to connect between parking lots. Median islands are recommended to be installed in areas where driveways have been consolidated to calm traffic and reduce turning conflicts.

The roadway is recommended to remain two lanes of traffic moving in each direction separated by a center turn lane or median lane. A shared use path is recommended for the east side of the street. Utilities should be buried and a shared use path should be considered on both sides of the street.





Commercial Boulevard 1 - Existing Typical
ROW = 100
Curb to Curb = 62



Commercial Boulevard 1 - Proposed
ROW = 100
Curb to Curb = 62
Mode Hierarchy = A>T>P>B



Not to architectural scale.



Community Avenue 1: Location
 (Above) Cedar Street from
 Fay Street to Keller Road
 (Right) Aerial view

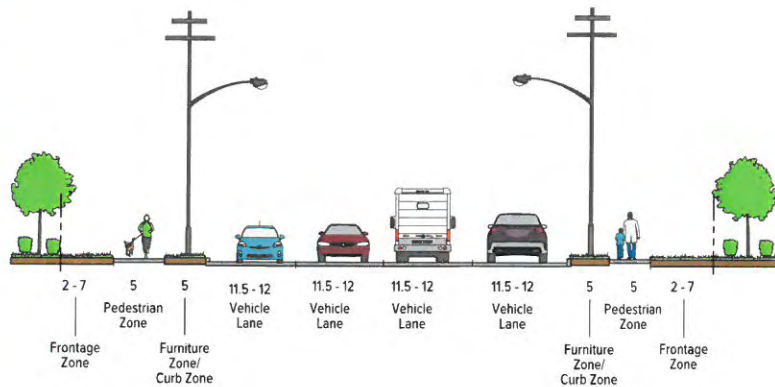
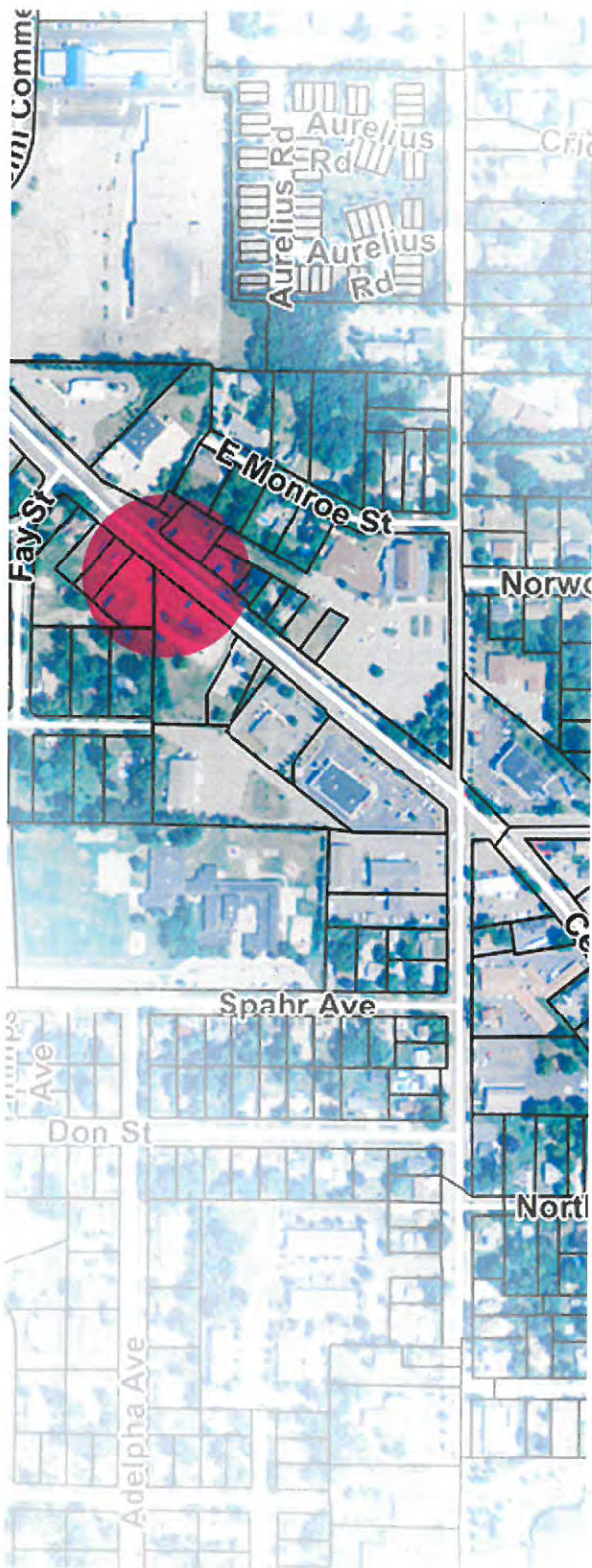
Community Avenue 1: Fay Street to Keller Road

This character segment starts at Fay and continues to Keller. It is zoned General Business, Low-Impact Commercial, and Residential. The Future Land Use plan for this area recommends the expansion of the Community Activity Center Designation. The Community Avenue typology is intended to transition traffic from the Commercial Boulevard typology into the Core Street typology.

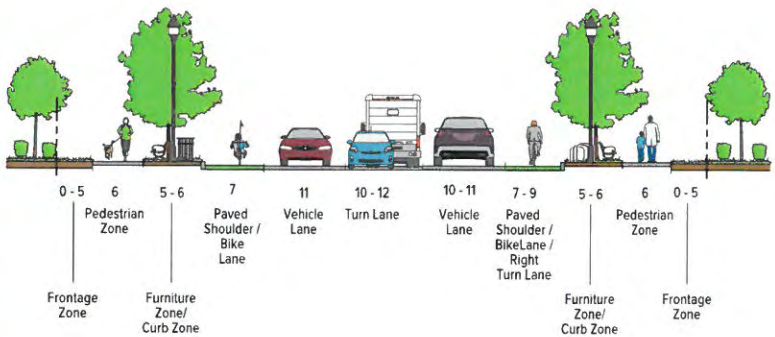
There are some vacant sites that could be redeveloped in this area, including the old Marathon filling station site, located southeast of Fay Street. Additionally, a large church parking lot near the intersection of Cedar Street and Aurelius Road is an opportunity for development to enhance the street frontage. The church site has a well maintained green space at the corner and a bus shelter.

Beginning at Fay Street and also continuing south the pavement narrows from five lanes to four and the placement of mature and new shade trees is adjacent to the sidewalk, opposite the roadway, consistent with a residential porch and lawn frontage type. Fay Street is the start of the four lane to three lane conversion from the north. On street parking is not recommended, instead a paved shoulder or a conventional marked bike lane can be used to connect to the shared use path recommended to the north. Right turn lanes are recommended when feasible, however, when there are right turn lanes, bike lanes must transition to marked shared lanes or be located between the right turn lane and the travel lane per AASHTO guidance.





Community Avenue 1 - Existing
ROW = 70 to 80
Curb to Curb = 46 to 48



Community Avenue 1 - Proposed
ROW = 70 to 80
Curb to Curb = 46 to 48
Mode Hierarchy = V>P>B>T



Not to architectural scale.



Core Street 1: Location
(Above) Cedar Street from
Keller Road to Bertha
Street
(Right) Aerial view

Core Street 1: Keller Road to Bertha Street

This character segment starts east of Keller Road and includes the Farmer's Market node. It is zoned Town Center with a few sites zoned Public Property. The Future Land Use plan recommends the creation of a new Community Core land use designation to correspond with this area.

The current uses and single-family residential site configurations generally reflect these zoning classifications, although there are some existing buildings setback and off-street parking on the street side. These sites are priorities for redevelopment, with the Farmer's Market node as the focus point. This area has a parking lot of considerable size and several buildings that front to the sidewalk. The intersection of Cedar and North Street includes several redevelopment site opportunities. The northwest corner is recommended for the development of a mixed-use building with a public parking lot that links to and shares parking with the Post Office, which fronts on Aurelius Road.

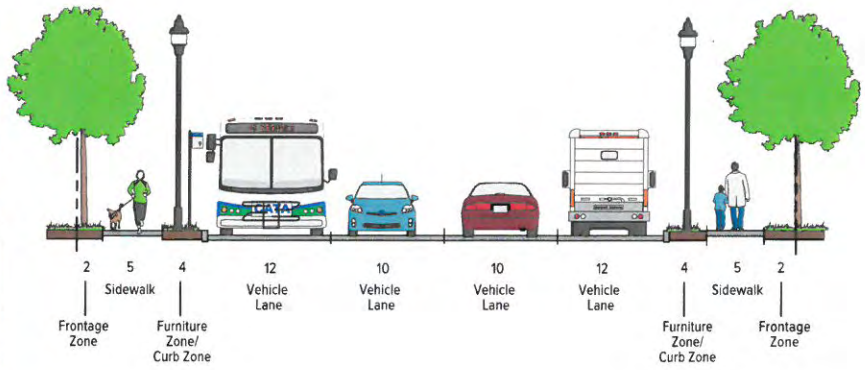
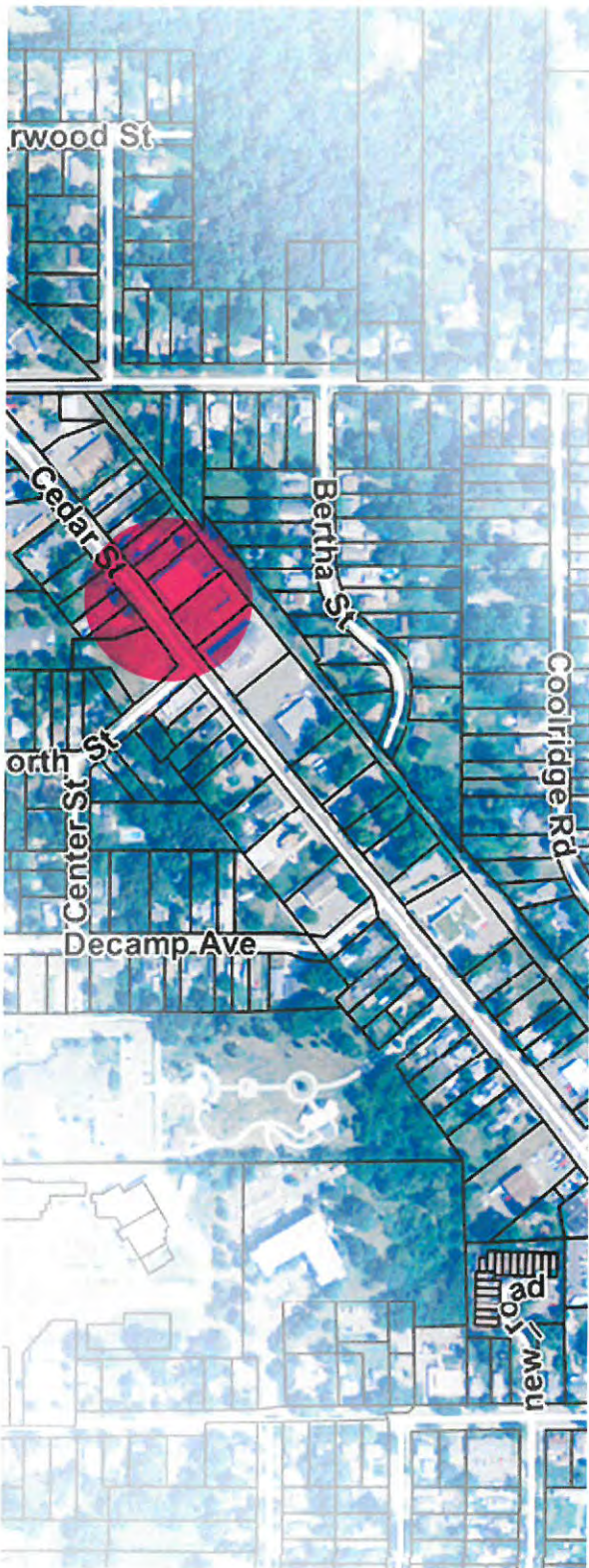
Streetscape and hardscape elements will complement the Township's traditionally-styled pedestrian-oriented lights, which begin at Aurelius Road and continue south until Watson Road. The spacing of these lights should be 40 to 80 feet and complemented with landscape islands. This area should be prioritized for on-street parking with bump-outs.

The curb line could be moved in sections with on-street parking to provide 8-foot parking lanes, or 11-foot travel lanes, depending on engineering judgment, however, a 10.5-foot travel lane and 7-foot parking lane will be more cost effective. Additionally, if turning movement analysis concludes that a center turn lane is not a necessary design feature in the sections where on-street parking is proposed, 8-foot parking lanes and a 14-foot marked shared lane is preferred.

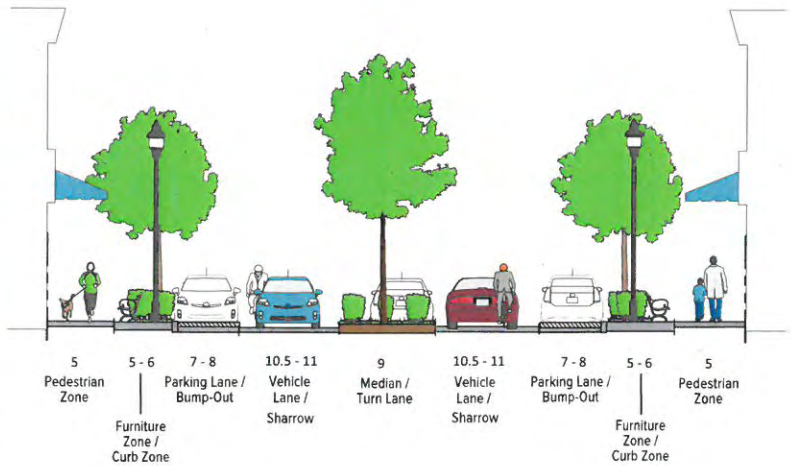
Bicycles should be accommodated through the use of marked shared lanes (sharrows). The optimal lane width for a marked-shared lane is 13 feet. For a 10-foot marked shared lane, the sharrow marking should be placed in the center of the travel lane because there is not room for vehicles to safely pass cyclists and cyclists must take the lane. This condition is appropriate for short intervals of 600 to 800 feet (1/8 mile) to accommodate a connected bikeway system.

Utilities are located in a separate utility corridor that runs parallel on the north/east side of Cedar. The utilities should be buried to create a rear alley for pedestrian, bicycle and vehicle circulation. This can be achieved iteratively through site planning or as a single project. Streetscape and hardscape elements will complement the Township's traditionally-styled pedestrian-oriented lights, which begin at Aurelius Road and continue south until Watson Road. The spacing of these lights should be 40 to 80 feet and complemented with landscape islands. This area should be prioritized for on-street parking with bump-outs.





Core Street 1 - Existing
ROW = 66
Curb to Curb = 44



Core Street 1 - Proposed
ROW = 66 - 69
Curb to Curb = 44 - 47
Mode Hierarchy = P>B>V>T



Not to architectural scale.



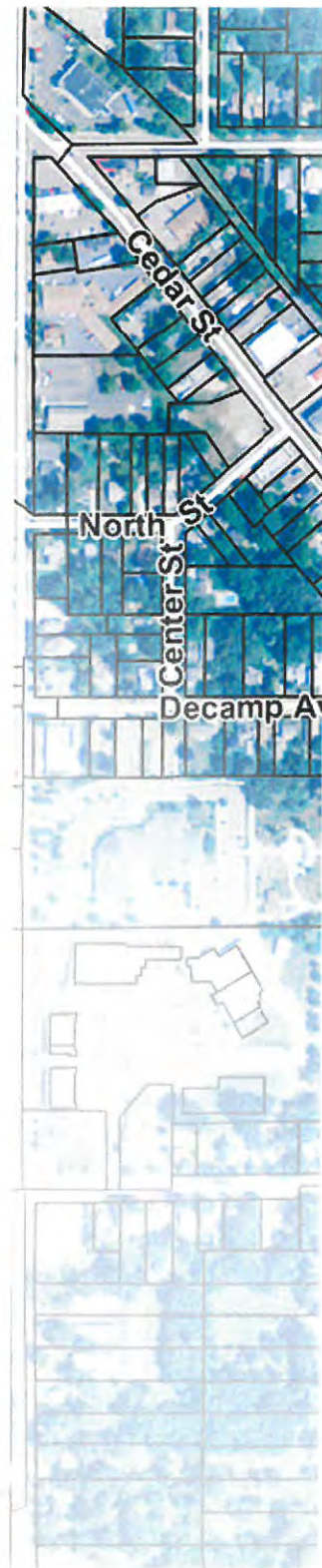
Cottage Retail Street: Location
(Above) Cedar Street from Bertha Street to Bond Avenue
(Right) Aerial view

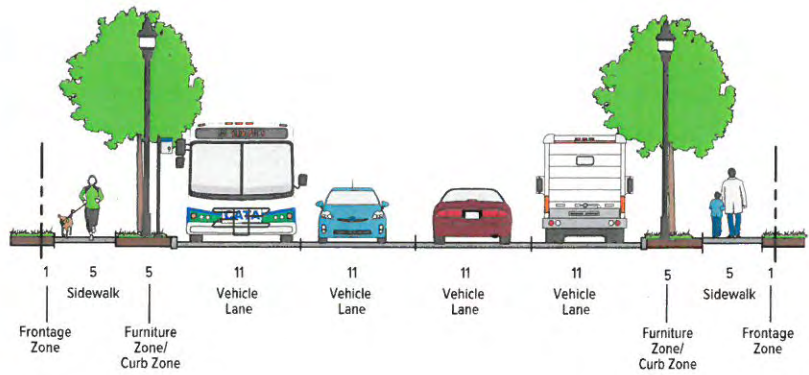
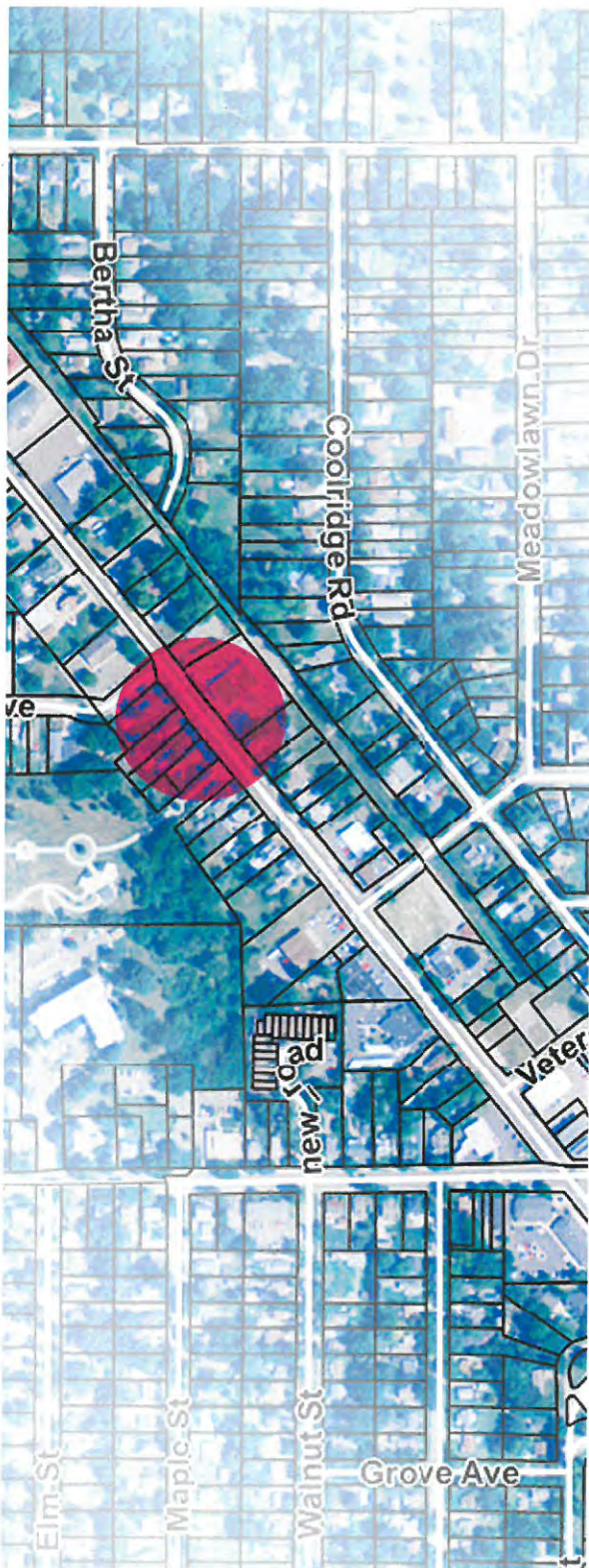
Cottage Retail Street: Bertha Street to Bond Avenue

The segment between the Farmers Market and the Bond Street is characterized by either single-family homes with uniform setbacks, porches and lawn frontages, or commercial enterprises and building types setback from the right-of-way and landscaped in a manner more or less consistent with these homes. The major development objective for this character segment will be to reinforce the character of these buildings to enhance walkability and a sense of place.

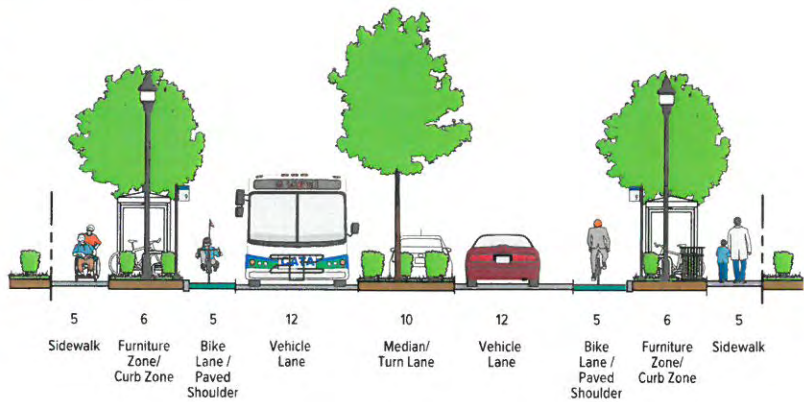
The focal points of the Cottage Retail Area are civic uses, including the Sam Corey Senior Center and the Veterans Memorial Gardens, which link to Township Hall. An existing mid-block crossing has been installed at this location, but the beacon only flashes yellow and does not have an all-red phase. This beacon could easily be updated to a High-Intensity Activated Crosswalk beacon (HAWK) to improved crossing safety. When the three lane profile is installed a median island is recommend at this crossing as well.

On-street parking is not as needed in this section of the street. Alternatively, a paved-shoulder or on-street bike lane is recommended on both sides of the street. Driveway consolidation and access management is recommended if sites are assembled and redeveloped together. A rear alley can be created if the utilities are buried on the north/east side of Cedar would benefit circulation. Additionally, circulation to the neighborhoods would be improved if Bertha Street were connected into Cedar. Minimally, a bicycle and pedestrian connection to Bertha Street should be considered.





Core Street 1 - Existing
ROW = 66
Curb to Curb = 44



Core Street 2 - Proposed
ROW = 66
Curb to Curb = 44
Mode Hierarchy = P>B>V>T



Not to architectural scale.



Core Street 2: Location
 (Above) Cedar Street from
 Bond Avenue to Holt Road
 (Right) Aerial view

Core Street 2: Bond Avenue to Holt Road

This intersection also represents the commercial center of the unincorporated community of Holt, Michigan. This report refers to the area as the Downtown Nodes, although Downtown Holt may be a more appropriate moniker.

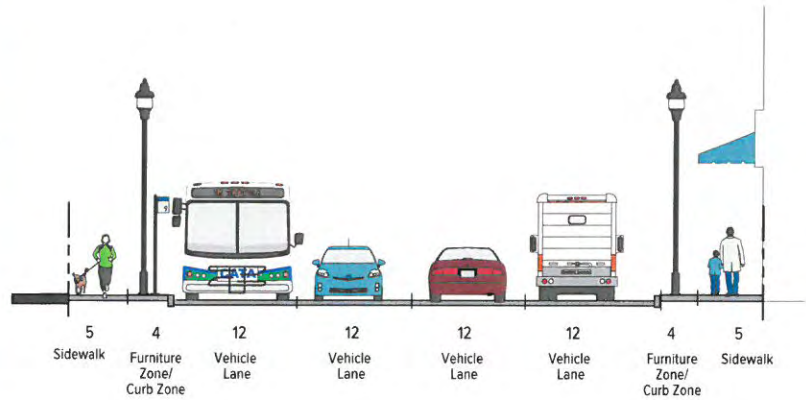
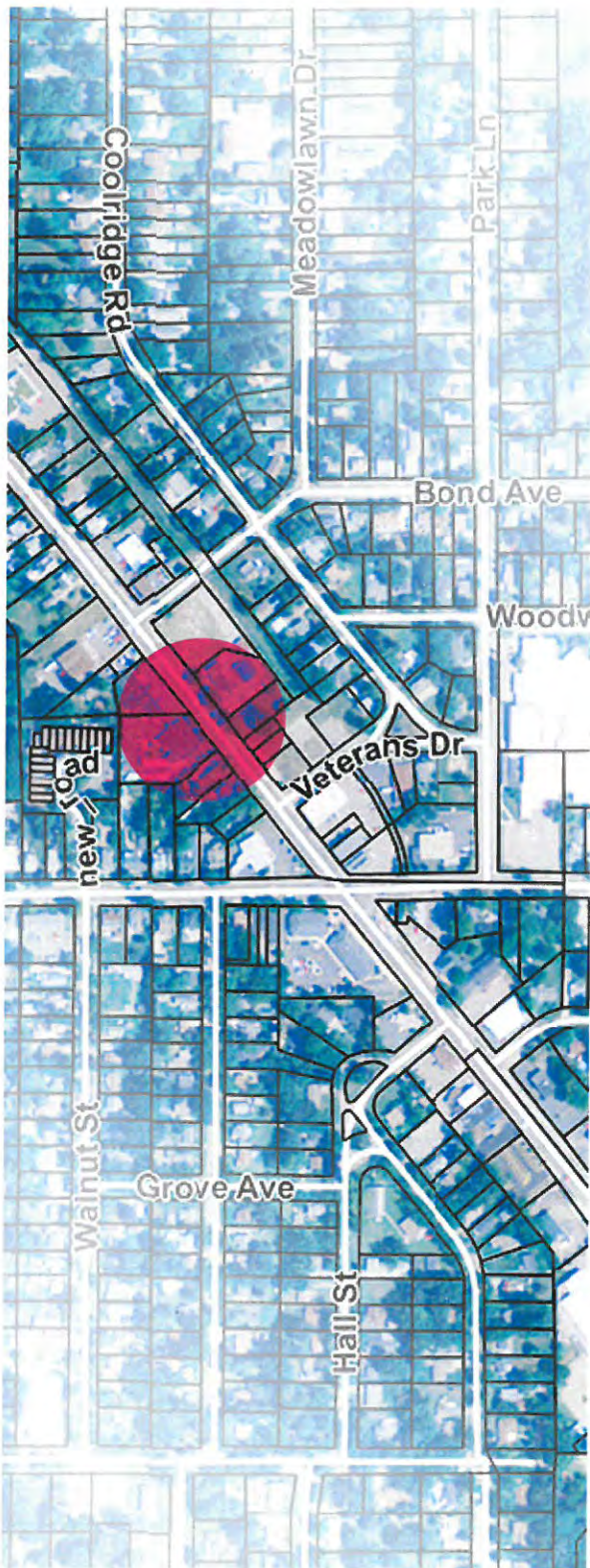
High quality traditional downtown anchor buildings are located at the portion of Cedar Street within one block of Holt Road. Many of the existing buildings do not have side-yards and are close to the sidewalk, resulting in a pedestrian friendly environment. The entire north/east block between Bond Street and Veterans Drive is a high priority for redevelopment. This site is the heart of a future downtown district and it is large enough to provide, retail, shopping, office, and residential uses, as well as a formal public parking area with rear alley access.

The bank site at the northwest corner of Holt Road and Cedar Street has off-street parking in the front, which presents a challenge for the further development of a walkable town center at this location.

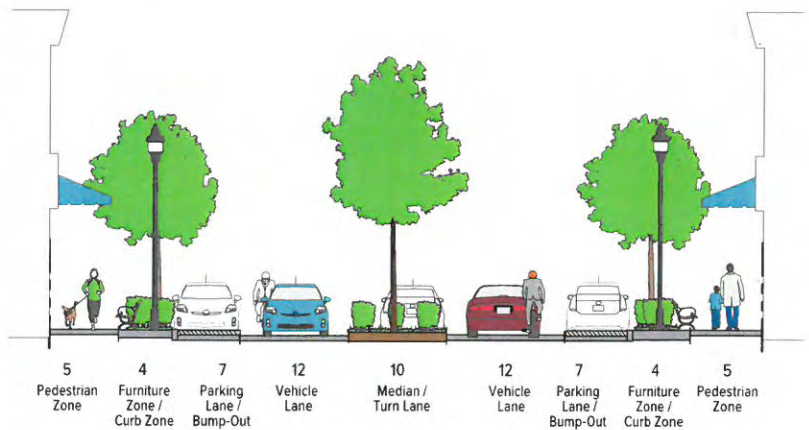
Street lamps, landscaping islands, benches, bike parking, and other street furnishing and hardscape elements are recommended. This area is prioritized for on-street parking with bump-outs. Bicycle accommodations are recommended through the use of marked shared lanes (sharrows).

Refer to the discussion in the Core Street 1 section for design considerations related to on-street parking and marked shared lanes.





Core Street 1 - Existing
ROW = 66
Curb to Curb = 48



Core Street 1 - Proposed
ROW = 66
Curb to Curb = 48
Mode Hierarchy = P>B>V>T



Not to architectural scale.



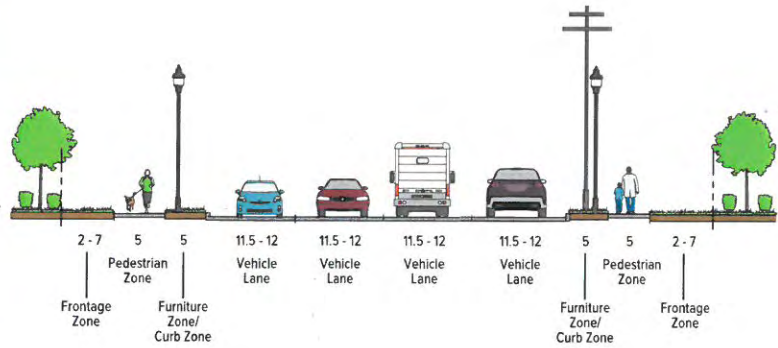
Community Avenue 2: Location
 (Above) Cedar Street from Holt
 Road to Dallas Avenue
 (Right) Aerial view

Community Avenue 2: Holt Road to Dallas Avenue

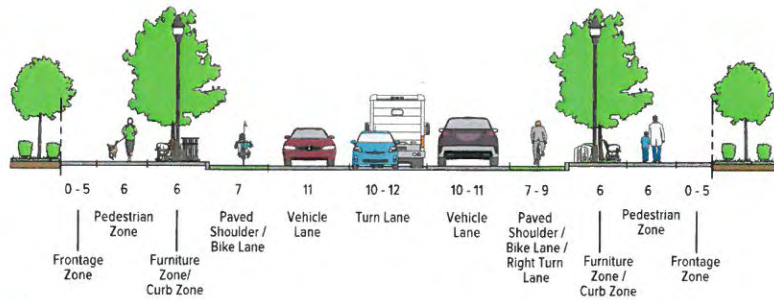
This segment of Cedar Street traverses the Town Center zoning and General Business districts. The area is recommended for the expansion of the Community Activity Center Future Land Use area. The existing cross-section throughout this segment of the Cedar Street corridor remains at four lanes, without a center turn lane. Street tree placement through this segment of the corridor continues adjacent to the sidewalk but opposite the roadway.

Traditionally-styled and pedestrian-oriented light standards are located along Cedar Street throughout this character segment, spaced for an urban context. This area is recommended to begin the four lane to three lane conversion from the south. On street parking is not recommended, instead a paved shoulder or a conventional marked bike lane can be used to connect to the shared use path that begins on the east side of Cedar and extends south to the roundabout. Right turn lanes are recommended when feasible, however, bike lanes must become marked shared lanes or be located between the right turn lane and the travel lane per AASHTO guidance.





Community Avenue 2 - Existing
ROW = 70 to 80
Curb to Curb = 46 to 48



Community Avenue 2 - Proposed
ROW = 70 to 80
Curb to Curb = 46 to 48
Mode Hierarchy = V>P>B>T





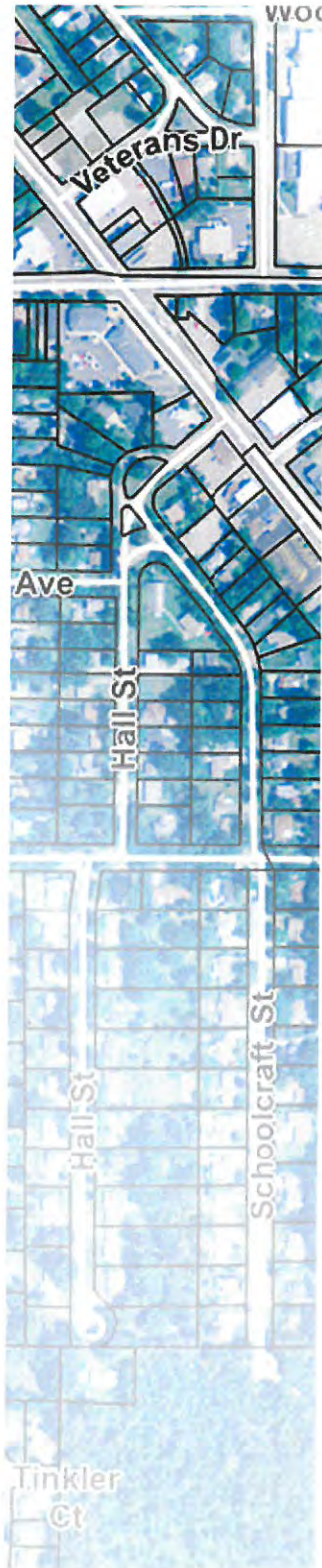
Commercial Boulevard 2: Location
 (Above) Cedar Street from Dallas Avenue
 to Holbrook Drive
 (Right) Aerial view

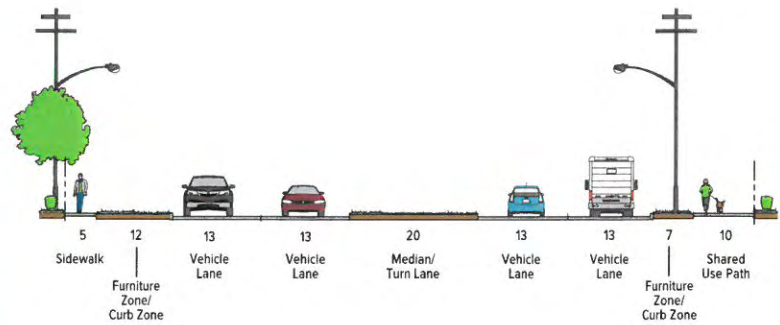
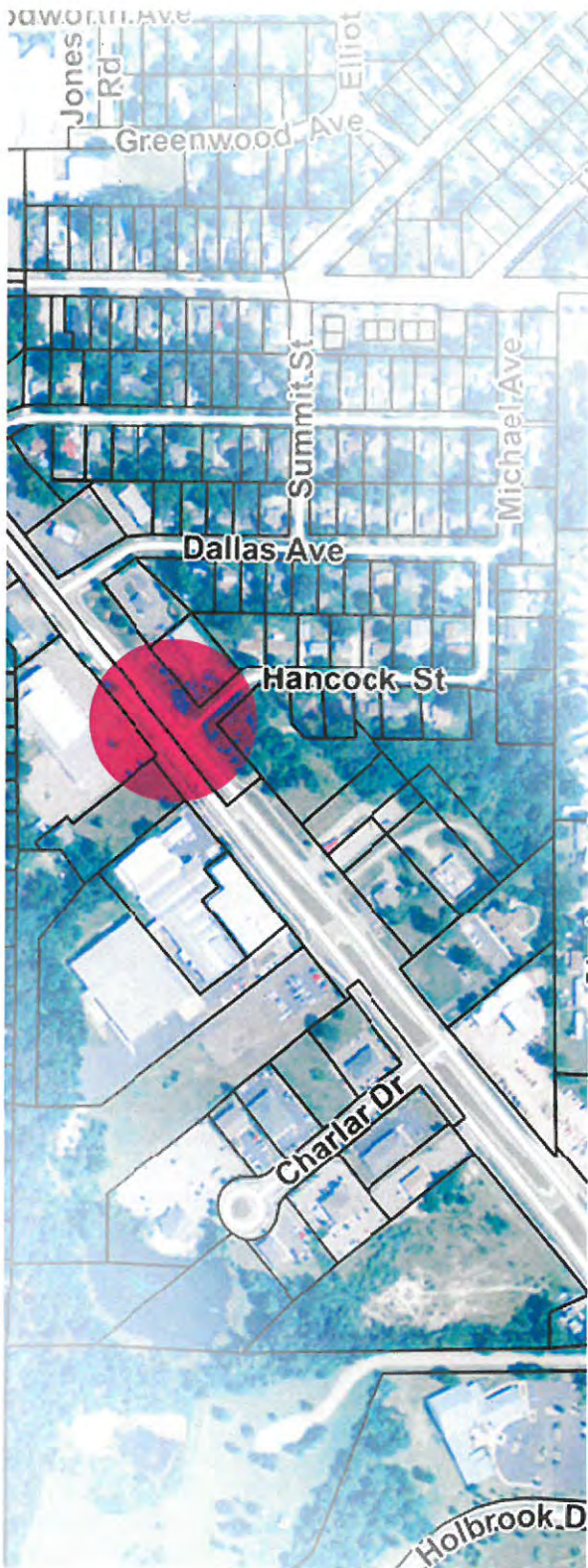
Commercial Boulevard 2: Dallas to Holbrook

Zoning classifications along this character segment vary widely including Town Center, General Business, Low Impact Business and Industrial. At approximately Dallas Avenue the building character abruptly changes back to auto-oriented design, similar to the northernmost segment of Cedar. Setbacks and frontages are less consistent in styles and the quality of building type varies notably. Beyond Hancock Drive building setbacks increase and industrial or campus office uses begin to dominate.

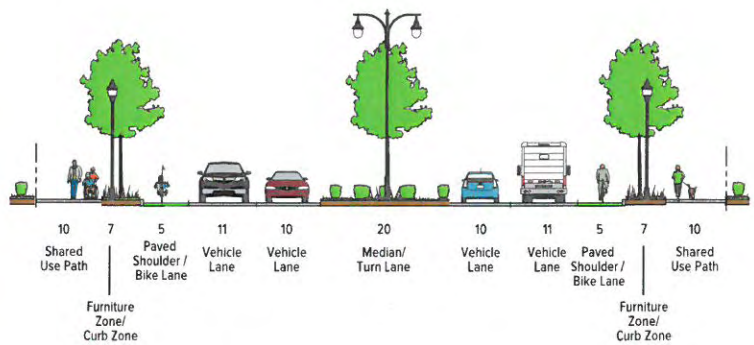
The roadway is recommended to remain two lanes of traffic moving in each direction separated by a center turn lane or median lane. A shared use path exists on the east side of the street. Utilities are overhead and adjacent to the west side of the roadway seems to be established and viable. If utilities can be feasibly buried, a shared use path should be considered for the west side of the street as well.

This area of the street is recommended for lane narrowing and landscaping to encourage reduced travel speeds. The current configuration encourages high-speeds prior the roundabout. A commercial boulevard should support more site access and landscaping islands and lane narrowing may be the most effective treatments. Chicane-style bump-out islands, or shoulders should be added on the east and west curb side and lane width should be reduced to 10 to 11 feet. A median is existing and can be used for public art and plantings.





Commercial Boulevard 2 - Existing
ROW = 110
Curb to Curb = 72



Commercial Boulevard 2 - Proposed
ROW = 110
Curb to Curb = 72
Mode Hierarchy = A>T>P>B



Not to architectural scale.



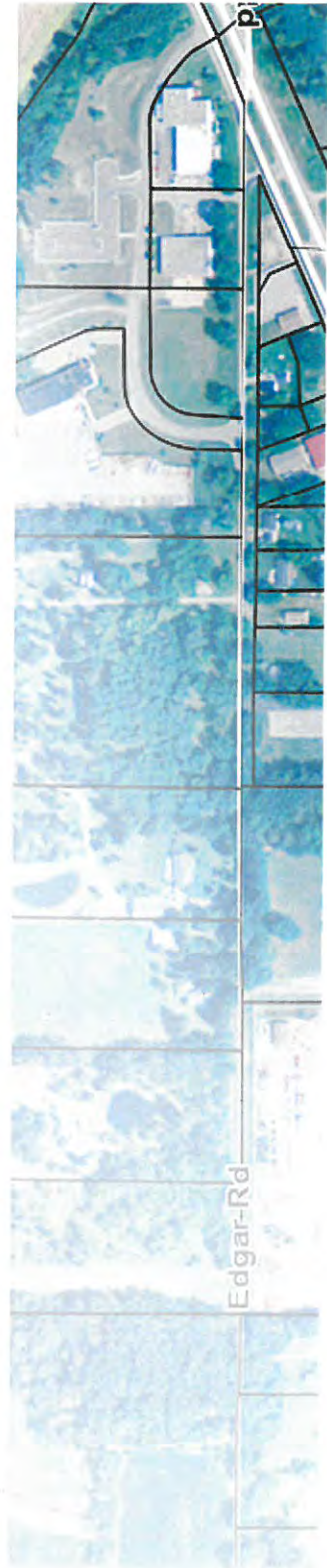
Commercial Parkway: Location
 (Above) Cedar Street from Holbrook
 Drive to College Road
 (Right) Aerial view

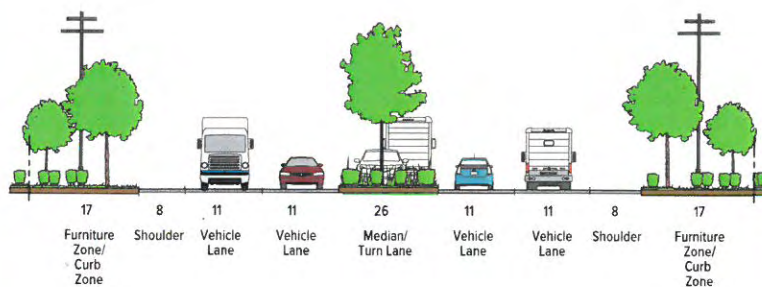
Commercial Parkway: Holbrook to College

South of the Holbrook roundabout the building setbacks become greater and the built environment gives way to a natural or agrarian landscape. Where existing businesses can share access drives, driveway consolidation is recommended.

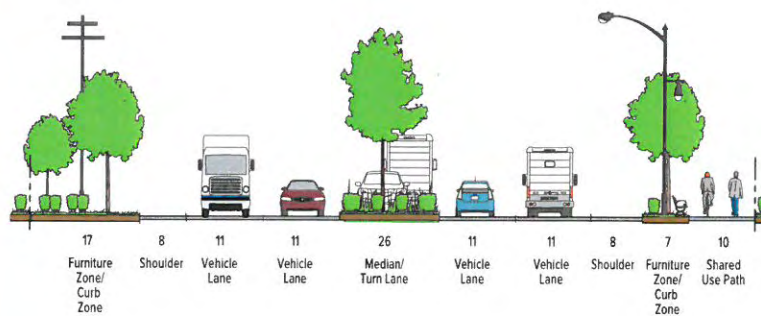
The current roadway configuration is consistent with a parkway typology and a few minor modifications will greatly improve Cedar's entrance into Delhi Township from the south. Signing and other identity features should be consistent with the rest of the corridor to create a unified identity. Additionally, landscaping elements are recommended for the median and along business frontages. A native prairie and/or street trees are recommended to be installed in the entire median from College to Holbrook.

A shared use path or trail is recommended to be installed on the east side of the roadway. Where feasible, trail separation of greater than 10 feet from the roadway is desirable and a screen row of shrubs, native grasses and trees should be used to improve the comfort level of trail users.





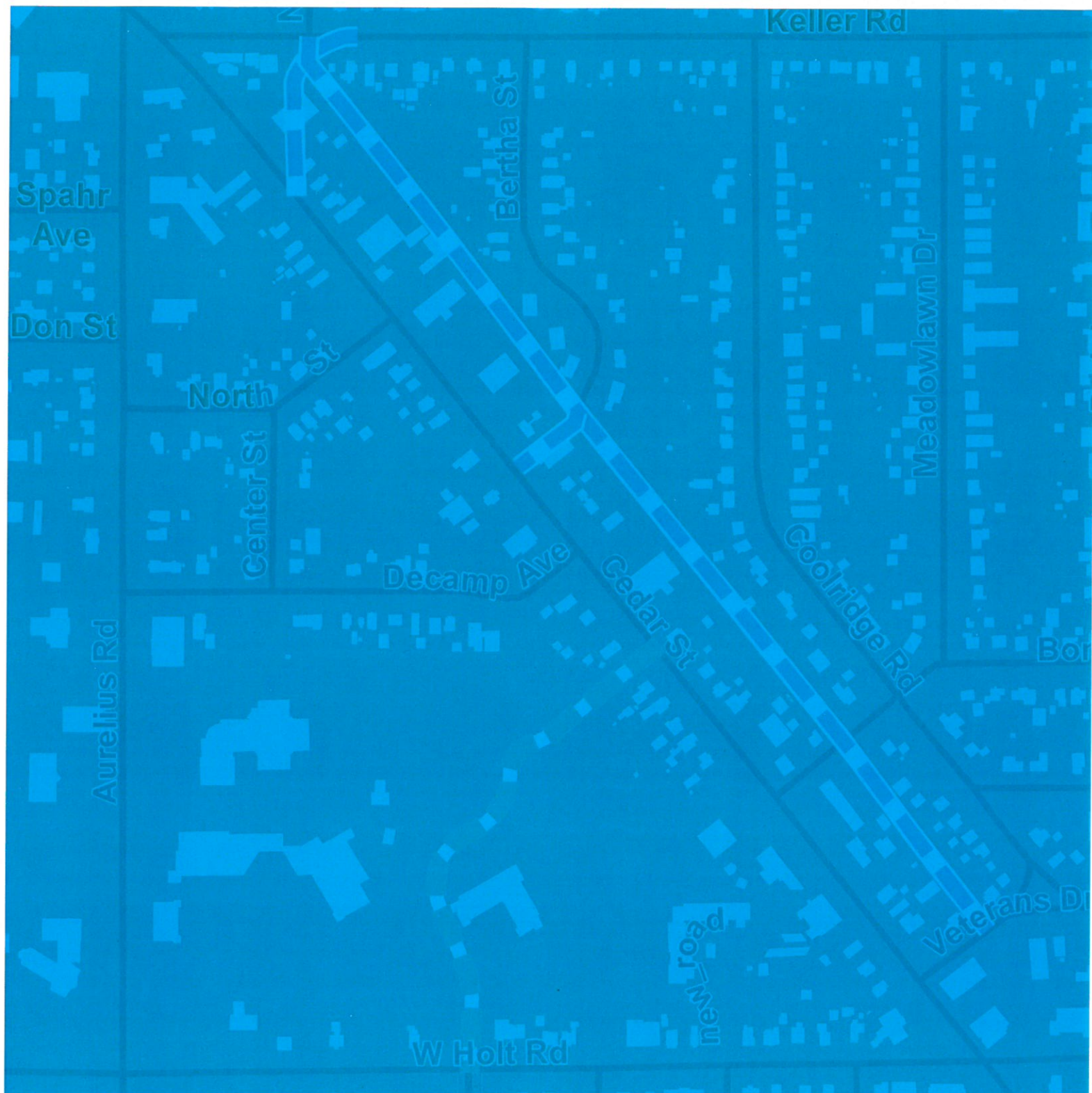
Industrial Parkway - Existing
ROW = 120
Curb to Curb = 86



Industrial Parkway - Proposed
ROW = 120
Curb to Curb = 86
Mode Hierarchy = A>T>B>P



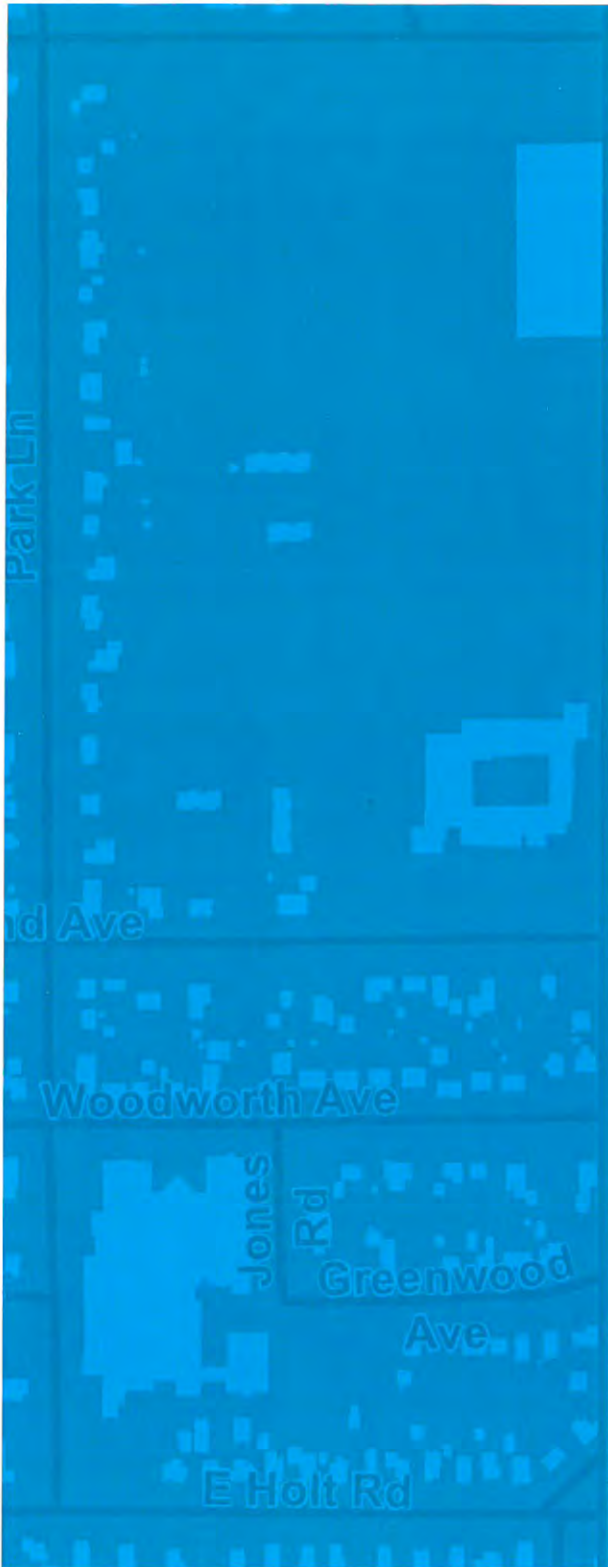
Not to architectural scale.



3.4 Grid Retrofits

Currently, there are some limitations in the intersection density of the street grid in the triangle area on Cedar between Holt and Aurelius. The segment is approximately $\frac{2}{3}$ of a mile or 3,427 feet and has only two intersections on each side. A desirable standard block length for walkability and vehicle circulation in a downtown area is 300 feet to 600 feet. On the east side of the street, the Bond to Keller block is approximately 2,400 feet.

On the west side of the street, the De Camp to Holt block is approximately 1,600 feet. The other blocks, range roughly from 600 feet to 800 feet.

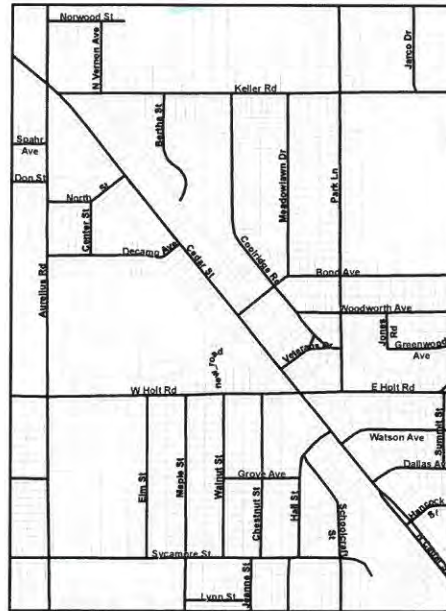


Grid Retrofit

This diagram shows the existing street grid and the proposed additional connections to the surrounding neighborhoods.

Existing (top)

Proposed (bottom)



**Map 3B:
Proposed Grid**

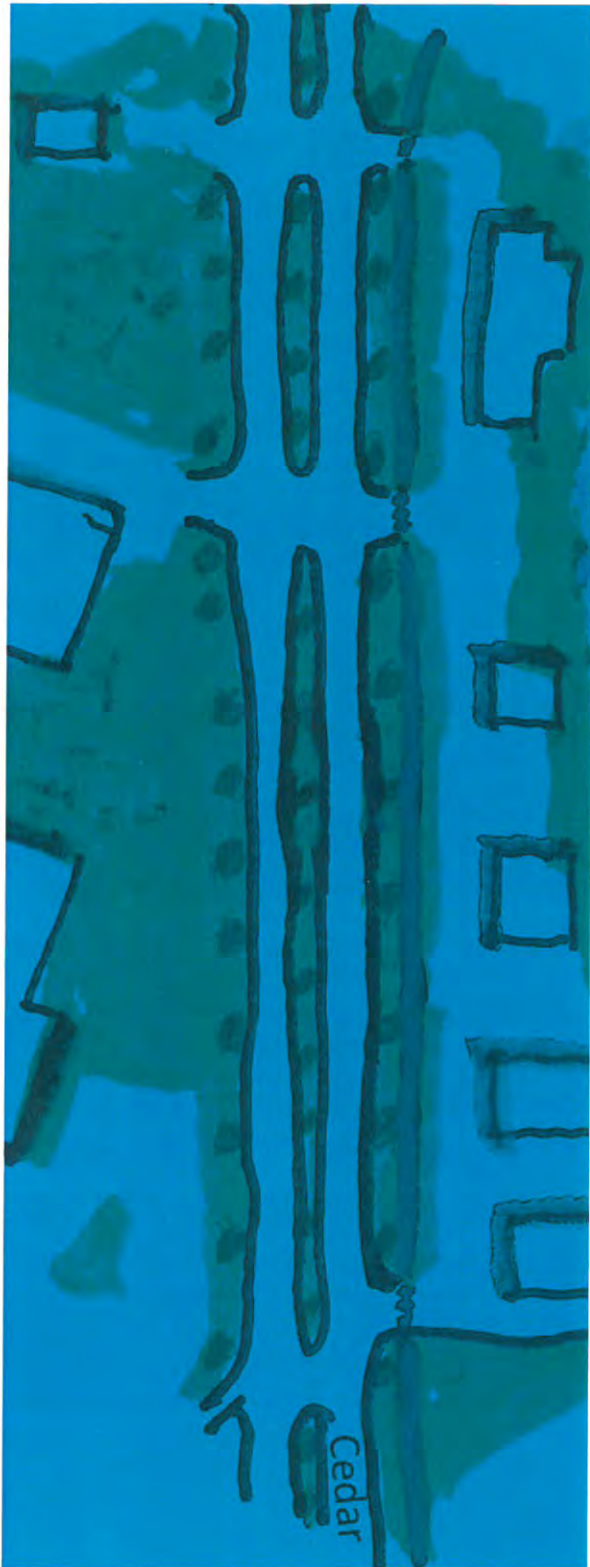
— New Connections
— Pedestrian Link

While it is not practical to completely retrofit the street grid to create 300 to 600 foot block lengths, there is potential to add a few key retrofits to the network to eliminate the two mega-blocks noted above, as follows:

- Realign Keller Street by moving it approximately 200 feet to the south to create more than 300 feet of distance between the Aurelius Road intersection
 - Realigning Keller will permit the intersection to be on a separate signal, or possibly a stop sign
 - The realignment can improve the signal phasing and functioning of both Aurelius and Keller to allow shared phases, currently each direction of travel has its own dedicated signal phase
- Connect Bertha through to Cedar between North and De Camp
- Add a rear alley from Keller to Veterans on the parallel to Cedar in the north/east utility corridor
 - For bicyclists less comfortable biking on-street or in shared travel lanes with vehicles, the rear ally will provide an alternate bike connection along Cedar between Keller and Holt
- Link Elm Street through to Cedar between De Camp and Bond with a pedestrian and bicycle connection
- Connect Sycamore through to Cedar south of Hancock
- Convert Veterans Drive to an alley, shared street, or parking lot driveway to discourage cut-through traffic and prioritize walking and biking connectivity

New connections should be skinny streets or alleys with target vehicle speeds of 15 mph to 20 mph, and 16 to 22 feet curb to curb, shared biking and pedestrian access and two-way traffic. Where feasible, to match the context of the residential neighborhoods, a 5 foot sidewalk with a 5 foot separation lawn should be added.

Currently, every site in the district manages its own parking, with no on-street parking, shared parking, or cross site access. Adding new streets will provide circulation and access to new on-street parking, shared private parking, and new public parking areas so customers can park once to access multiple destinations.



3.5 Access Management

Another way to improve pedestrian and traffic circulation along Cedar Street is through the application of access management. Access management reduces the number of points of access to the street from adjacent properties.

This benefits pedestrians by reducing the number of points along a sidewalk where they may encounter a vehicle, and it benefits traffic by reducing the number of points for other vehicles to enter the street. Cross access should be required on Cedar Street and the total number of driveways should be reduced as sites are redeveloped. An alley should also be constructed in the utility corridor on the east side of Cedar Street.

Although access management reduces the number of access points, an adequate supply of parking still must be provided. Part of the proposed Cedar Street redesign includes on-street parking near nodes of activity. Public off-street parking can use existing parking lots at the Holt Farmer's Market and the Post Office, as well as new parking lots behind the buildings within new developments. Providing consistent and adequate public parking, along with cross access parking lot connections, will encourage people to use businesses along Cedar Street by enabling people to park once and visit multiple destinations. This allows for a decrease of turning movements, a reduction of traffic looking for open parking spaces, and an increase in pedestrian activity especially in the Community Core and Community Activity Center.

Commercial Boulevard 1

Commercial Parkway

a Existing Access Management
The existing driveway and access conditions in the Commercial Boulevard 1 area allow several driveways that are close together, creating potential vehicle conflict points.

b Proposed Access Management:
Proposed access management for the Commercial Boulevard 1 area consolidates several driveways, allows cross access at the rear of sites, installs medians where turning movements are no longer needed, and allows for walking and biking access.



c Existing Access Management
The existing driveway and access conditions in the Commercial Parkway area permit several driveways on the east side which are inaccessible for the traffic going southbound on Cedar Street.

d Proposed Access Management:
The proposed access management for the Commercial Parkway area consolidates several driveways, continues the existing cross access at the front of sites, enables all driveways to be accessible for both directions of traffic, and allows for the future construction of a trail on the east side of the roadway.



3.6 Mode Accommodation

Improving the pedestrian and bicycle networks in Delhi Township with connections to the employment and shopping destinations along Cedar Street will support residents' health and wellness. With network improvements, more Township residents will be able to make safe, short trips to parks, schools, and even downtown entertainment and shopping, all without getting in the car. Bicycle network improvements are recommended based on the need for separation from vehicle traffic, existing signal locations to cross major roadways, and alignment with desirable community destinations, like schools, parks, public facilities, and commercial areas.

Shared Use Paths and Trails

Shared use paths and trails are paved concrete or asphalt paths wide enough to accommodate both pedestrians and bicyclists. They are typically a minimum of 10 feet wide with 2 feet of clearance on either side of the path. Shared use paths offer cyclists a safe place to bike off-street when there is no space for a bike lane, or it is unsafe to bike on the street.

Conventional Bike Lanes and Paved Shoulders

Bike lanes create a dedicated space for cyclists on a roadway. They are appropriate on streets with moderate to heavy traffic. Bike lanes are indicated by on-street markings, which can be supplemented with signage. Bike lanes reinforce proper roadway etiquette, raise the visibility of bicyclists, and help both bicyclists and drivers behave predictably when sharing road space. For safe cycling, bike lanes should be 4 feet to 6 feet wide.

Marked Shared Lanes or Sharrows

Marked shared lanes use a double chevron and bicycle marking, or "sharrow," in a lane intended for the joint use of motorized and bicycle traffic. Chevron symbols direct bicyclists to ride in the safest location within the lane, outside of the door zone of parked cars and areas where debris is likely to collect. Generally, marked shared lanes are a low-cost treatment suitable for lightly traveled collector and arterial roads.

Improved Pedestrian Crossings

Improved and frequent pedestrian crossings are recommended to support safety, comfort, speed, and convenience of walking trips. Pedestrian crossings also serve bicyclists. The crosswalk at Sam Corey Senior Center was cited as dangerous for pedestrians because the traffic does not slow down or stop, even when the light is activated.

a Shared Use Path

Shared use paths of 10 feet are ideal for shared pedestrian and cycling spaces on higher speed commercial corridors with limited driveways

b Bike Lane

Bike lanes create a separate operational area for cyclists and should be striped at 5 to 6 feet

c Sharrows

Sharrows can be used to indicate the preferred space for a bicycle to operate on the roadway, especially for streets that are too narrow to install a bike lane; enough space should be provided to prevent "dooring" by parked car doors and, in tight areas, markings should be placed in the center of the vehicle lane

d Crosswalks

Example of a ladder, or continental style crosswalk that features highly visible roadway markings



Non-Motorized Connections
Map showing potential biking and walking connections from Cedar Street to other parts of the Township and to the region

Map 3C:
Non-Motorized Connections
Delhi Charter Township, Michigan

-  New Existing Trail
-  Marked Share Lanes
-  On Street Bike Lanes
-  Paved Shoulders
-  Shared Use Path
-  New Grid Connections
-  Shared Bicycle Alley
-  Improved Pedestrian Crossings

FEET 0 500 1,000

McKenna
ASSOCIATES



Source: Delhi Charter Township, McKenna Associates, 08/01/16





CEDAR

SEMI-CHARLEY TOWNSHIP, MICHIGAN



3.7 Feasibility

A four lane to three lane roadway conversion, or "road diet" is essential to achieve the redevelopment vision for Cedar Street in Delhi Township and improve the safety of all potential users along the corridor. Between Fay Street and Dallas Avenue, Cedar Street currently has a four-lane profile with two travel lanes for through traffic in each direction. This road design increases the probability of rear-end crashes and left-turn crashes from drivers attempting to maneuver behind or around turning traffic.

Safety Factors

Crash Analysis

Cedar Street has two major intersections near the downtown area of the Township, with Aurelius Road and Holt Road. The design and operation of these two intersections make them susceptible to crashes. Cedar Street and Aurelius Road is essentially a five-way intersection with Keller Road enabling traffic to and from the east Cedar Street intersects Aurelius Road at a sharp angle, reducing visibility. The Cedar and Aurelius intersection is one of the most crash-prone within Ingham County. According to Michigan Traffic Crash Facts data, there were a total of 14 crashes in 2015 and 21 crashes in 2014 within 150 feet of this intersection. Cedar Street and Holt Road is another intersection at an angle, although less sharp of an angle than at Aurelius Road. The intersection had 8 crashes in 2015 and 10 crashes in 2014 within 150 feet according to Michigan Traffic Crash Facts.

The data shows a significant number of pedestrians or bicyclists involved in crashes, with 2-3 on average in the entire Township per year. Additionally, there may not be a large amount of walking or biking activity along major corridors in the Township since not all major destinations are reachable on foot or on a bike. As Cedar Street is redeveloped, it is important to keep in mind bicycle and pedestrian safety with the expected increase in walking and biking activity.

The northern end of Cedar Street has had a high number of crashes causing injury, with approximately 12-15 injury crashes each year over the past 4 years. Injury crashes were generally concentrated near Cedar and Holt, Cedar and Aurelius, and along Cedar between Delhi Commerce and Willoughby. These crashes imply that operational improvements can be made to the roadway to reduce the likelihood of future crashes, including improved signal timing on Cedar at both Holt and Aurelius, and shared access drives with reduced driveways on Cedar especially near Willoughby and Delhi Commerce.

Crosswalks (Pedestrian Issues)

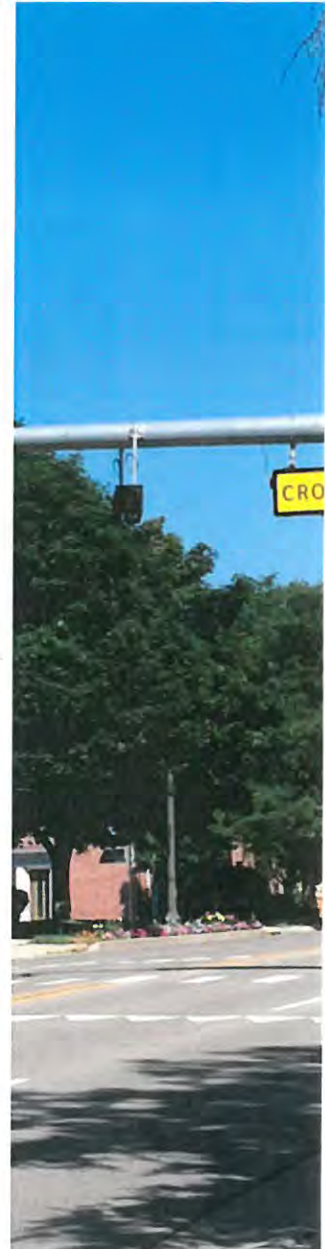
The four-lane profile of Cedar Street presents several conflicts for pedestrians traveling in the corridor. The only mid-block crossing between Aurelius and Holt is located at the Sam Corey Senior Center. The pedestrian crossing is controlled by a pedestrian-activated light which only warns traffic to slow down. This light does not stop traffic and the design of the street does not encourage traffic to slow down.

Driveway Access

Cedar Street contains a high frequency of driveway access points. This frequency encourages weaving around turning traffic and creates conflicts between drivers traveling in different directions. The road diet would provide an opportunity for drivers turning left to move out of the travel lane and would result in fewer conflict points, easier maneuverability, and improved sight distance.

Crosswalks

The crosswalk at Sam Corey Senior Center was cited as dangerous for pedestrians because the traffic does not slow down or stop, even when the light is activated





Context Sensitive Solutions and Complete Streets

Design Excellence and Geometrics

A road diet on Cedar Street would support the existing and future land uses desired in the community. People in the community and Township leaders have expressed a goal of making the segment of Cedar Street between Aurelius and Holt Roads feel more like a downtown. Redesigning the street profile will create a safer environment for pedestrian traffic, provide opportunities for on-street parking, and calm the speed of through traffic.

Community Support

Delhi Township has undergone extensive public engagement to determine how Cedar Street can best serve the community in the future. The Township held three focus groups to gauge ideas about Cedar Street: one each for senior citizens, residents in the corridor, and business owners. Attendees at each focus group were asked about their big ideas for Cedar Street, participated in an exercise to rank goals and priorities, and took part in a visual preference survey. Residents were also asked to contribute big ideas and take the goal and priority ranking exercise through online surveys. Throughout all the public engagement, people expressed an interest in improving pedestrian safety and movement along Cedar Street, improving the flow of traffic and signal timing at key intersections, and adding new land uses to the corridor especially between Aurelius and Holt Roads. These goals can be supported by a road diet.

Pedestrian / Bicycle Accommodation and Mode Hierarchy

Discussion with Township staff and engagement with the public produced the desired modal hierarchy for Cedar Street between Aurelius and Holt Roads. Pedestrians will be given the highest priority, followed by bicyclists, vehicles, and transit respectively. There was a strong desire to improve pedestrian safety in this segment, but also a recognized need to allow for the movement of cars and to improve safety near several key intersections. Cedar Street is a key connection between both existing and planned bikeways and parallel bike routes. Adding marked shared lanes to Cedar Street will support potential bicycle riders there, which is a beneficial outcome of the road diet. The transit route serving Cedar Street only goes northbound toward Lansing, and pullout areas will be created along this section to provide operational space for buses. These pullout areas will also allow pedestrian bump outs to be constructed, and a future design operational analysis will not be needed for these bump outs based on the AADT of only 10,550 cars per day.



Cedar Street Operations

(Top) Because of the frequency of driveway access points and the lack of a center turn lane, parts of Cedar Street with four lanes function as if there were only three lanes

3Q Signal Timing

(Bottom) The intersections at Cedar and Aurelius and at Cedar and Holt would be improved with shared signal phasing to allow both directions of the road to move at once

Operations

De Facto Three Lane Operation

The segment of Cedar Street between Aurelius and Holt Roads often functions as a de facto three lane roadway. There are several small lots with small commercial buildings, single family houses, converted single family houses for offices, and others, resulting in a high driveway frequency. Traffic turning into these driveways can cause backups in either through lane, and drivers will often weave around turning cars to avoid having to stop. A three-lane profile moves left turning traffic to its own lane and does not allow for weaving around right turning traffic.

Speed and Traffic Calming

Pedestrian safety and the streetscape environment can be improved by reducing speed along this segment of Cedar Street. The overall operation of Cedar Street can also be improved by streamlining speed limits along the entire corridor. The speed limit south of the roundabout currently is 50 mph. This decreases to 25 mph in the roundabout, then up to 45 mph exiting the roundabout. The speed limit becomes 35 mph leading into and through the downtown area. The speed limits create erratic speed patterns and cause safety issues for all users of the corridor.

Delay

Based on traffic counts, minimal impact to the vehicle level of service (LOS), especially at off-peak times, is expected. Significant improvement in safety and operations, especially at on-peak times, is expected. Some delay should be tolerated based on the volume of peak hour traffic and the loss of a through lane in each direction. However, the safety and operation of the roadway can be improved by adding the left turn lane and eliminating the possibility of weaving.

Signal Timing

Signal timing at Cedar and Aurelius and at Cedar and Holt will be adjusted to improve the operation of the roadway. The signal at Aurelius currently allows only one segment of each road the chance to move per phase, meaning a complete cycle must go through four steps to go through each direction of each road. The signal at Holt currently has two phase cycles on Cedar and a dedicated left phase on Holt. With a three-lane profile, the approaches to these intersections will have a more natural separation of left turning traffic and through traffic, and the signals will be timed to allow both directions of the road to move at once. Operations analysis shows that shorter and more shared signal phasing will improve traffic flow on Cedar, as well as on Aurelius and Holt Roads and wait times will be reduced by a three lane profile. New on-street parking and off-street parking will reduce turning movements when motorists visit multiple destinations because they can park once.

Quality of Service (Multimodal Level of Service)

The multimodal level of service is likely to increase with a road diet. Pedestrian LOS scores are likely to improve due to the lane reduction, speed reduction, and addition of on-street parking. A refuge island for the crossing at Sam Corey Senior Center, as well as a HAWK signal, would greatly improve safety at this key mid-block crossing. Adding a refuge island would not require an operational analysis based on the Annual Average Daily Traffic (AADT) of 10,550 cars per day.

Annual Average Daily Traffic

The AADT for Cedar Street is approximately 10,550 vehicles per day based on data from May 18-19, 2016. Road diets are generally feasible for roads with an AADT of up to 24,000 cars per day, so Cedar Street falls well into the acceptable range.

Based on FHWA guidance, a roadway that has a design year AADT under 15,000 does not require an operational analysis. The current AADT based on our counts from May 18-19, 2016 is substantially lower than this benchmark. The amount of growth needed to reach 15,000 AADT would be about 36% growth over the next 10-20 years. There was construction on Cedar under Interstate 96 when the counts were taken, which may have diverted some traffic away from Cedar, but the Township engineer estimates the impact to be approximately 10%.

Peak Hour Peak Direction

The segment of Cedar Street between Aurelius and Holt Roads has a flat peak traffic time based on the proximity of several schools. Peak traffic is split among morning commute to work, morning drop off at school, afternoon pickup from school, and evening commute from work. A road diet will not adversely affect the peak traffic. Defined spaces for the different turning motions allows for better management of traffic at peak times.

Frequent Stopping/Slow Vehicles

Some transit and truck traffic exists along this portion of Cedar Street. There is a bus that only reaches as far south as Holt Road, and only travels north between Aurelius and Holt Roads. The proposed road design after the road diet includes designated pullout areas for buses and designated loading areas for delivery trucks. These spaces will help keep the flow of traffic moving while still providing the benefits of the road diet to the corridor, and bump outs can provide specific benefits to pedestrians without the need for an operational analysis.



Frequent Stopping Vehicles

Pullout areas for frequent stopping vehicles such as delivery trucks and buses will reduce the interruption of traffic flow



Rooftop art at Edru Skate

Bicycle, Pedestrian, Transit, and Freight Considerations

The three-lane profile of a road diet for Cedar Street can reduce conflicts between vehicles, bicyclists, and pedestrians, and decrease the complexity of traffic crossing maneuvers. Pedestrian activity would be expected to increase with improved safety and future land uses along the corridor. Bicycle activity would likely increase, as Cedar Street is near a regional trail network and the road diet will help fill a gap in this network. Transit and freight traffic would each be provided with their own spaces to pull out of travel lanes and not interrupt the traffic flow.

Other Factors

Cost and Right-of-Way

A road diet is feasible for Cedar Street because it can be accommodated using the width of the existing right of way. A road diet can be accomplished solely by re-striping the lanes. No additional right of way purchase is necessary, and the curb line does not need to be moved further back. Thus, a road diet can be accomplished within a reasonable budget.

Parallel Roadways

The segment of Cedar Street within Delhi Township is not a State Highway, but it is an National Highway System Map-21 Primary Arterial. Cedar is used mostly as a connector from Lansing to Mason. Parallel routes are available in the area. Traffic between Lansing and Mason, which acts as cut through traffic within Delhi Township, can use the freeway system including I-96 and US 127. Local traffic can use some nearby streets, although many of these streets go through neighborhoods and cut through traffic is discouraged. A bypass road was once considered for this corridor, and if necessary the bypass could be reconsidered in 20-30 years in case traffic volumes warrant such consideration.

Parking

Parking availability was cited as a key need in the corridor. The road diet will allow on-street parking to be added within strategic locations between Aurelius and Holt Roads. On-street parking will add to the total supply of parking in the area, support existing and future businesses, and help create a downtown feel along this section of Cedar Street.

Public Outreach and Political Considerations

The public engagement process has shown broad support for this project. People have cited key issues such as pedestrian safety, parking, and the lack of a downtown, which can all be addressed with a road diet. The Township and other regional stakeholders such as the Ingham County Road Department, the Lansing Economic Area Partnership and others support the Realize Cedar project.

ATTACHMENT B

September 11, 2017

Delhi Charter Township
2074 Aurelius Road
Holt, Michigan 48842

Attn: Tracy LC Miller, Director
Department of Community Development

Re: Cedar Street Traffic Analysis - ADDENDUM

HRC Job No. 20161043

Dear Ms. Miller:

Hubbell, Roth & Clark, Inc. (HRC) has updated the traffic analysis for the Cedar Street Road Diet from four lanes to three lanes from Aurelius Road to Holt Road in downtown Holt. The initial analysis was completed in August of 2016. HRC recollected traffic volumes in March of 2017 due to concerns from the Ingham County Road Department (ICRD).

To complete the traffic analysis, HRC undertook the following tasks:

- ≡ Collected turning movement counts during AM and PM Peak hours (7:00 -9:00 AM and 2:00 – 6:00 PM) at the following intersections:
 - ≡ Cedar Street and Aurelius Road and Keller Road
 - ≡ Cedar Street and Holt Road
- ≡ Projected future traffic volumes
- ≡ Conducted a capacity analysis for the intersections during AM and PM peak hours using Synchro 9 Software and the techniques outlined in the Transportation Research Board Highway Capacity Manual
- ≡ Prepared a letter report with our findings and recommendations

Data Collection

HRC collected three days of turning movement counts at the two intersections beginning Tuesday, March 21, 2017. At the Cedar/Aurelius/Keller intersection, the AM peak hour is 7:45 – 8:45 AM and the PM peak hour is 5:00 – 6:00 PM. At the Cedar/Holt intersection, the AM Peak hour 7:30 – 8:30 AM and the PM peak hour is 4:45 – 5:45 PM. **Attachment A** provides the peak hour turning movement counts for each intersection.

HRC previously collected data at the same intersections on Thursday, May 16, 2016. Due to a nearby construction project impacting traffic volumes, the ICRD had concerns that the traffic volumes were low. The 2016 turning movement counts were about 20% less during construction at the Cedar/Aurelius/Keller intersection than those collected in 2017 when traffic patterns had returned to normal. The turning movement counts at Cedar/Holt remained the same.

PRINCIPALS

Daniel W. Mitchell | Nancy M.D. Faught
Keith D. McCormack | Jesse B. VanDeCreek
Roland N. Alix | Michael C. MacDonald
James F. Burton | Charles E. Hart

SENIOR ASSOCIATES

Gary J. Tressel | Randal L. Ford
William R. Davis | Dennis J. Benoit
Robert F. DeFrain | Thomas D. LaCross
Albert P. Mickalich | Timothy H. Sullivan
Thomas G. Maxwell

ASSOCIATES

Marvin A. Olane | Marshall J. Grazioli
Donna M. Martin | Colleen L. Hill-Stramsak
Bradley W. Shepler | Karyn M. Stickel
Jane M. Graham | Todd J. Sneathen
Aaron A. Uranga | Salvatore Conigliaro

Future Volumes

When road conversions are proposed, it is typical to analyze the impact on current traffic volumes as well as future traffic volumes. HRC projected future traffic volumes to 2026. Based on recommendation from Tri-County Regional Planning Commission, an annual growth rate of 0.8% was applied over 10 years and resulted in an increase of 8% over 2016 volumes.

Intersection Capacity Analysis

HRC created a road network using Synchro 9 software and the Highway Capacity Manual (HCM) procedures for analysis. **Attachment B** contains Synchro reports for the analysis.

Signalized Intersections

For signalized intersections, the HCM defines level of service in terms of control delay. Delay may be measured in the field, or it may be estimated. Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the volume to capacity ratio for the lane group or approach in question. **Table 1** indicates the control delay criteria used for determining level of service (LOS) for signalized intersections.

Table 1: Level of Service Criteria for Signalized Intersections

| Level of Service | Control Delay per Vehicle (Seconds) |
|------------------|-------------------------------------|
| A | <10 |
| B | >10 to ≤ 20 |
| C | >20 to ≤ 35 |
| D | >35 to ≤ 55 |
| E | >55 to ≤ 80 |
| F | >80 |

Level of Service A describes operations with very low control delay up to 10.0 sec per vehicle. This occurs when progression is exceptionally favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of Service B describes operations with control delay in the range of 10.1 to 20.0 sec per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for Level of Service A, causing higher levels of average delay.

Level of Service C describes operations with control delay in the range of 20.1 to 35.0 sec per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of Service D describes operations with control delay in the range of 35.1 to 55.0 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E describes operations with control delay in the range of 55.1 to 80.0 sec per vehicle. This is above the limit of acceptable delay for an urban roadway in the study area. These high delay values generally indicate poor progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences.

Level of Service F describes operations with control delay more than 80.1 sec per vehicle. This is unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high volume to capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

A capacity analysis was conducted for the two signalized intersections during the AM and PM peak hours for four scenarios:

- ≡ Existing traffic volumes and existing 4-lane road
- ≡ Existing traffic volumes and 3-lane road
- ≡ Future traffic volumes and existing 3-lane road
- ≡ Future traffic volumes and 3-lane road

The 3-lane road analysis was completed with Keller Road realigned to the south. Keller Road would intersect with Cedar at a stop controlled intersection perpendicular to Cedar.

Table 2 provides the results of the AM and PM peak hour capacity analysis for the intersection of Cedar Street and Aurelius Road by scenario and movement. The Synchro results show an acceptable level of service for all scenarios and movements.

Table 2: Cedar Street and Aurelius Road Level of Service Comparison

| Approach/Lane | | Existing 4 Lane | | Existing 3 Lane | | Future 4 Lane | | Future 3 Lane | |
|------------------------------------|-----------|-----------------|-----|-----------------|-----|---------------|-----|---------------|-----|
| | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| AM Peak (7:45 AM - 8:45 AM) | | | | | | | | | |
| NB Aurelius | LT | 83.7 | F | 40.1 | D | 97.9 | F | 26.7 | C |
| | TH | 81.3 | F | 39.3 | D | 95.7 | F | 37.9 | D |
| SB Aurelius | LT | 50.2 | D | 36.0 | D | 47.8 | D | 34.8 | C |
| | TH | 56.8 | E | 38.5 | D | 55.2 | E | 37.0 | D |
| SEB Cedar | LT | - | - | 17.8 | B | - | - | 18.1 | B |
| | TH | 47.7 | D | 22.8 | C | 55.2 | E | 23.2 | C |
| | RT | 38.3 | D | 18.1 | B | 41.7 | D | 17.9 | B |
| NWB Cedar | LT | - | - | 15.9 | B | - | - | 11.7 | B |
| | TH | 52.5 | D | 34.4 | D | 57.3 | E | 34.3 | C |
| Intersection Total | | 61.9 | E | 32.1 | C | 67.1 | E | 30.1 | C |

Key: Highlighted cells have unacceptable levels of service (E or F)

Table 2: Cedar Street and Aurelius Road Level of Service Comparison (Cont.)

| Approach/Lane | | Existing 4 Lane | | Existing 3 Lane | | Future 4 Lane | | Future 3 Lane | |
|------------------------------------|-----------|-----------------|-----|-----------------|-----|---------------|-----|---------------|-----|
| | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| PM Peak (5:00 PM - 6:00 PM) | | | | | | | | | |
| NB Aurelius | LT | 76.2 | E | 48.9 | D | 86.2 | F | 44.6 | D |
| | TH | 73.5 | E | 37.7 | D | 82.6 | F | 43.1 | D |
| SB Aurelius | LT | 46.3 | D | 28.6 | C | 47.7 | D | 32.6 | C |
| | TH | 110.9 | F | 41.0 | D | 145.0 | F | 54.7 | D |
| SEB Cedar | LT | - | - | 21.3 | C | - | - | 24.9 | C |
| | TH | 52.4 | D | 25.8 | C | 56.1 | E | 29.4 | C |
| | RT | 45.7 | D | 19.6 | B | 47.4 | D | 21.7 | C |
| NWB Cedar | LT | - | - | 13.5 | B | - | - | 25.0 | C |
| | TH | 62.6 | E | 34.3 | C | 76.4 | E | 48.9 | D |
| Intersection Total | | 65.6 | E | 31.8 | C | 76.7 | E | 38.4 | D |

Key: Highlighted cells have unacceptable levels of service (E or F)

The signal timing plan at this intersection provides a separate phase for each approach for the 4-lane scenarios. For the 3-lane scenarios, southeast bound (SEB) and northwest bound (NWB) Cedar traffic share a phase and left turns are permitted. The signal timing was optimized for all scenarios. A proposed layout for the 3-lane geometry is shown in **Figure 1**.

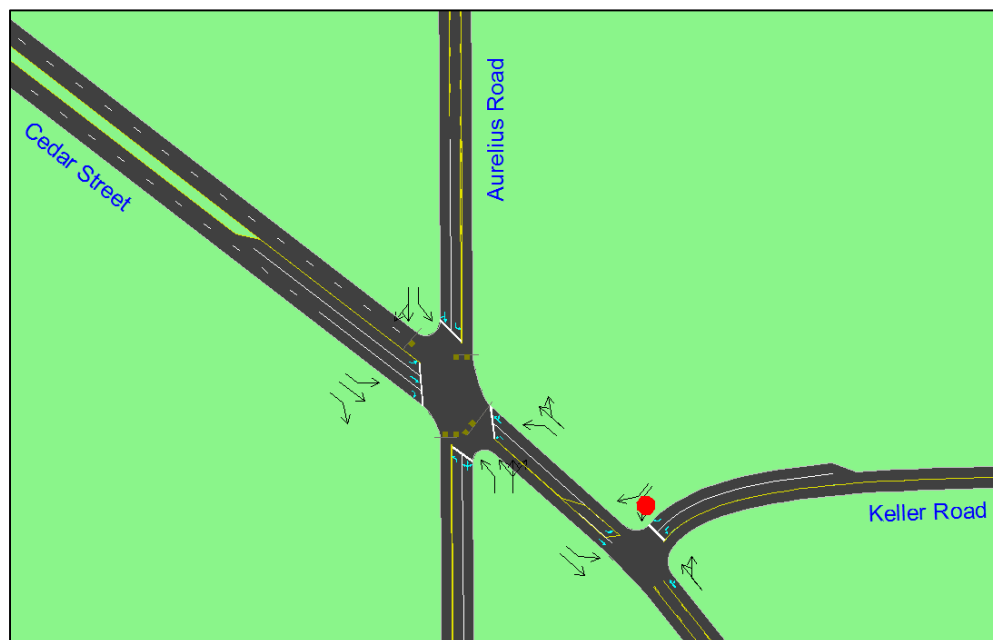


Figure 1: Proposed Three Lane Geometry on Cedar Street South of Aurelius Road

Table 3 provides the results of the AM and PM capacity analysis at the intersection of Cedar Street and Holt Road by scenario and movement. The Synchro results show an acceptable level of service in the

AM peak hour. In the PM peak hour, the WB and NWB through movements are currently experiencing a LOS E, which is not acceptable. In the future with the existing geometry, the delay will increase.

Table 3: Holt Road and Cedar Street Level of Service Comparison

| Approach/Lane | | Existing 4 Lane | | Existing 3 Lane | | Future 4 Lane | | Future 3 Lane | |
|------------------------------------|-----------|-----------------|-----|-----------------|-----|---------------|-----|---------------|-----|
| | | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| AM Peak (7:45 AM - 8:45 AM) | | | | | | | | | |
| EB Holt | LT | 26.8 | C | 12.9 | B | 18.3 | B | 13.2 | B |
| | TH | 62.6 | E | 28.2 | C | 39.4 | D | 28.0 | C |
| | RT | 31.1 | C | 20.2 | C | 22.3 | C | 29.4 | C |
| WB Holt | LT | 32.1 | C | 37.0 | D | 21.0 | C | 34.6 | C |
| | TH | 33.7 | C | 28.2 | C | 23.8 | C | 25.7 | C |
| | RT | 28.9 | C | 23.9 | C | 20.2 | C | 21.7 | C |
| SEB Cedar | LT | | | 17.1 | B | | | 37.8 | C |
| | TH | 55.5 | E | 13.8 | B | 45.3 | D | 25.8 | C |
| NWB Cedar | LT | | | 23.6 | C | | | 27.4 | C |
| | TH | 36.7 | D | 32.4 | C | 45.4 | D | 33.6 | C |
| Intersection Total | | 45.2 | D | 25.6 | C | 35.6 | D | 28.5 | C |
| PM Peak (5:00 PM - 6:00 PM) | | | | | | | | | |
| EB Holt | LT | 38.2 | D | 35.2 | D | 34.0 | C | 35.1 | D |
| | TH | 48.3 | D | 21.3 | C | 43.7 | D | 38.8 | D |
| | RT | 41.2 | D | 41.6 | D | 36.7 | D | 53.3 | D |
| WB Holt | LT | 33.5 | C | 24.0 | C | 29.5 | C | 27.8 | C |
| | TH | 58.0 | E | 34.2 | C | 53.7 | D | 38.6 | D |
| | RT | 39.0 | D | 24.1 | C | 34.8 | C | 26.2 | C |
| SEB Cedar | LT | | | 44.2 | D | | | 43.2 | D |
| | TH | 39.6 | D | 25.6 | C | 46.8 | D | 31.9 | C |
| NWB Cedar | LT | | | 30.1 | C | | | 38.0 | D |
| | TH | 92.1 | F | 40.1 | D | 72.2 | E | 46.8 | D |
| Intersection Total | | 60.5 | E | 32.2 | C | 53.7 | D | 39.0 | D |

Key: Highlighted cells have unacceptable levels of service (E or F)

The signal timing plan for this intersection provides a separate phase for SEB and NEB Cedar movements while EB and WB Holt movements share a through phase. It should be noted that the WB left-turns have a leading left turn phase and the EB left-turns have a lagging left turn phase. For the 3-lane scenarios, SEB/NWB and EB/WB are protected-permissive left-turn phases. The signal timing was optimized for all scenarios. A proposed layout for the 3-lane geometry is shown in **Figure 2**.

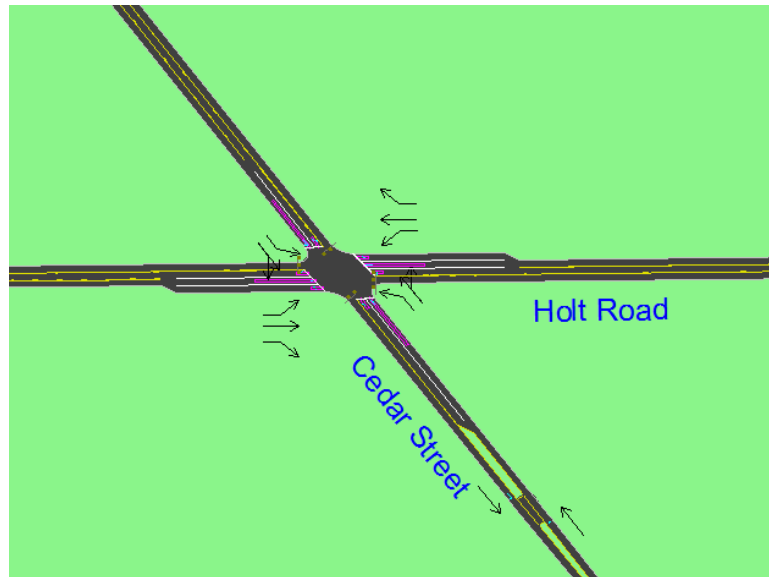


Figure 2. Proposed Three Lane Geometry on Cedar Street North of Holt Road

Findings and Recommendation

The traffic analysis has demonstrated that converting Cedar Street from four lanes to three lanes will not adversely impact traffic operations. The 3-lane scenario allows for more efficient operation of the traffic signals. The center left turn lane allows northwest and southeast Cedar traffic to travel at the same time, not separate times as in the four-lane scenario. The three-lane scenario and associated signal timings will improve the level of service at the two intersections.

The improvements will require realignment of Keller Road away from the intersection of Cedar Street and Aurelius Road. Keller Road should be realigned to the south so that it intersects Cedar Street at 90 degrees. Keller Road should be stop controlled.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Lia Michaels, P.E., PTOE
Project Engineer

COB/bjl

Attachment A – Turning Movement Counts
Attachment B – Synchro Reports

pc: HRC; J. Burton, T. Sneathen, File

Attachment A: Turning Movement Counts

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/21/2017

Location: Cedar & Aurelius (AM)

Counted by: HRC

File Name : Cedar_&_Aurelius_21_AM_393387_03-21-2017

Site Code : Cedar & Aurelius 21/AM

Start Date : 3/21/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 0 | 58 | 49 | 0 | 8 | 61 | 11 | 0 | 85 | 39 | 1 | 0 | 8 | 38 | 1 | 1 | 360 |
| 07:15 AM | 1 | 58 | 50 | 0 | 9 | 86 | 8 | 0 | 95 | 67 | 0 | 0 | 12 | 19 | 4 | 0 | 409 |
| 07:30 AM | 3 | 64 | 39 | 0 | 5 | 89 | 26 | 0 | 71 | 66 | 1 | 1 | 18 | 18 | 6 | 0 | 407 |
| 07:45 AM | 1 | 81 | 47 | 0 | 5 | 101 | 23 | 0 | 79 | 61 | 2 | 0 | 18 | 22 | 5 | 0 | 445 |
| Total | 5 | 261 | 185 | 0 | 27 | 337 | 68 | 0 | 330 | 233 | 4 | 1 | 56 | 97 | 16 | 1 | 1621 |
| 08:00 AM | 0 | 90 | 38 | 0 | 8 | 99 | 21 | 0 | 51 | 43 | 1 | 0 | 21 | 32 | 4 | 0 | 408 |
| 08:15 AM | 0 | 92 | 52 | 0 | 11 | 114 | 22 | 0 | 82 | 43 | 4 | 0 | 21 | 35 | 3 | 1 | 480 |
| 08:30 AM | 2 | 61 | 41 | 0 | 6 | 139 | 27 | 0 | 107 | 49 | 3 | 0 | 12 | 20 | 4 | 2 | 473 |
| 08:45 AM | 1 | 57 | 33 | 0 | 5 | 100 | 9 | 0 | 71 | 30 | 5 | 1 | 11 | 16 | 5 | 0 | 344 |
| Total | 3 | 300 | 164 | 0 | 30 | 452 | 79 | 0 | 311 | 165 | 13 | 1 | 65 | 103 | 16 | 3 | 1705 |
| Grand Total | 8 | 561 | 349 | 0 | 57 | 789 | 147 | 0 | 641 | 398 | 17 | 2 | 121 | 200 | 32 | 4 | 3326 |
| Apprch % | 0.9 | 61.1 | 38 | 0 | 5.7 | 79.5 | 14.8 | 0 | 60.6 | 37.6 | 1.6 | 0.2 | 33.9 | 56 | 9 | 1.1 | |
| Total % | 0.2 | 16.9 | 10.5 | 0 | 1.7 | 23.7 | 4.4 | 0 | 19.3 | 12 | 0.5 | 0.1 | 3.6 | 6 | 1 | 0.1 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 8 | 469 | 291 | 0 | 50 | 671 | 124 | 0 | 588 | 327 | 13 | 0 | 102 | 181 | 24 | 0 | 2848 |
| % Cars | 100 | 83.6 | 83.4 | 0 | 87.7 | 85 | 84.4 | 0 | 91.7 | 82.2 | 76.5 | 0 | 84.3 | 90.5 | 75 | 0 | 85.6 |
| Light Goods Vehicles | 0 | 79 | 43 | 0 | 5 | 98 | 13 | 0 | 42 | 56 | 4 | 0 | 12 | 14 | 4 | 0 | 370 |
| % Light Goods Vehicles | 0 | 14.1 | 12.3 | 0 | 8.8 | 12.4 | 8.8 | 0 | 6.6 | 14.1 | 23.5 | 0 | 9.9 | 7 | 12.5 | 0 | 11.1 |
| Buses | 0 | 7 | 6 | 0 | 2 | 12 | 5 | 0 | 1 | 7 | 0 | 0 | 4 | 4 | 1 | 0 | 49 |
| % Buses | 0 | 1.2 | 1.7 | 0 | 3.5 | 1.5 | 3.4 | 0 | 0.2 | 1.8 | 0 | 0 | 3.3 | 2 | 3.1 | 0 | 1.5 |
| Single-Unit Trucks | 0 | 5 | 8 | 0 | 0 | 8 | 4 | 0 | 8 | 8 | 0 | 0 | 3 | 1 | 2 | 0 | 47 |
| % Single-Unit Trucks | 0 | 0.9 | 2.3 | 0 | 0 | 1 | 2.7 | 0 | 1.2 | 2 | 0 | 0 | 2.5 | 0.5 | 6.2 | 0 | 1.4 |
| Articulated Trucks | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| % Articulated Trucks | 0 | 0.2 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 3.1 | 0 | 0.1 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 4 | 6 |
| % Pedestrians | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.2 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Aurelius (AM)
Counted by: HRC

File Name : Cedar_&_Aurelius_21_AM_393387_03-21-2017
Site Code : Cedar & Aurelius 21/AM
Start Date : 3/21/2017
Page No : 2

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | |
|--|--------------------|------|-------|------|------------|--------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 1 | 81 | 47 | 0 | 129 | 5 | 101 | 23 | 0 | 129 | 79 | 61 | 2 | 0 | 142 | 18 | 22 | 5 | 0 | 45 | 445 |
| 08:00 AM | 0 | 90 | 38 | 0 | 128 | 8 | 99 | 21 | 0 | 128 | 51 | 43 | 1 | 0 | 95 | 21 | 32 | 4 | 0 | 57 | 408 |
| 08:15 AM | 0 | 92 | 52 | 0 | 144 | 11 | 114 | 22 | 0 | 147 | 82 | 43 | 4 | 0 | 129 | 21 | 35 | 3 | 1 | 60 | 480 |
| 08:30 AM | 2 | 61 | 41 | 0 | 104 | 6 | 139 | 27 | 0 | 172 | 107 | 49 | 3 | 0 | 159 | 12 | 20 | 4 | 2 | 38 | 473 |
| Total Volume | 3 | 324 | 178 | 0 | 505 | 30 | 453 | 93 | 0 | 576 | 319 | 196 | 10 | 0 | 525 | 72 | 109 | 16 | 3 | 200 | 1806 |
| % App. Total | 0.6 | 64.2 | 35.2 | 0 | | 5.2 | 78.6 | 16.1 | 0 | | 60.8 | 37.3 | 1.9 | 0 | | 36 | 54.5 | 8 | 1.5 | | |
| PHF | .375 | .880 | .856 | .000 | .877 | .682 | .815 | .861 | .000 | .837 | .745 | .803 | .625 | .000 | .825 | .857 | .779 | .800 | .375 | .833 | .941 |

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Location: Cedar & Aurelius (PM)

Counted by: HRC

File Name : Cedar_&_Aurelius_21_PM_393389_03-21-2017

Site Code : Cedar & Aurelius 21/PM

Start Date : 3/21/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 7 | 91 | 66 | 0 | 6 | 111 | 16 | 1 | 60 | 35 | 4 | 1 | 14 | 22 | 6 | 0 | 440 |
| 02:15 PM | 4 | 102 | 74 | 1 | 7 | 95 | 15 | 0 | 55 | 26 | 3 | 1 | 29 | 31 | 3 | 1 | 447 |
| 02:30 PM | 5 | 98 | 67 | 0 | 4 | 104 | 17 | 0 | 84 | 34 | 4 | 0 | 20 | 44 | 9 | 0 | 490 |
| 02:45 PM | 5 | 85 | 70 | 3 | 11 | 104 | 20 | 2 | 72 | 51 | 6 | 0 | 11 | 36 | 5 | 2 | 483 |
| Total | 21 | 376 | 277 | 4 | 28 | 414 | 68 | 3 | 271 | 146 | 17 | 2 | 74 | 133 | 23 | 3 | 1860 |
| 03:00 PM | 6 | 104 | 73 | 2 | 10 | 114 | 17 | 2 | 57 | 34 | 6 | 1 | 16 | 45 | 3 | 1 | 491 |
| 03:15 PM | 3 | 97 | 110 | 1 | 8 | 103 | 20 | 0 | 53 | 35 | 6 | 1 | 30 | 65 | 5 | 0 | 537 |
| 03:30 PM | 5 | 100 | 79 | 5 | 7 | 142 | 17 | 1 | 64 | 50 | 11 | 2 | 17 | 37 | 6 | 0 | 543 |
| 03:45 PM | 9 | 86 | 73 | 2 | 13 | 160 | 21 | 6 | 98 | 51 | 6 | 0 | 16 | 47 | 8 | 3 | 599 |
| Total | 23 | 387 | 335 | 10 | 38 | 519 | 75 | 9 | 272 | 170 | 29 | 4 | 79 | 194 | 22 | 4 | 2170 |
| 04:00 PM | 7 | 96 | 69 | 0 | 5 | 103 | 19 | 2 | 79 | 44 | 3 | 0 | 26 | 45 | 4 | 0 | 502 |
| 04:15 PM | 2 | 64 | 85 | 0 | 6 | 114 | 13 | 3 | 57 | 39 | 3 | 0 | 15 | 51 | 7 | 0 | 459 |
| 04:30 PM | 1 | 111 | 100 | 0 | 2 | 123 | 20 | 4 | 81 | 31 | 3 | 0 | 28 | 54 | 3 | 1 | 562 |
| 04:45 PM | 11 | 103 | 102 | 1 | 7 | 125 | 19 | 0 | 57 | 40 | 2 | 0 | 28 | 55 | 4 | 0 | 554 |
| Total | 21 | 374 | 356 | 1 | 20 | 465 | 71 | 9 | 274 | 154 | 11 | 0 | 97 | 205 | 18 | 1 | 2077 |
| 05:00 PM | 7 | 114 | 98 | 0 | 9 | 126 | 22 | 0 | 81 | 44 | 2 | 0 | 23 | 70 | 1 | 0 | 597 |
| 05:15 PM | 6 | 114 | 102 | 0 | 15 | 162 | 29 | 1 | 80 | 37 | 1 | 1 | 32 | 82 | 6 | 1 | 669 |
| 05:30 PM | 6 | 112 | 101 | 0 | 12 | 106 | 14 | 0 | 77 | 36 | 6 | 0 | 20 | 71 | 1 | 0 | 562 |
| 05:45 PM | 5 | 78 | 84 | 0 | 7 | 115 | 15 | 0 | 70 | 40 | 7 | 0 | 14 | 49 | 3 | 1 | 488 |
| Total | 24 | 418 | 385 | 0 | 43 | 509 | 80 | 1 | 308 | 157 | 16 | 1 | 89 | 272 | 11 | 2 | 2316 |
| Grand Total | 89 | 1555 | 1353 | 15 | 129 | 1907 | 294 | 22 | 1125 | 627 | 73 | 7 | 339 | 804 | 74 | 10 | 8423 |
| Apprch % | 3 | 51.6 | 44.9 | 0.5 | 5.5 | 81.1 | 12.5 | 0.9 | 61.4 | 34.2 | 4 | 0.4 | 27.6 | 65.5 | 6 | 0.8 | |
| Total % | 1.1 | 18.5 | 16.1 | 0.2 | 1.5 | 22.6 | 3.5 | 0.3 | 13.4 | 7.4 | 0.9 | 0.1 | 4 | 9.5 | 0.9 | 0.1 | |
| Motorcycles | 0 | 2 | 1 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 8 |
| % Motorcycles | 0 | 0.1 | 0.1 | 0 | 0 | 0.2 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0.1 |
| Cars | 86 | 1289 | 1158 | 0 | 110 | 1627 | 247 | 0 | 1012 | 516 | 56 | 0 | 270 | 690 | 71 | 0 | 7132 |
| % Cars | 96.6 | 82.9 | 85.6 | 0 | 85.3 | 85.3 | 84 | 0 | 90 | 82.3 | 76.7 | 0 | 79.6 | 85.8 | 95.9 | 0 | 84.7 |
| Light Goods Vehicles | 3 | 230 | 169 | 0 | 17 | 242 | 36 | 0 | 97 | 83 | 16 | 0 | 59 | 98 | 2 | 0 | 1052 |
| % Light Goods Vehicles | 3.4 | 14.8 | 12.5 | 0 | 13.2 | 12.7 | 12.2 | 0 | 8.6 | 13.2 | 21.9 | 0 | 17.4 | 12.2 | 2.7 | 0 | 12.5 |
| Buses | 0 | 11 | 15 | 0 | 0 | 19 | 5 | 0 | 2 | 20 | 0 | 0 | 5 | 10 | 1 | 0 | 88 |
| % Buses | 0 | 0.7 | 1.1 | 0 | 0 | 1 | 1.7 | 0 | 0.2 | 3.2 | 0 | 0 | 1.5 | 1.2 | 1.4 | 0 | 1 |
| Single-Unit Trucks | 0 | 18 | 10 | 0 | 2 | 12 | 6 | 0 | 12 | 5 | 1 | 0 | 1 | 3 | 0 | 0 | 70 |
| % Single-Unit Trucks | 0 | 1.2 | 0.7 | 0 | 1.6 | 0.6 | 2 | 0 | 1.1 | 0.8 | 1.4 | 0 | 0.3 | 0.4 | 0 | 0 | 0.8 |

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Site Code : Cedar & Aurelius 21/PM
Start Date : 3/21/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|-----------------|------|-------|------|-----------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 5 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 3 | 0 | 0 | 3 | 2 | 0 | 0 | 18 |
| % Articulated Trucks | 0 | 0.3 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0.1 | 0.5 | 0 | 0 | 0.9 | 0.2 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 6.7 | 0 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| Pedestrians | 0 | 0 | 0 | 14 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 8 | 50 |
| % Pedestrians | 0 | 0 | 0 | 93.3 | 0 | 0 | 0 | 95.5 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 80 | 0.6 |

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | Int. Total |
|--|-----------------|------|-------|------|------------|-----------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:30 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:30 PM | 1 | 111 | 100 | 0 | 212 | 2 | 123 | 20 | 4 | 149 | 81 | 31 | 3 | 0 | 115 | 28 | 54 | 3 | 1 | 86 | 562 |
| 04:45 PM | 11 | 103 | 102 | 1 | 217 | 7 | 125 | 19 | 0 | 151 | 57 | 40 | 2 | 0 | 99 | 28 | 55 | 4 | 0 | 87 | 554 |
| 05:00 PM | 7 | 114 | 98 | 0 | 219 | 9 | 126 | 22 | 0 | 157 | 81 | 44 | 2 | 0 | 127 | 23 | 70 | 1 | 0 | 94 | 597 |
| 05:15 PM | 6 | 114 | 102 | 0 | 222 | 15 | 162 | 29 | 1 | 207 | 80 | 37 | 1 | 1 | 119 | 32 | 82 | 6 | 1 | 121 | 669 |
| Total Volume | 25 | 442 | 402 | 1 | 870 | 33 | 536 | 90 | 5 | 664 | 299 | 152 | 8 | 1 | 460 | 111 | 261 | 14 | 2 | 388 | 2382 |
| % App. Total | 2.9 | 50.8 | 46.2 | 0.1 | | 5 | 80.7 | 13.6 | 0.8 | | 65 | 33 | 1.7 | 0.2 | | 28.6 | 67.3 | 3.6 | 0.5 | | |
| PHF | .568 | .969 | .985 | .250 | .980 | .550 | .827 | .776 | .313 | .802 | .923 | .864 | .667 | .250 | .906 | .867 | .796 | .583 | .500 | .802 | .890 |

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Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/22/2017

Location: Cedar & Aurelius (AM)

Counted by: HRC

File Name : Cedar_&_Aurelius_22_AM_393391_03-22-2017

Site Code : Cedar & Aurelius 22/AM

Start Date : 3/22/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 0 | 52 | 35 | 1 | 1 | 65 | 14 | 0 | 50 | 29 | 1 | 0 | 12 | 18 | 6 | 0 | 284 |
| 07:15 AM | 0 | 48 | 33 | 0 | 4 | 81 | 9 | 0 | 64 | 41 | 1 | 1 | 8 | 11 | 1 | 3 | 305 |
| 07:30 AM | 3 | 68 | 41 | 0 | 7 | 98 | 17 | 1 | 74 | 52 | 0 | 0 | 17 | 22 | 2 | 0 | 402 |
| 07:45 AM | 2 | 90 | 44 | 0 | 5 | 87 | 33 | 0 | 66 | 74 | 3 | 1 | 25 | 31 | 7 | 0 | 468 |
| Total | 5 | 258 | 153 | 1 | 17 | 331 | 73 | 1 | 254 | 196 | 5 | 2 | 62 | 82 | 16 | 3 | 1459 |
| 08:00 AM | 1 | 95 | 41 | 0 | 7 | 98 | 16 | 1 | 48 | 45 | 2 | 1 | 20 | 30 | 3 | 0 | 408 |
| 08:15 AM | 1 | 96 | 53 | 0 | 13 | 136 | 25 | 0 | 62 | 38 | 4 | 0 | 28 | 28 | 3 | 1 | 488 |
| 08:30 AM | 1 | 61 | 45 | 0 | 8 | 150 | 20 | 0 | 108 | 56 | 3 | 0 | 11 | 23 | 2 | 0 | 488 |
| 08:45 AM | 1 | 71 | 42 | 0 | 4 | 80 | 8 | 0 | 62 | 31 | 3 | 0 | 15 | 21 | 5 | 1 | 344 |
| Total | 4 | 323 | 181 | 0 | 32 | 464 | 69 | 1 | 280 | 170 | 12 | 1 | 74 | 102 | 13 | 2 | 1728 |
| Grand Total | 9 | 581 | 334 | 1 | 49 | 795 | 142 | 2 | 534 | 366 | 17 | 3 | 136 | 184 | 29 | 5 | 3187 |
| Apprch % | 1 | 62.8 | 36.1 | 0.1 | 5 | 80.5 | 14.4 | 0.2 | 58 | 39.8 | 1.8 | 0.3 | 38.4 | 52 | 8.2 | 1.4 | |
| Total % | 0.3 | 18.2 | 10.5 | 0 | 1.5 | 24.9 | 4.5 | 0.1 | 16.8 | 11.5 | 0.5 | 0.1 | 4.3 | 5.8 | 0.9 | 0.2 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 7 | 484 | 263 | 0 | 41 | 657 | 115 | 0 | 452 | 298 | 9 | 0 | 111 | 160 | 26 | 0 | 2623 |
| % Cars | 77.8 | 83.3 | 78.7 | 0 | 83.7 | 82.6 | 81 | 0 | 84.6 | 81.4 | 52.9 | 0 | 81.6 | 87 | 89.7 | 0 | 82.3 |
| Light Goods Vehicles | 2 | 84 | 61 | 0 | 5 | 113 | 22 | 0 | 69 | 60 | 7 | 0 | 17 | 15 | 1 | 0 | 456 |
| % Light Goods Vehicles | 22.2 | 14.5 | 18.3 | 0 | 10.2 | 14.2 | 15.5 | 0 | 12.9 | 16.4 | 41.2 | 0 | 12.5 | 8.2 | 3.4 | 0 | 14.3 |
| Buses | 0 | 4 | 6 | 0 | 2 | 13 | 4 | 0 | 7 | 1 | 0 | 0 | 4 | 5 | 1 | 0 | 47 |
| % Buses | 0 | 0.7 | 1.8 | 0 | 4.1 | 1.6 | 2.8 | 0 | 1.3 | 0.3 | 0 | 0 | 2.9 | 2.7 | 3.4 | 0 | 1.5 |
| Single-Unit Trucks | 0 | 6 | 3 | 0 | 1 | 12 | 1 | 0 | 5 | 7 | 0 | 0 | 3 | 4 | 0 | 0 | 42 |
| % Single-Unit Trucks | 0 | 1 | 0.9 | 0 | 2 | 1.5 | 0.7 | 0 | 0.9 | 1.9 | 0 | 0 | 2.2 | 2.2 | 0 | 0 | 1.3 |
| Articulated Trucks | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 8 |
| % Articulated Trucks | 0 | 0.5 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 5.9 | 0 | 0.7 | 0 | 3.4 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 5 | 11 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.3 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Aurelius (AM)
Counted by: HRC

File Name : Cedar_&_Aurelius_22_AM_393391_03-22-2017
Site Code : Cedar & Aurelius 22/AM
Start Date : 3/22/2017
Page No : 2

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | |
|--|--------------------|------|-------|------|------------|--------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 2 | 90 | 44 | 0 | 136 | 5 | 87 | 33 | 0 | 125 | 66 | 74 | 3 | 1 | 144 | 25 | 31 | 7 | 0 | 63 | 468 |
| 08:00 AM | 1 | 95 | 41 | 0 | 137 | 7 | 98 | 16 | 1 | 122 | 48 | 45 | 2 | 1 | 96 | 20 | 30 | 3 | 0 | 53 | 408 |
| 08:15 AM | 1 | 96 | 53 | 0 | 150 | 13 | 136 | 25 | 0 | 174 | 62 | 38 | 4 | 0 | 104 | 28 | 28 | 3 | 1 | 60 | 488 |
| 08:30 AM | 1 | 61 | 45 | 0 | 107 | 8 | 150 | 20 | 0 | 178 | 108 | 56 | 3 | 0 | 167 | 11 | 23 | 2 | 0 | 36 | 488 |
| Total Volume | 5 | 342 | 183 | 0 | 530 | 33 | 471 | 94 | 1 | 599 | 284 | 213 | 12 | 2 | 511 | 84 | 112 | 15 | 1 | 212 | 1852 |
| % App. Total | 0.9 | 64.5 | 34.5 | 0 | | 5.5 | 78.6 | 15.7 | 0.2 | | 55.6 | 41.7 | 2.3 | 0.4 | | 39.6 | 52.8 | 7.1 | 0.5 | | |
| PHF | .625 | .891 | .863 | .000 | .883 | .635 | .785 | .712 | .250 | .841 | .657 | .720 | .750 | .500 | .765 | .750 | .903 | .536 | .250 | .841 | .949 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/22/2017

Location: Cedar & Aurelius (PM)

Counted by: HRC

File Name : Cedar_&_Aurelius_22_PM_393395_03-22-2017

Site Code : Cedar & Aurelius 22/PM

Start Date : 3/22/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 3 | 115 | 80 | 0 | 8 | 131 | 13 | 5 | 99 | 43 | 4 | 0 | 13 | 30 | 6 | 0 | 550 |
| 02:15 PM | 6 | 99 | 75 | 0 | 3 | 97 | 13 | 1 | 63 | 45 | 4 | 0 | 16 | 24 | 3 | 2 | 451 |
| 02:30 PM | 7 | 103 | 82 | 0 | 8 | 121 | 15 | 0 | 65 | 41 | 6 | 0 | 16 | 46 | 10 | 2 | 522 |
| 02:45 PM | 4 | 83 | 97 | 1 | 5 | 94 | 16 | 0 | 84 | 52 | 5 | 0 | 13 | 22 | 7 | 0 | 483 |
| Total | 20 | 400 | 334 | 1 | 24 | 443 | 57 | 6 | 311 | 181 | 19 | 0 | 58 | 122 | 26 | 4 | 2006 |
| 03:00 PM | 2 | 85 | 81 | 0 | 9 | 116 | 16 | 3 | 62 | 40 | 3 | 0 | 18 | 39 | 3 | 2 | 479 |
| 03:15 PM | 4 | 80 | 68 | 0 | 7 | 91 | 9 | 3 | 67 | 24 | 6 | 0 | 14 | 28 | 8 | 1 | 410 |
| 03:30 PM | 7 | 87 | 71 | 0 | 6 | 117 | 9 | 0 | 71 | 28 | 5 | 0 | 23 | 42 | 3 | 0 | 469 |
| 03:45 PM | 10 | 89 | 85 | 0 | 6 | 80 | 14 | 0 | 77 | 35 | 6 | 1 | 20 | 46 | 2 | 0 | 471 |
| Total | 23 | 341 | 305 | 0 | 28 | 404 | 48 | 6 | 277 | 127 | 20 | 1 | 75 | 155 | 16 | 3 | 1829 |
| 04:00 PM | 6 | 75 | 75 | 0 | 4 | 124 | 26 | 0 | 64 | 25 | 6 | 0 | 21 | 43 | 4 | 1 | 474 |
| 04:15 PM | 4 | 109 | 80 | 0 | 6 | 89 | 15 | 0 | 45 | 37 | 1 | 0 | 22 | 41 | 7 | 0 | 456 |
| 04:30 PM | 4 | 98 | 75 | 0 | 6 | 117 | 15 | 0 | 61 | 49 | 3 | 0 | 20 | 51 | 4 | 0 | 503 |
| 04:45 PM | 5 | 116 | 100 | 0 | 9 | 97 | 19 | 1 | 69 | 36 | 3 | 0 | 28 | 61 | 5 | 0 | 549 |
| Total | 19 | 398 | 330 | 0 | 25 | 427 | 75 | 1 | 239 | 147 | 13 | 0 | 91 | 196 | 20 | 1 | 1982 |
| 05:00 PM | 3 | 113 | 104 | 2 | 9 | 159 | 27 | 1 | 64 | 54 | 2 | 0 | 26 | 62 | 3 | 1 | 630 |
| 05:15 PM | 8 | 100 | 115 | 3 | 13 | 142 | 20 | 0 | 71 | 27 | 2 | 0 | 36 | 63 | 7 | 0 | 607 |
| 05:30 PM | 8 | 102 | 107 | 2 | 5 | 128 | 22 | 0 | 68 | 37 | 3 | 0 | 23 | 71 | 6 | 3 | 585 |
| 05:45 PM | 5 | 120 | 94 | 1 | 7 | 89 | 16 | 2 | 79 | 41 | 4 | 1 | 21 | 56 | 4 | 1 | 541 |
| Total | 24 | 435 | 420 | 8 | 34 | 518 | 85 | 3 | 282 | 159 | 11 | 1 | 106 | 252 | 20 | 5 | 2363 |
| Grand Total | 86 | 1574 | 1389 | 9 | 111 | 1792 | 265 | 16 | 1109 | 614 | 63 | 2 | 330 | 725 | 82 | 13 | 8180 |
| Apprch % | 2.8 | 51.5 | 45.4 | 0.3 | 5.1 | 82.1 | 12.1 | 0.7 | 62 | 34.3 | 3.5 | 0.1 | 28.7 | 63 | 7.1 | 1.1 | |
| Total % | 1.1 | 19.2 | 17 | 0.1 | 1.4 | 21.9 | 3.2 | 0.2 | 13.6 | 7.5 | 0.8 | 0 | 4 | 8.9 | 1 | 0.2 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 82 | 1313 | 1227 | 0 | 88 | 1480 | 229 | 0 | 1002 | 522 | 56 | 0 | 268 | 617 | 76 | 0 | 6960 |
| % Cars | 95.3 | 83.4 | 88.3 | 0 | 79.3 | 82.6 | 86.4 | 0 | 90.4 | 85 | 88.9 | 0 | 81.2 | 85.1 | 92.7 | 0 | 85.1 |
| Light Goods Vehicles | 4 | 240 | 137 | 0 | 20 | 279 | 27 | 0 | 96 | 63 | 6 | 0 | 49 | 89 | 5 | 0 | 1015 |
| % Light Goods Vehicles | 4.7 | 15.2 | 9.9 | 0 | 18 | 15.6 | 10.2 | 0 | 8.7 | 10.3 | 9.5 | 0 | 14.8 | 12.3 | 6.1 | 0 | 12.4 |
| Buses | 0 | 5 | 14 | 0 | 3 | 15 | 3 | 0 | 4 | 15 | 1 | 0 | 4 | 8 | 0 | 0 | 72 |
| % Buses | 0 | 0.3 | 1 | 0 | 2.7 | 0.8 | 1.1 | 0 | 0.4 | 2.4 | 1.6 | 0 | 1.2 | 1.1 | 0 | 0 | 0.9 |
| Single-Unit Trucks | 0 | 12 | 9 | 0 | 0 | 16 | 5 | 0 | 7 | 11 | 0 | 0 | 6 | 9 | 1 | 0 | 76 |
| % Single-Unit Trucks | 0 | 0.8 | 0.6 | 0 | 0 | 0.9 | 1.9 | 0 | 0.6 | 1.8 | 0 | 0 | 1.8 | 1.2 | 1.2 | 0 | 0.9 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
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Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Aurelius (PM)
Counted by: HRC

File Name : Cedar_&_Aurelius_22_PM_393395_03-22-2017
Site Code : Cedar & Aurelius 22/PM
Start Date : 3/22/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|-----------------|------|-------|------|-----------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 4 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | 0 | 0 | 3 | 2 | 0 | 0 | 17 |
| % Articulated Trucks | 0 | 0.3 | 0.1 | 0 | 0 | 0.1 | 0.4 | 0 | 0 | 0.5 | 0 | 0 | 0.9 | 0.3 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 13 | 39 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 93.8 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.5 |

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | Int. Total |
|--|-----------------|------|-------|------|------------|-----------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:45 PM | 5 | 116 | 100 | 0 | 221 | 9 | 97 | 19 | 1 | 126 | 69 | 36 | 3 | 0 | 108 | 28 | 61 | 5 | 0 | 94 | 549 |
| 05:00 PM | 3 | 113 | 104 | 2 | 222 | 9 | 159 | 27 | 1 | 196 | 64 | 54 | 2 | 0 | 120 | 26 | 62 | 3 | 1 | 92 | 630 |
| 05:15 PM | 8 | 100 | 115 | 3 | 226 | 13 | 142 | 20 | 0 | 175 | 71 | 27 | 2 | 0 | 100 | 36 | 63 | 7 | 0 | 106 | 607 |
| 05:30 PM | 8 | 102 | 107 | 2 | 219 | 5 | 128 | 22 | 0 | 155 | 68 | 37 | 3 | 0 | 108 | 23 | 71 | 6 | 3 | 103 | 585 |
| Total Volume | 24 | 431 | 426 | 7 | 888 | 36 | 526 | 88 | 2 | 652 | 272 | 154 | 10 | 0 | 436 | 113 | 257 | 21 | 4 | 395 | 2371 |
| % App. Total | 2.7 | 48.5 | 48 | 0.8 | | 5.5 | 80.7 | 13.5 | 0.3 | | 62.4 | 35.3 | 2.3 | 0 | | 28.6 | 65.1 | 5.3 | 1 | | |
| PHF | .750 | .929 | .926 | .583 | .982 | .692 | .827 | .815 | .500 | .832 | .958 | .713 | .833 | .000 | .908 | .785 | .905 | .750 | .333 | .932 | .941 |

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555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Aurelius (AM)

Counted by: HRC

File Name : Cedar_&_Aurelius_23_AM_393398_03-23-2017

Site Code : Cedar & Aurelius 23/AM

Start Date : 3/23/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 0 | 45 | 57 | 0 | 8 | 70 | 5 | 0 | 90 | 40 | 2 | 0 | 13 | 37 | 2 | 1 | 370 |
| 07:15 AM | 1 | 49 | 52 | 0 | 6 | 73 | 12 | 0 | 102 | 53 | 2 | 1 | 12 | 22 | 6 | 0 | 391 |
| 07:30 AM | 2 | 68 | 44 | 1 | 6 | 112 | 19 | 0 | 85 | 60 | 3 | 0 | 16 | 19 | 1 | 0 | 436 |
| 07:45 AM | 1 | 90 | 47 | 1 | 6 | 98 | 23 | 0 | 82 | 69 | 3 | 0 | 24 | 20 | 7 | 1 | 472 |
| Total | 4 | 252 | 200 | 2 | 26 | 353 | 59 | 0 | 359 | 222 | 10 | 1 | 65 | 98 | 16 | 2 | 1669 |
| 08:00 AM | 1 | 91 | 54 | 1 | 3 | 88 | 12 | 0 | 73 | 37 | 1 | 0 | 28 | 35 | 2 | 1 | 427 |
| 08:15 AM | 5 | 103 | 58 | 0 | 9 | 120 | 23 | 0 | 70 | 43 | 2 | 0 | 21 | 41 | 1 | 0 | 496 |
| 08:30 AM | 1 | 62 | 42 | 0 | 5 | 131 | 21 | 0 | 119 | 42 | 3 | 3 | 14 | 17 | 5 | 0 | 465 |
| 08:45 AM | 3 | 70 | 50 | 1 | 5 | 73 | 10 | 1 | 89 | 40 | 3 | 1 | 12 | 27 | 6 | 0 | 391 |
| Total | 10 | 326 | 204 | 2 | 22 | 412 | 66 | 1 | 351 | 162 | 9 | 4 | 75 | 120 | 14 | 1 | 1779 |
| Grand Total | 14 | 578 | 404 | 4 | 48 | 765 | 125 | 1 | 710 | 384 | 19 | 5 | 140 | 218 | 30 | 3 | 3448 |
| Apprch % | 1.4 | 57.8 | 40.4 | 0.4 | 5.1 | 81.5 | 13.3 | 0.1 | 63.5 | 34.3 | 1.7 | 0.4 | 35.8 | 55.8 | 7.7 | 0.8 | |
| Total % | 0.4 | 16.8 | 11.7 | 0.1 | 1.4 | 22.2 | 3.6 | 0 | 20.6 | 11.1 | 0.6 | 0.1 | 4.1 | 6.3 | 0.9 | 0.1 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 13 | 479 | 342 | 0 | 42 | 630 | 100 | 0 | 621 | 325 | 16 | 0 | 110 | 194 | 29 | 0 | 2901 |
| % Cars | 92.9 | 82.9 | 84.7 | 0 | 87.5 | 82.4 | 80 | 0 | 87.5 | 84.6 | 84.2 | 0 | 78.6 | 89 | 96.7 | 0 | 84.1 |
| Light Goods Vehicles | 1 | 85 | 55 | 0 | 5 | 117 | 19 | 0 | 81 | 51 | 1 | 0 | 19 | 13 | 1 | 0 | 448 |
| % Light Goods Vehicles | 7.1 | 14.7 | 13.6 | 0 | 10.4 | 15.3 | 15.2 | 0 | 11.4 | 13.3 | 5.3 | 0 | 13.6 | 6 | 3.3 | 0 | 13 |
| Buses | 0 | 5 | 6 | 0 | 1 | 10 | 4 | 0 | 4 | 5 | 1 | 0 | 8 | 5 | 0 | 0 | 49 |
| % Buses | 0 | 0.9 | 1.5 | 0 | 2.1 | 1.3 | 3.2 | 0 | 0.6 | 1.3 | 5.3 | 0 | 5.7 | 2.3 | 0 | 0 | 1.4 |
| Single-Unit Trucks | 0 | 8 | 1 | 0 | 0 | 7 | 1 | 0 | 2 | 3 | 1 | 0 | 3 | 4 | 0 | 0 | 30 |
| % Single-Unit Trucks | 0 | 1.4 | 0.2 | 0 | 0 | 0.9 | 0.8 | 0 | 0.3 | 0.8 | 5.3 | 0 | 2.1 | 1.8 | 0 | 0 | 0.9 |
| Articulated Trucks | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 7 |
| % Articulated Trucks | 0 | 0.2 | 0 | 0 | 0 | 0.1 | 0.8 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 3 | 13 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.4 |

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Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Aurelius (AM)
Counted by: HRC

File Name : Cedar_&_Aurelius_23_AM_393398_03-23-2017
Site Code : Cedar & Aurelius 23/AM
Start Date : 3/23/2017
Page No : 2

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | |
|--|--------------------|------|-------|------|------------|--------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 1 | 90 | 47 | 1 | 139 | 6 | 98 | 23 | 0 | 127 | 82 | 69 | 3 | 0 | 154 | 24 | 20 | 7 | 1 | 52 | 472 |
| 08:00 AM | 1 | 91 | 54 | 1 | 147 | 3 | 88 | 12 | 0 | 103 | 73 | 37 | 1 | 0 | 111 | 28 | 35 | 2 | 1 | 66 | 427 |
| 08:15 AM | 5 | 103 | 58 | 0 | 166 | 9 | 120 | 23 | 0 | 152 | 70 | 43 | 2 | 0 | 115 | 21 | 41 | 1 | 0 | 63 | 496 |
| 08:30 AM | 1 | 62 | 42 | 0 | 105 | 5 | 131 | 21 | 0 | 157 | 119 | 42 | 3 | 3 | 167 | 14 | 17 | 5 | 0 | 36 | 465 |
| Total Volume | 8 | 346 | 201 | 2 | 557 | 23 | 437 | 79 | 0 | 539 | 344 | 191 | 9 | 3 | 547 | 87 | 113 | 15 | 2 | 217 | 1860 |
| % App. Total | 1.4 | 62.1 | 36.1 | 0.4 | | 4.3 | 81.1 | 14.7 | 0 | | 62.9 | 34.9 | 1.6 | 0.5 | | 40.1 | 52.1 | 6.9 | 0.9 | | |
| PHF | .400 | .840 | .866 | .500 | .839 | .639 | .834 | .859 | .000 | .858 | .723 | .692 | .750 | .250 | .819 | .777 | .689 | .536 | .500 | .822 | .938 |

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Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Aurelius (PM)

Counted by: HRC

File Name : Cedar_&_Aurelius_23_PM_393400_03-23-2017

Site Code : Cedar & Aurelius 23/PM

Start Date : 3/23/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|------------------------|--------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|------------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 4 | 103 | 72 | 0 | 4 | 91 | 19 | 0 | 46 | 23 | 4 | 0 | 10 | 34 | 3 | 2 | 415 |
| 02:15 PM | 5 | 96 | 93 | 1 | 4 | 76 | 17 | 0 | 59 | 31 | 5 | 0 | 16 | 35 | 3 | 1 | 442 |
| 02:30 PM | 2 | 92 | 65 | 0 | 5 | 136 | 17 | 0 | 70 | 37 | 1 | 0 | 15 | 38 | 8 | 0 | 486 |
| 02:45 PM | 4 | 101 | 66 | 2 | 7 | 83 | 21 | 3 | 66 | 44 | 6 | 0 | 15 | 31 | 3 | 1 | 453 |
| Total | 15 | 392 | 296 | 3 | 20 | 386 | 74 | 3 | 241 | 135 | 16 | 0 | 56 | 138 | 17 | 4 | 1796 |
| 03:00 PM | 7 | 112 | 78 | 0 | 14 | 98 | 11 | 4 | 62 | 35 | 11 | 0 | 13 | 49 | 4 | 2 | 500 |
| 03:15 PM | 3 | 89 | 92 | 0 | 11 | 102 | 17 | 0 | 52 | 30 | 4 | 1 | 25 | 59 | 7 | 1 | 493 |
| 03:30 PM | 1 | 99 | 73 | 0 | 7 | 159 | 18 | 1 | 80 | 46 | 11 | 1 | 26 | 43 | 7 | 1 | 573 |
| 03:45 PM | 6 | 95 | 80 | 1 | 6 | 144 | 22 | 0 | 98 | 48 | 7 | 0 | 18 | 38 | 4 | 0 | 567 |
| Total | 17 | 395 | 323 | 1 | 38 | 503 | 68 | 5 | 292 | 159 | 33 | 2 | 82 | 189 | 22 | 4 | 2133 |
| 04:00 PM | 4 | 117 | 63 | 0 | 5 | 91 | 16 | 1 | 76 | 38 | 4 | 0 | 21 | 41 | 3 | 0 | 480 |
| 04:15 PM | 3 | 101 | 68 | 0 | 13 | 120 | 10 | 0 | 55 | 36 | 5 | 0 | 25 | 53 | 4 | 0 | 493 |
| 04:30 PM | 3 | 108 | 81 | 1 | 5 | 120 | 13 | 1 | 92 | 44 | 8 | 0 | 24 | 40 | 6 | 0 | 546 |
| 04:45 PM | 6 | 97 | 92 | 0 | 15 | 115 | 15 | 0 | 70 | 29 | 5 | 0 | 30 | 66 | 9 | 1 | 550 |
| Total | 16 | 423 | 304 | 1 | 38 | 446 | 54 | 2 | 293 | 147 | 22 | 0 | 100 | 200 | 22 | 1 | 2069 |
| 05:00 PM | 5 | 99 | 131 | 1 | 5 | 141 | 24 | 0 | 82 | 28 | 5 | 0 | 26 | 66 | 7 | 0 | 620 |
| 05:15 PM | 8 | 137 | 119 | 0 | 9 | 136 | 23 | 0 | 65 | 37 | 7 | 1 | 32 | 79 | 8 | 0 | 661 |
| 05:30 PM | 4 | 106 | 116 | 1 | 12 | 132 | 28 | 0 | 63 | 46 | 5 | 0 | 24 | 61 | 4 | 2 | 604 |
| 05:45 PM | 2 | 118 | 96 | 1 | 9 | 107 | 14 | 0 | 67 | 27 | 7 | 1 | 19 | 60 | 6 | 2 | 536 |
| Total | 19 | 460 | 462 | 3 | 35 | 516 | 89 | 0 | 277 | 138 | 24 | 2 | 101 | 266 | 25 | 4 | 2421 |
| Grand Total | 67 | 1670 | 1385 | 8 | 131 | 1851 | 285 | 10 | 1103 | 579 | 95 | 4 | 339 | 793 | 86 | 13 | 8419 |
| Apprch % | 2.1 | 53.4 | 44.2 | 0.3 | 5.8 | 81.3 | 12.5 | 0.4 | 61.9 | 32.5 | 5.3 | 0.2 | 27.5 | 64.4 | 7 | 1.1 | |
| Total % | 0.8 | 19.8 | 16.5 | 0.1 | 1.6 | 22 | 3.4 | 0.1 | 13.1 | 6.9 | 1.1 | 0 | 4 | 9.4 | 1 | 0.2 | |
| Motorcycles | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Motorcycles | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 64 | 1387 | 1208 | 0 | 115 | 1579 | 241 | 0 | 995 | 471 | 80 | 0 | 281 | 693 | 81 | 0 | 7195 |
| % Cars | 95.5 | 83.1 | 87.2 | 0 | 87.8 | 85.3 | 84.6 | 0 | 90.2 | 81.3 | 84.2 | 0 | 82.9 | 87.4 | 94.2 | 0 | 85.5 |
| Light Goods Vehicles | 2 | 259 | 155 | 0 | 15 | 239 | 31 | 0 | 99 | 78 | 12 | 0 | 50 | 86 | 4 | 0 | 1030 |
| % Light Goods Vehicles | 3 | 15.5 | 11.2 | 0 | 11.5 | 12.9 | 10.9 | 0 | 9 | 13.5 | 12.6 | 0 | 14.7 | 10.8 | 4.7 | 0 | 12.2 |
| Buses | 1 | 10 | 14 | 0 | 1 | 16 | 6 | 0 | 4 | 19 | 3 | 0 | 6 | 7 | 1 | 0 | 88 |
| % Buses | 1.5 | 0.6 | 1 | 0 | 0.8 | 0.9 | 2.1 | 0 | 0.4 | 3.3 | 3.2 | 0 | 1.8 | 0.9 | 1.2 | 0 | 1 |
| Single-Unit Trucks | 0 | 12 | 6 | 0 | 0 | 14 | 5 | 0 | 3 | 11 | 0 | 0 | 0 | 6 | 0 | 0 | 57 |
| % Single-Unit Trucks | 0 | 0.7 | 0.4 | 0 | 0 | 0.8 | 1.8 | 0 | 0.3 | 1.9 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0.7 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Aurelius (PM)

Counted by: HRC

File Name : Cedar_&_Aurelius_23_PM_393400_03-23-2017

Site Code : Cedar & Aurelius 23/PM

Start Date : 3/23/2017

Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Cedar Eastbound | | | | Cedar Westbound | | | | Aurelius Northbound | | | | Aurelius Southbound | | | | Int. Total |
|-------------------------|-----------------|------|-------|------|-----------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 2 | 1 | 0 | 0 | 3 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 13 |
| % Articulated Trucks | 0 | 0.1 | 0.1 | 0 | 0 | 0.2 | 0.7 | 0 | 0.2 | 0 | 0 | 0 | 0.6 | 0.1 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.7 | 0 |
| Pedestrians | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 12 | 31 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 70 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 92.3 | 0.4 |

| | Cedar Eastbound | | | | | Cedar Westbound | | | | | Aurelius Northbound | | | | | Aurelius Southbound | | | | | Int. Total |
|--|-----------------|------|-------|------|------------|-----------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:45 PM | 6 | 97 | 92 | 0 | 195 | 15 | 115 | 15 | 0 | 145 | 70 | 29 | 5 | 0 | 104 | 30 | 66 | 9 | 1 | 106 | 550 |
| 05:00 PM | 5 | 99 | 131 | 1 | 236 | 5 | 141 | 24 | 0 | 170 | 82 | 28 | 5 | 0 | 115 | 26 | 66 | 7 | 0 | 99 | 620 |
| 05:15 PM | 8 | 137 | 119 | 0 | 264 | 9 | 136 | 23 | 0 | 168 | 65 | 37 | 7 | 1 | 110 | 32 | 79 | 8 | 0 | 119 | 661 |
| 05:30 PM | 4 | 106 | 116 | 1 | 227 | 12 | 132 | 28 | 0 | 172 | 63 | 46 | 5 | 0 | 114 | 24 | 61 | 4 | 2 | 91 | 604 |
| Total Volume | 23 | 439 | 458 | 2 | 922 | 41 | 524 | 90 | 0 | 655 | 280 | 140 | 22 | 1 | 443 | 112 | 272 | 28 | 3 | 415 | 2435 |
| % App. Total | 2.5 | 47.6 | 49.7 | 0.2 | | 6.3 | 80 | 13.7 | 0 | | 63.2 | 31.6 | 5 | 0.2 | | 27 | 65.5 | 6.7 | 0.7 | | |
| PHF | .719 | .801 | .874 | .500 | .873 | .683 | .929 | .804 | .000 | .952 | .854 | .761 | .786 | .250 | .963 | .875 | .861 | .778 | .375 | .872 | .921 |

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824
Consulting Engineers Since 1915

Consulting Engineers Since 1915

File Name : Cedar_&_Holt_21_AM_394976_03-21-2017
Site Code : SB Cedar & EB Holt 21/AM
Start Date : 3/21/2017
Page No : 1

| | Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians | | | | | | | | | | | | | | | | |
|------------------------|---|------|-------|------|----------------|------|-------|------|------------------|------|-------|------|------------------|------|-------|------|------------|
| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | |
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Int. Total |
| 07:00 AM | 8 | 64 | 20 | 3 | 11 | 65 | 16 | 0 | 8 | 28 | 15 | 1 | 12 | 49 | 8 | 0 | 308 |
| 07:15 AM | 11 | 114 | 24 | 0 | 20 | 60 | 27 | 0 | 9 | 39 | 19 | 0 | 2 | 44 | 8 | 0 | 377 |
| 07:30 AM | 10 | 115 | 22 | 0 | 15 | 50 | 25 | 1 | 14 | 68 | 16 | 0 | 14 | 57 | 9 | 0 | 416 |
| 07:45 AM | 9 | 101 | 37 | 2 | 21 | 44 | 30 | 1 | 15 | 69 | 15 | 0 | 26 | 60 | 4 | 6 | 440 |
| Total | 38 | 394 | 103 | 5 | 67 | 219 | 98 | 2 | 46 | 204 | 65 | 1 | 54 | 210 | 29 | 6 | 1541 |
| 08:00 AM | 3 | 77 | 17 | 0 | 24 | 53 | 19 | 0 | 15 | 57 | 16 | 0 | 22 | 50 | 11 | 6 | 370 |
| 08:15 AM | 18 | 114 | 9 | 1 | 18 | 67 | 25 | 3 | 10 | 48 | 24 | 0 | 21 | 47 | 15 | 6 | 426 |
| 08:30 AM | 14 | 90 | 19 | 1 | 12 | 44 | 22 | 0 | 11 | 69 | 23 | 0 | 20 | 36 | 10 | 1 | 372 |
| 08:45 AM | 7 | 61 | 19 | 1 | 16 | 34 | 27 | 0 | 8 | 56 | 8 | 0 | 17 | 40 | 5 | 1 | 300 |
| Total | 42 | 342 | 64 | 3 | 70 | 198 | 93 | 3 | 44 | 230 | 71 | 0 | 80 | 173 | 41 | 14 | 1468 |
| Grand Total | 80 | 736 | 167 | 8 | 137 | 417 | 191 | 5 | 90 | 434 | 136 | 1 | 134 | 383 | 70 | 20 | 3009 |
| Apprch % | 8.1 | 74.3 | 16.9 | 0.8 | 18.3 | 55.6 | 25.5 | 0.7 | 13.6 | 65.7 | 20.6 | 0.2 | 22.1 | 63.1 | 11.5 | 3.3 | |
| Total % | 2.7 | 24.5 | 5.6 | 0.3 | 4.6 | 13.9 | 6.3 | 0.2 | 3 | 14.4 | 4.5 | 0 | 4.5 | 12.7 | 2.3 | 0.7 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 67 | 644 | 143 | 0 | 113 | 352 | 160 | 0 | 74 | 348 | 113 | 0 | 89 | 334 | 63 | 0 | 2500 |
| % Cars | 83.8 | 87.5 | 85.6 | 0 | 82.5 | 84.4 | 83.8 | 0 | 82.2 | 80.2 | 83.1 | 0 | 66.4 | 87.2 | 90 | 0 | 83.1 |
| Light Goods Vehicles | 10 | 68 | 21 | 0 | 19 | 48 | 23 | 0 | 14 | 69 | 13 | 0 | 33 | 43 | 7 | 0 | 368 |
| % Light Goods Vehicles | 12.5 | 9.2 | 12.6 | 0 | 13.9 | 11.5 | 12 | 0 | 15.6 | 15.9 | 9.6 | 0 | 24.6 | 11.2 | 10 | 0 | 12.2 |
| Buses | 3 | 18 | 2 | 0 | 0 | 10 | 1 | 0 | 1 | 10 | 5 | 0 | 10 | 4 | 0 | 0 | 64 |
| % Buses | 3.8 | 2.4 | 1.2 | 0 | 0 | 2.4 | 0.5 | 0 | 1.1 | 2.3 | 3.7 | 0 | 7.5 | 1 | 0 | 0 | 2.1 |
| Single-Unit Trucks | 0 | 4 | 1 | 0 | 4 | 4 | 6 | 0 | 1 | 5 | 3 | 0 | 2 | 2 | 0 | 0 | 32 |
| % Single-Unit Trucks | 0 | 0.5 | 0.6 | 0 | 2.9 | 1 | 3.1 | 0 | 1.1 | 1.2 | 2.2 | 0 | 1.5 | 0.5 | 0 | 0 | 1.1 |
| Articulated Trucks | 0 | 2 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 10 |
| % Articulated Trucks | 0 | 0.3 | 0 | 0 | 0.7 | 0.7 | 0 | 0 | 0 | 0.5 | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | | | | | | | | | | | | | | |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824
Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Holt (AM)
Counted by: HRC

File Name : Cedar_&_Holt_21_AM_394976_03-21-2017
Site Code : SB Cedar & EB Holt 21/AM
Start Date : 3/21/2017
Page No : 2

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|-------------------|------|-------|------|------------|-------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 10 | 115 | 22 | 0 | 147 | 15 | 50 | 25 | 1 | 91 | 14 | 68 | 16 | 0 | 98 | 14 | 57 | 9 | 0 | 80 | 416 |
| 07:45 AM | 9 | 101 | 37 | 2 | 149 | 21 | 44 | 30 | 1 | 96 | 15 | 69 | 15 | 0 | 99 | 26 | 60 | 4 | 6 | 96 | 440 |
| 08:00 AM | 3 | 77 | 17 | 0 | 97 | 24 | 53 | 19 | 0 | 96 | 15 | 57 | 16 | 0 | 88 | 22 | 50 | 11 | 6 | 89 | 370 |
| 08:15 AM | 18 | 114 | 9 | 1 | 142 | 18 | 67 | 25 | 3 | 113 | 10 | 48 | 24 | 0 | 82 | 21 | 47 | 15 | 6 | 89 | 426 |
| Total Volume | 40 | 407 | 85 | 3 | 535 | 78 | 214 | 99 | 5 | 396 | 54 | 242 | 71 | 0 | 367 | 83 | 214 | 39 | 18 | 354 | 1652 |
| % App. Total | 7.5 | 76.1 | 15.9 | 0.6 | | 19.7 | 54 | 25 | 1.3 | | 14.7 | 65.9 | 19.3 | 0 | | 23.4 | 60.5 | 11 | 5.1 | | |
| PHF | .556 | .885 | .574 | .375 | .898 | .813 | .799 | .825 | .417 | .876 | .900 | .877 | .740 | .000 | .927 | .798 | .892 | .650 | .750 | .922 | .939 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Holt (PM)
Counted by: HRC

File Name : Cedar_&_Holt_21_PM_394975_03-21-2017
Site Code : SB Cedar & EB Holt 21/PM
Start Date : 3/21/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|-------------------|------|-------|------|-------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 15 | 38 | 19 | 1 | 13 | 43 | 27 | 0 | 16 | 71 | 19 | 2 | 19 | 70 | 14 | 0 | 367 |
| 02:15 PM | 10 | 26 | 17 | 0 | 15 | 59 | 20 | 0 | 23 | 58 | 13 | 0 | 15 | 85 | 13 | 0 | 354 |
| 02:30 PM | 6 | 55 | 18 | 1 | 10 | 52 | 21 | 1 | 23 | 69 | 16 | 0 | 35 | 65 | 10 | 0 | 382 |
| 02:45 PM | 14 | 71 | 18 | 4 | 14 | 51 | 33 | 0 | 22 | 57 | 12 | 0 | 25 | 61 | 14 | 5 | 401 |
| Total | 45 | 190 | 72 | 6 | 52 | 205 | 101 | 1 | 84 | 255 | 60 | 2 | 94 | 281 | 51 | 5 | 1504 |
| 03:00 PM | 7 | 55 | 18 | 1 | 10 | 68 | 38 | 1 | 34 | 76 | 13 | 0 | 20 | 63 | 7 | 3 | 414 |
| 03:15 PM | 12 | 57 | 20 | 0 | 17 | 57 | 30 | 1 | 22 | 61 | 19 | 1 | 26 | 57 | 19 | 0 | 399 |
| 03:30 PM | 15 | 64 | 12 | 9 | 21 | 57 | 27 | 5 | 13 | 59 | 15 | 0 | 27 | 60 | 21 | 15 | 420 |
| 03:45 PM | 16 | 90 | 21 | 4 | 20 | 88 | 34 | 1 | 19 | 83 | 25 | 1 | 26 | 62 | 21 | 8 | 519 |
| Total | 50 | 266 | 71 | 14 | 68 | 270 | 129 | 8 | 88 | 279 | 72 | 2 | 99 | 242 | 68 | 26 | 1752 |
| 04:00 PM | 10 | 53 | 21 | 0 | 18 | 66 | 27 | 0 | 27 | 77 | 22 | 1 | 23 | 72 | 12 | 2 | 431 |
| 04:15 PM | 15 | 44 | 14 | 0 | 26 | 63 | 30 | 0 | 22 | 65 | 15 | 0 | 22 | 60 | 14 | 0 | 390 |
| 04:30 PM | 14 | 51 | 15 | 1 | 19 | 70 | 35 | 1 | 30 | 102 | 20 | 0 | 30 | 78 | 12 | 0 | 478 |
| 04:45 PM | 13 | 47 | 20 | 0 | 20 | 82 | 23 | 0 | 24 | 71 | 16 | 0 | 22 | 93 | 11 | 0 | 442 |
| Total | 52 | 195 | 70 | 1 | 83 | 281 | 115 | 1 | 103 | 315 | 73 | 1 | 97 | 303 | 49 | 2 | 1741 |
| 05:00 PM | 8 | 60 | 16 | 1 | 32 | 91 | 30 | 0 | 48 | 93 | 23 | 0 | 31 | 71 | 11 | 0 | 515 |
| 05:15 PM | 15 | 60 | 24 | 1 | 25 | 88 | 31 | 2 | 39 | 110 | 18 | 0 | 35 | 77 | 12 | 0 | 537 |
| 05:30 PM | 12 | 74 | 11 | 1 | 16 | 84 | 34 | 1 | 19 | 69 | 21 | 1 | 30 | 70 | 12 | 0 | 455 |
| 05:45 PM | 12 | 51 | 22 | 3 | 24 | 86 | 18 | 3 | 23 | 68 | 26 | 1 | 28 | 77 | 7 | 0 | 449 |
| Total | 47 | 245 | 73 | 6 | 97 | 349 | 113 | 6 | 129 | 340 | 88 | 2 | 124 | 295 | 42 | 0 | 1956 |
| Grand Total | 194 | 896 | 286 | 27 | 300 | 1105 | 458 | 16 | 404 | 1189 | 293 | 7 | 414 | 1121 | 210 | 33 | 6953 |
| Apprch % | 13.8 | 63.9 | 20.4 | 1.9 | 16 | 58.8 | 24.4 | 0.9 | 21.3 | 62.8 | 15.5 | 0.4 | 23.3 | 63 | 11.8 | 1.9 | |
| Total % | 2.8 | 12.9 | 4.1 | 0.4 | 4.3 | 15.9 | 6.6 | 0.2 | 5.8 | 17.1 | 4.2 | 0.1 | 6 | 16.1 | 3 | 0.5 | |
| Motorcycles | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 2 | 2 | 0 | 12 |
| % Motorcycles | 0.5 | 0 | 0 | 0 | 0.3 | 0.1 | 0.2 | 0 | 0.2 | 0.2 | 0.3 | 0 | 0 | 0.2 | 1 | 0 | 0.2 |
| Cars | 160 | 733 | 231 | 0 | 244 | 917 | 378 | 0 | 329 | 988 | 233 | 0 | 343 | 917 | 172 | 0 | 5645 |
| % Cars | 82.5 | 81.8 | 80.8 | 0 | 81.3 | 83 | 82.5 | 0 | 81.4 | 83.1 | 79.5 | 0 | 82.9 | 81.8 | 81.9 | 0 | 81.2 |
| Light Goods Vehicles | 20 | 120 | 44 | 0 | 49 | 150 | 69 | 0 | 68 | 180 | 52 | 0 | 58 | 183 | 35 | 0 | 1028 |
| % Light Goods Vehicles | 10.3 | 13.4 | 15.4 | 0 | 16.3 | 13.6 | 15.1 | 0 | 16.8 | 15.1 | 17.7 | 0 | 14 | 16.3 | 16.7 | 0 | 14.8 |
| Buses | 11 | 28 | 3 | 0 | 2 | 23 | 3 | 0 | 1 | 8 | 3 | 0 | 2 | 7 | 0 | 0 | 91 |
| % Buses | 5.7 | 3.1 | 1 | 0 | 0.7 | 2.1 | 0.7 | 0 | 0.2 | 0.7 | 1 | 0 | 0.5 | 0.6 | 0 | 0 | 1.3 |
| Single-Unit Trucks | 1 | 8 | 7 | 0 | 2 | 9 | 5 | 0 | 3 | 9 | 3 | 0 | 7 | 8 | 1 | 0 | 63 |
| % Single-Unit Trucks | 0.5 | 0.9 | 2.4 | 0 | 0.7 | 0.8 | 1.1 | 0 | 0.7 | 0.8 | 1 | 0 | 1.7 | 0.7 | 0.5 | 0 | 0.9 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Holt (PM)
Counted by: HRC

File Name : Cedar_&_Holt_21_PM_394975_03-21-2017
Site Code : SB Cedar & EB Holt 21/PM
Start Date : 3/21/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|----------------|------|-------|------|----------------|------|-------|------|------------------|------|-------|------|------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 1 | 5 | 1 | 0 | 2 | 3 | 2 | 0 | 2 | 2 | 1 | 0 | 4 | 4 | 0 | 0 | 27 |
| % Articulated Trucks | 0.5 | 0.6 | 0.3 | 0 | 0.7 | 0.3 | 0.4 | 0 | 0.5 | 0.2 | 0.3 | 0 | 1 | 0.4 | 0 | 0 | 0.4 |
| Bicycles on Road | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| % Bicycles on Road | 0 | 0.2 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 7.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.1 | 0.1 |
| Pedestrians | 0 | 0 | 0 | 25 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 31 | 79 |
| % Pedestrians | 0 | 0 | 0 | 92.6 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 93.9 | 1.1 |

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|----------------|------|-------|------|------------|----------------|------|-------|------|------------|------------------|------|-------|------|------------|------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:30 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:30 PM | 14 | 51 | 15 | 1 | 81 | 19 | 70 | 35 | 1 | 125 | 30 | 102 | 20 | 0 | 152 | 30 | 78 | 12 | 0 | 120 | 478 |
| 04:45 PM | 13 | 47 | 20 | 0 | 80 | 20 | 82 | 23 | 0 | 125 | 24 | 71 | 16 | 0 | 111 | 22 | 93 | 11 | 0 | 126 | 442 |
| 05:00 PM | 8 | 60 | 16 | 1 | 85 | 32 | 91 | 30 | 0 | 153 | 48 | 93 | 23 | 0 | 164 | 31 | 71 | 11 | 0 | 113 | 515 |
| 05:15 PM | 15 | 60 | 24 | 1 | 100 | 25 | 88 | 31 | 2 | 146 | 39 | 110 | 18 | 0 | 167 | 35 | 77 | 12 | 0 | 124 | 537 |
| Total Volume | 50 | 218 | 75 | 3 | 346 | 96 | 331 | 119 | 3 | 549 | 141 | 376 | 77 | 0 | 594 | 118 | 319 | 46 | 0 | 483 | 1972 |
| % App. Total | 14.5 | 63 | 21.7 | 0.9 | | 17.5 | 60.3 | 21.7 | 0.5 | | 23.7 | 63.3 | 13 | 0 | | 24.4 | 66 | 9.5 | 0 | | |
| PHF | .833 | .908 | .781 | .750 | .865 | .750 | .909 | .850 | .375 | .897 | .734 | .855 | .837 | .000 | .889 | .843 | .858 | .958 | .000 | .958 | .918 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/22/2017

Location: Cedar & Holt (AM)

Counted by: HRC

File Name : Cedar_&_Holt_22_AM_393455_03-22-2017

Site Code : Cedar & Holt 22/AM

Start Date : 3/22/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|-------------------|------|-------|------|-------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 5 | 49 | 14 | 0 | 12 | 30 | 14 | 0 | 6 | 45 | 14 | 0 | 17 | 27 | 5 | 0 | 238 |
| 07:15 AM | 2 | 83 | 16 | 0 | 14 | 36 | 23 | 0 | 15 | 40 | 19 | 0 | 12 | 41 | 4 | 0 | 305 |
| 07:30 AM | 5 | 75 | 27 | 0 | 14 | 49 | 32 | 1 | 10 | 70 | 16 | 1 | 15 | 54 | 5 | 0 | 374 |
| 07:45 AM | 8 | 89 | 46 | 2 | 18 | 50 | 20 | 0 | 16 | 71 | 19 | 1 | 16 | 75 | 3 | 0 | 434 |
| Total | 20 | 296 | 103 | 2 | 58 | 165 | 89 | 1 | 47 | 226 | 68 | 2 | 60 | 197 | 17 | 0 | 1351 |
| 08:00 AM | 6 | 86 | 17 | 0 | 33 | 54 | 28 | 0 | 17 | 47 | 23 | 0 | 15 | 54 | 6 | 0 | 386 |
| 08:15 AM | 20 | 105 | 18 | 3 | 22 | 69 | 23 | 2 | 9 | 60 | 24 | 0 | 27 | 39 | 11 | 3 | 435 |
| 08:30 AM | 11 | 87 | 17 | 0 | 20 | 34 | 30 | 1 | 10 | 59 | 21 | 0 | 12 | 41 | 14 | 0 | 357 |
| 08:45 AM | 10 | 44 | 12 | 0 | 21 | 31 | 22 | 0 | 13 | 53 | 13 | 1 | 24 | 61 | 6 | 0 | 311 |
| Total | 47 | 322 | 64 | 3 | 96 | 188 | 103 | 3 | 49 | 219 | 81 | 1 | 78 | 195 | 37 | 3 | 1489 |
| Grand Total | 67 | 618 | 167 | 5 | 154 | 353 | 192 | 4 | 96 | 445 | 149 | 3 | 138 | 392 | 54 | 3 | 2840 |
| Apprch % | 7.8 | 72.1 | 19.5 | 0.6 | 21.9 | 50.2 | 27.3 | 0.6 | 13.9 | 64.2 | 21.5 | 0.4 | 23.5 | 66.8 | 9.2 | 0.5 | |
| Total % | 2.4 | 21.8 | 5.9 | 0.2 | 5.4 | 12.4 | 6.8 | 0.1 | 3.4 | 15.7 | 5.2 | 0.1 | 4.9 | 13.8 | 1.9 | 0.1 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 57 | 533 | 145 | 0 | 134 | 288 | 154 | 0 | 77 | 356 | 122 | 0 | 103 | 332 | 50 | 0 | 2351 |
| % Cars | 85.1 | 86.2 | 86.8 | 0 | 87 | 81.6 | 80.2 | 0 | 80.2 | 80 | 81.9 | 0 | 74.6 | 84.7 | 92.6 | 0 | 82.8 |
| Light Goods Vehicles | 6 | 76 | 20 | 0 | 15 | 36 | 33 | 0 | 14 | 79 | 18 | 0 | 30 | 50 | 4 | 0 | 381 |
| % Light Goods Vehicles | 9 | 12.3 | 12 | 0 | 9.7 | 10.2 | 17.2 | 0 | 14.6 | 17.8 | 12.1 | 0 | 21.7 | 12.8 | 7.4 | 0 | 13.4 |
| Buses | 4 | 6 | 2 | 0 | 2 | 23 | 2 | 0 | 2 | 5 | 5 | 0 | 4 | 1 | 0 | 0 | 56 |
| % Buses | 6 | 1 | 1.2 | 0 | 1.3 | 6.5 | 1 | 0 | 2.1 | 1.1 | 3.4 | 0 | 2.9 | 0.3 | 0 | 0 | 2 |
| Single-Unit Trucks | 0 | 3 | 0 | 0 | 2 | 6 | 3 | 0 | 2 | 5 | 3 | 0 | 0 | 6 | 0 | 0 | 30 |
| % Single-Unit Trucks | 0 | 0.5 | 0 | 0 | 1.3 | 1.7 | 1.6 | 0 | 2.1 | 1.1 | 2 | 0 | 0 | 1.5 | 0 | 0 | 1.1 |
| Articulated Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 7 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 0.6 | 0 | 0 | 0 | 1 | 0 | 0.7 | 0 | 0.7 | 0.8 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33.3 | 0 | 0 | 0 | 0 | 0.1 |
| Pedestrians | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 13 |
| % Pedestrians | 0 | 0 | 0 | 80 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 66.7 | 0 | 0 | 0 | 100 | 0.5 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Holt (AM)
Counted by: HRC

File Name : Cedar_&_Holt_22_AM_393455_03-22-2017
Site Code : Cedar & Holt 22/AM
Start Date : 3/22/2017
Page No : 2

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|-------------------|------|-------|------|------------|-------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 5 | 75 | 27 | 0 | 107 | 14 | 49 | 32 | 1 | 96 | 10 | 70 | 16 | 1 | 97 | 15 | 54 | 5 | 0 | 74 | 374 |
| 07:45 AM | 8 | 89 | 46 | 2 | 145 | 18 | 50 | 20 | 0 | 88 | 16 | 71 | 19 | 1 | 107 | 16 | 75 | 3 | 0 | 94 | 434 |
| 08:00 AM | 6 | 86 | 17 | 0 | 109 | 33 | 54 | 28 | 0 | 115 | 17 | 47 | 23 | 0 | 87 | 15 | 54 | 6 | 0 | 75 | 386 |
| 08:15 AM | 20 | 105 | 18 | 3 | 146 | 22 | 69 | 23 | 2 | 116 | 9 | 60 | 24 | 0 | 93 | 27 | 39 | 11 | 3 | 80 | 435 |
| Total Volume | 39 | 355 | 108 | 5 | 507 | 87 | 222 | 103 | 3 | 415 | 52 | 248 | 82 | 2 | 384 | 73 | 222 | 25 | 3 | 323 | 1629 |
| % App. Total | 7.7 | 70 | 21.3 | 1 | | 21 | 53.5 | 24.8 | 0.7 | | 13.5 | 64.6 | 21.4 | 0.5 | | 22.6 | 68.7 | 7.7 | 0.9 | | |
| PHF | .488 | .845 | .587 | .417 | .868 | .659 | .804 | .805 | .375 | .894 | .765 | .873 | .854 | .500 | .897 | .676 | .740 | .568 | .250 | .859 | .936 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Holt (PM)
Counted by: HRC

File Name : Cedar_&_Holt_22_PM_393456_03-22-2017
Site Code : Cedar & Holt 22/pm
Start Date : 3/22/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|-------------------|------|-------|------|-------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 17 | 56 | 28 | 0 | 16 | 69 | 23 | 3 | 25 | 63 | 18 | 0 | 15 | 68 | 10 | 0 | 411 |
| 02:15 PM | 7 | 52 | 21 | 1 | 8 | 47 | 31 | 0 | 20 | 51 | 8 | 0 | 24 | 90 | 13 | 2 | 375 |
| 02:30 PM | 10 | 49 | 20 | 3 | 15 | 45 | 29 | 0 | 20 | 79 | 15 | 2 | 23 | 67 | 12 | 0 | 389 |
| 02:45 PM | 8 | 78 | 22 | 5 | 19 | 65 | 21 | 0 | 24 | 63 | 18 | 0 | 18 | 66 | 5 | 4 | 416 |
| Total | 42 | 235 | 91 | 9 | 58 | 226 | 104 | 3 | 89 | 256 | 59 | 2 | 80 | 291 | 40 | 6 | 1591 |
| 03:00 PM | 12 | 54 | 16 | 4 | 9 | 49 | 21 | 2 | 27 | 76 | 23 | 1 | 12 | 72 | 7 | 5 | 390 |
| 03:15 PM | 11 | 54 | 20 | 0 | 14 | 54 | 21 | 0 | 29 | 49 | 12 | 0 | 26 | 62 | 7 | 0 | 359 |
| 03:30 PM | 5 | 47 | 19 | 0 | 14 | 64 | 17 | 1 | 18 | 65 | 14 | 1 | 14 | 71 | 9 | 2 | 361 |
| 03:45 PM | 8 | 61 | 16 | 0 | 15 | 71 | 25 | 1 | 22 | 59 | 10 | 0 | 18 | 62 | 9 | 0 | 377 |
| Total | 36 | 216 | 71 | 4 | 52 | 238 | 84 | 4 | 96 | 249 | 59 | 2 | 70 | 267 | 32 | 7 | 1487 |
| 04:00 PM | 10 | 44 | 17 | 0 | 15 | 51 | 22 | 0 | 27 | 83 | 23 | 0 | 25 | 69 | 7 | 1 | 394 |
| 04:15 PM | 13 | 49 | 15 | 1 | 19 | 75 | 31 | 0 | 25 | 67 | 14 | 0 | 37 | 73 | 9 | 0 | 428 |
| 04:30 PM | 11 | 52 | 26 | 1 | 14 | 69 | 28 | 0 | 26 | 71 | 25 | 2 | 27 | 76 | 11 | 0 | 439 |
| 04:45 PM | 13 | 34 | 20 | 0 | 28 | 93 | 34 | 1 | 22 | 68 | 21 | 1 | 29 | 75 | 11 | 3 | 453 |
| Total | 47 | 179 | 78 | 2 | 76 | 288 | 115 | 1 | 100 | 289 | 83 | 3 | 118 | 293 | 38 | 4 | 1714 |
| 05:00 PM | 9 | 63 | 27 | 1 | 21 | 73 | 36 | 1 | 33 | 118 | 19 | 6 | 34 | 93 | 15 | 1 | 550 |
| 05:15 PM | 19 | 46 | 24 | 0 | 21 | 101 | 25 | 0 | 51 | 110 | 27 | 0 | 26 | 87 | 15 | 1 | 553 |
| 05:30 PM | 13 | 73 | 29 | 1 | 31 | 82 | 30 | 0 | 24 | 74 | 21 | 1 | 27 | 98 | 17 | 4 | 525 |
| 05:45 PM | 11 | 52 | 25 | 1 | 10 | 65 | 24 | 0 | 33 | 67 | 15 | 3 | 36 | 92 | 13 | 1 | 448 |
| Total | 52 | 234 | 105 | 3 | 83 | 321 | 115 | 1 | 141 | 369 | 82 | 10 | 123 | 370 | 60 | 7 | 2076 |
| Grand Total | 177 | 864 | 345 | 18 | 269 | 1073 | 418 | 9 | 426 | 1163 | 283 | 17 | 391 | 1221 | 170 | 24 | 6868 |
| Apprch % | 12.6 | 61.5 | 24.6 | 1.3 | 15.2 | 60.7 | 23.6 | 0.5 | 22.6 | 61.6 | 15 | 0.9 | 21.7 | 67.6 | 9.4 | 1.3 | |
| Total % | 2.6 | 12.6 | 5 | 0.3 | 3.9 | 15.6 | 6.1 | 0.1 | 6.2 | 16.9 | 4.1 | 0.2 | 5.7 | 17.8 | 2.5 | 0.3 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 155 | 725 | 293 | 0 | 220 | 927 | 346 | 0 | 356 | 956 | 215 | 0 | 329 | 1005 | 148 | 0 | 5675 |
| % Cars | 87.6 | 83.9 | 84.9 | 0 | 81.8 | 86.4 | 82.8 | 0 | 83.6 | 82.2 | 76 | 0 | 84.1 | 82.3 | 87.1 | 0 | 82.6 |
| Light Goods Vehicles | 12 | 105 | 43 | 0 | 45 | 129 | 65 | 0 | 66 | 190 | 53 | 0 | 50 | 195 | 20 | 0 | 973 |
| % Light Goods Vehicles | 6.8 | 12.2 | 12.5 | 0 | 16.7 | 12 | 15.6 | 0 | 15.5 | 16.3 | 18.7 | 0 | 12.8 | 16 | 11.8 | 0 | 14.2 |
| Buses | 10 | 22 | 7 | 0 | 1 | 9 | 1 | 0 | 3 | 4 | 2 | 0 | 5 | 4 | 2 | 0 | 70 |
| % Buses | 5.6 | 2.5 | 2 | 0 | 0.4 | 0.8 | 0.2 | 0 | 0.7 | 0.3 | 0.7 | 0 | 1.3 | 0.3 | 1.2 | 0 | 1 |
| Single-Unit Trucks | 0 | 7 | 2 | 0 | 2 | 5 | 4 | 0 | 0 | 13 | 9 | 0 | 5 | 12 | 0 | 0 | 59 |
| % Single-Unit Trucks | 0 | 0.8 | 0.6 | 0 | 0.7 | 0.5 | 1 | 0 | 0 | 1.1 | 3.2 | 0 | 1.3 | 1 | 0 | 0 | 0.9 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Holt (PM)
Counted by: HRC

File Name : Cedar_&_Holt_22_PM_393456_03-22-2017
Site Code : Cedar & Holt 22/pm
Start Date : 3/22/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|----------------|------|-------|------|----------------|------|-------|------|------------------|------|-------|------|------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 5 | 0 | 0 | 1 | 3 | 2 | 0 | 1 | 0 | 4 | 0 | 2 | 5 | 0 | 0 | 23 |
| % Articulated Trucks | 0 | 0.6 | 0 | 0 | 0.4 | 0.3 | 0.5 | 0 | 0.2 | 0 | 1.4 | 0 | 0.5 | 0.4 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11.8 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 24 | 66 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 88.2 | 0 | 0 | 0 | 100 | 1 |

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|----------------|------|-------|------|------------|----------------|------|-------|------|------------|------------------|------|-------|------|------------|------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:45 PM | 13 | 34 | 20 | 0 | 67 | 28 | 93 | 34 | 1 | 156 | 22 | 68 | 21 | 1 | 112 | 29 | 75 | 11 | 3 | 118 | 453 |
| 05:00 PM | 9 | 63 | 27 | 1 | 100 | 21 | 73 | 36 | 1 | 131 | 33 | 118 | 19 | 6 | 176 | 34 | 93 | 15 | 1 | 143 | 550 |
| 05:15 PM | 19 | 46 | 24 | 0 | 89 | 21 | 101 | 25 | 0 | 147 | 51 | 110 | 27 | 0 | 188 | 26 | 87 | 15 | 1 | 129 | 553 |
| 05:30 PM | 13 | 73 | 29 | 1 | 116 | 31 | 82 | 30 | 0 | 143 | 24 | 74 | 21 | 1 | 120 | 27 | 98 | 17 | 4 | 146 | 525 |
| Total Volume | 54 | 216 | 100 | 2 | 372 | 101 | 349 | 125 | 2 | 577 | 130 | 370 | 88 | 8 | 596 | 116 | 353 | 58 | 9 | 536 | 2081 |
| % App. Total | 14.5 | 58.1 | 26.9 | 0.5 | | 17.5 | 60.5 | 21.7 | 0.3 | | 21.8 | 62.1 | 14.8 | 1.3 | | 21.6 | 65.9 | 10.8 | 1.7 | | |
| PHF | .711 | .740 | .862 | .500 | .802 | .815 | .864 | .868 | .500 | .925 | .637 | .784 | .815 | .333 | .793 | .853 | .901 | .853 | .563 | .918 | .941 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Holt
Counted by: HRC

File Name : Cedar_&_Holt_23_AM_393457_03-23-2017
Site Code : Cedar & Holt 23/AM
Start Date : 3/23/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|-------------------|------|-------|------|-------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 6 | 74 | 13 | 0 | 13 | 56 | 14 | 0 | 8 | 36 | 18 | 0 | 15 | 36 | 6 | 2 | 297 |
| 07:15 AM | 7 | 96 | 17 | 1 | 12 | 62 | 17 | 0 | 9 | 48 | 20 | 0 | 11 | 48 | 6 | 0 | 354 |
| 07:30 AM | 10 | 128 | 30 | 1 | 13 | 41 | 32 | 2 | 13 | 64 | 13 | 1 | 19 | 61 | 4 | 0 | 432 |
| 07:45 AM | 11 | 93 | 39 | 1 | 25 | 55 | 27 | 0 | 19 | 65 | 20 | 0 | 16 | 67 | 3 | 5 | 446 |
| Total | 34 | 391 | 99 | 3 | 63 | 214 | 90 | 2 | 49 | 213 | 71 | 1 | 61 | 212 | 19 | 7 | 1529 |
| 08:00 AM | 8 | 88 | 15 | 0 | 36 | 67 | 18 | 1 | 7 | 52 | 13 | 0 | 20 | 53 | 6 | 3 | 387 |
| 08:15 AM | 16 | 117 | 23 | 2 | 18 | 75 | 19 | 2 | 12 | 59 | 27 | 0 | 17 | 43 | 16 | 3 | 449 |
| 08:30 AM | 17 | 74 | 14 | 0 | 18 | 45 | 29 | 0 | 12 | 53 | 28 | 0 | 27 | 34 | 12 | 0 | 363 |
| 08:45 AM | 6 | 57 | 12 | 0 | 17 | 37 | 21 | 0 | 10 | 43 | 12 | 0 | 16 | 51 | 6 | 0 | 288 |
| Total | 47 | 336 | 64 | 2 | 89 | 224 | 87 | 3 | 41 | 207 | 80 | 0 | 80 | 181 | 40 | 6 | 1487 |
| Grand Total | 81 | 727 | 163 | 5 | 152 | 438 | 177 | 5 | 90 | 420 | 151 | 1 | 141 | 393 | 59 | 13 | 3016 |
| Apprch % | 8.3 | 74.5 | 16.7 | 0.5 | 19.7 | 56.7 | 22.9 | 0.6 | 13.6 | 63.4 | 22.8 | 0.2 | 23.3 | 64.9 | 9.7 | 2.1 | |
| Total % | 2.7 | 24.1 | 5.4 | 0.2 | 5 | 14.5 | 5.9 | 0.2 | 3 | 13.9 | 5 | 0 | 4.7 | 13 | 2 | 0.4 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 67 | 610 | 135 | 0 | 125 | 378 | 143 | 0 | 71 | 328 | 119 | 0 | 108 | 336 | 53 | 0 | 2473 |
| % Cars | 82.7 | 83.9 | 82.8 | 0 | 82.2 | 86.3 | 80.8 | 0 | 78.9 | 78.1 | 78.8 | 0 | 76.6 | 85.5 | 89.8 | 0 | 82 |
| Light Goods Vehicles | 8 | 93 | 25 | 0 | 21 | 43 | 29 | 0 | 12 | 79 | 23 | 0 | 23 | 45 | 5 | 0 | 406 |
| % Light Goods Vehicles | 9.9 | 12.8 | 15.3 | 0 | 13.8 | 9.8 | 16.4 | 0 | 13.3 | 18.8 | 15.2 | 0 | 16.3 | 11.5 | 8.5 | 0 | 13.5 |
| Buses | 6 | 20 | 2 | 0 | 0 | 9 | 2 | 0 | 2 | 6 | 5 | 0 | 10 | 4 | 1 | 0 | 67 |
| % Buses | 7.4 | 2.8 | 1.2 | 0 | 0 | 2.1 | 1.1 | 0 | 2.2 | 1.4 | 3.3 | 0 | 7.1 | 1 | 1.7 | 0 | 2.2 |
| Single-Unit Trucks | 0 | 4 | 0 | 0 | 4 | 8 | 3 | 0 | 4 | 6 | 2 | 0 | 0 | 7 | 0 | 0 | 38 |
| % Single-Unit Trucks | 0 | 0.6 | 0 | 0 | 2.6 | 1.8 | 1.7 | 0 | 4.4 | 1.4 | 1.3 | 0 | 0 | 1.8 | 0 | 0 | 1.3 |
| Articulated Trucks | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 8 |
| % Articulated Trucks | 0 | 0 | 0.6 | 0 | 1.3 | 0 | 0 | 0 | 1.1 | 0.2 | 1.3 | 0 | 0 | 0.3 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 13 | 24 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.8 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Holt
Counted by: HRC

File Name : Cedar_&_Holt_23_AM_393457_03-23-2017
Site Code : Cedar & Holt 23/AM
Start Date : 3/23/2017
Page No : 2

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|-------------------|------|-------|------|------------|-------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:30 AM | 10 | 128 | 30 | 1 | 169 | 13 | 41 | 32 | 2 | 88 | 13 | 64 | 13 | 1 | 91 | 19 | 61 | 4 | 0 | 84 | 432 |
| 07:45 AM | 11 | 93 | 39 | 1 | 144 | 25 | 55 | 27 | 0 | 107 | 19 | 65 | 20 | 0 | 104 | 16 | 67 | 3 | 5 | 91 | 446 |
| 08:00 AM | 8 | 88 | 15 | 0 | 111 | 36 | 67 | 18 | 1 | 122 | 7 | 52 | 13 | 0 | 72 | 20 | 53 | 6 | 3 | 82 | 387 |
| 08:15 AM | 16 | 117 | 23 | 2 | 158 | 18 | 75 | 19 | 2 | 114 | 12 | 59 | 27 | 0 | 98 | 17 | 43 | 16 | 3 | 79 | 449 |
| Total Volume | 45 | 426 | 107 | 4 | 582 | 92 | 238 | 96 | 5 | 431 | 51 | 240 | 73 | 1 | 365 | 72 | 224 | 29 | 11 | 336 | 1714 |
| % App. Total | 7.7 | 73.2 | 18.4 | 0.7 | | 21.3 | 55.2 | 22.3 | 1.2 | | 14 | 65.8 | 20 | 0.3 | | 21.4 | 66.7 | 8.6 | 3.3 | | |
| PHF | .703 | .832 | .686 | .500 | .861 | .639 | .793 | .750 | .625 | .883 | .671 | .923 | .676 | .250 | .877 | .900 | .836 | .453 | .550 | .923 | .954 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Holt (PM)

Counted by: HRC

File Name : Cedar_&_Holt_23_PM_393458_03-23-2017

Site Code : Cedar & Holt 23/PM

Start Date : 3/23/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|-------------------|------|-------|------|-------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 3 | 33 | 19 | 1 | 11 | 26 | 26 | 1 | 24 | 49 | 5 | 0 | 20 | 60 | 11 | 1 | 290 |
| 02:15 PM | 8 | 38 | 20 | 0 | 15 | 54 | 20 | 0 | 27 | 55 | 15 | 1 | 23 | 84 | 3 | 0 | 363 |
| 02:30 PM | 7 | 54 | 17 | 0 | 16 | 49 | 33 | 0 | 27 | 88 | 23 | 0 | 29 | 57 | 18 | 0 | 418 |
| 02:45 PM | 17 | 71 | 19 | 3 | 12 | 52 | 22 | 1 | 23 | 63 | 14 | 0 | 24 | 81 | 7 | 12 | 421 |
| Total | 35 | 196 | 75 | 4 | 54 | 181 | 101 | 2 | 101 | 255 | 57 | 1 | 96 | 282 | 39 | 13 | 1492 |
| 03:00 PM | 9 | 63 | 9 | 0 | 20 | 68 | 29 | 0 | 28 | 57 | 19 | 1 | 23 | 60 | 9 | 2 | 397 |
| 03:15 PM | 7 | 48 | 22 | 7 | 19 | 54 | 26 | 1 | 26 | 75 | 21 | 1 | 22 | 48 | 10 | 5 | 392 |
| 03:30 PM | 10 | 57 | 15 | 16 | 14 | 75 | 38 | 2 | 20 | 62 | 21 | 0 | 30 | 71 | 19 | 16 | 466 |
| 03:45 PM | 14 | 72 | 27 | 4 | 27 | 71 | 31 | 1 | 20 | 55 | 16 | 1 | 27 | 70 | 20 | 5 | 461 |
| Total | 40 | 240 | 73 | 27 | 80 | 268 | 124 | 4 | 94 | 249 | 77 | 3 | 102 | 249 | 58 | 28 | 1716 |
| 04:00 PM | 12 | 49 | 14 | 0 | 14 | 48 | 29 | 0 | 22 | 77 | 16 | 1 | 26 | 69 | 18 | 3 | 398 |
| 04:15 PM | 19 | 55 | 22 | 0 | 23 | 73 | 31 | 0 | 38 | 74 | 10 | 1 | 40 | 75 | 16 | 1 | 478 |
| 04:30 PM | 13 | 41 | 25 | 3 | 12 | 73 | 28 | 0 | 17 | 91 | 15 | 0 | 25 | 77 | 16 | 4 | 440 |
| 04:45 PM | 7 | 46 | 18 | 2 | 23 | 71 | 26 | 0 | 41 | 57 | 15 | 0 | 26 | 70 | 14 | 2 | 418 |
| Total | 51 | 191 | 79 | 5 | 72 | 265 | 114 | 0 | 118 | 299 | 56 | 2 | 117 | 291 | 64 | 10 | 1734 |
| 05:00 PM | 12 | 59 | 30 | 0 | 16 | 86 | 33 | 0 | 52 | 101 | 27 | 0 | 37 | 72 | 16 | 1 | 542 |
| 05:15 PM | 21 | 63 | 19 | 1 | 25 | 92 | 34 | 0 | 35 | 108 | 24 | 1 | 28 | 93 | 16 | 0 | 560 |
| 05:30 PM | 14 | 84 | 30 | 0 | 23 | 97 | 25 | 0 | 30 | 79 | 15 | 0 | 43 | 76 | 22 | 1 | 539 |
| 05:45 PM | 10 | 65 | 19 | 0 | 20 | 73 | 30 | 0 | 18 | 73 | 20 | 0 | 26 | 71 | 8 | 0 | 433 |
| Total | 57 | 271 | 98 | 1 | 84 | 348 | 122 | 0 | 135 | 361 | 86 | 1 | 134 | 312 | 62 | 2 | 2074 |
| Grand Total | 183 | 898 | 325 | 37 | 290 | 1062 | 461 | 6 | 448 | 1164 | 276 | 7 | 449 | 1134 | 223 | 53 | 7016 |
| Apprch % | 12.7 | 62.2 | 22.5 | 2.6 | 15.9 | 58.4 | 25.3 | 0.3 | 23.6 | 61.4 | 14.6 | 0.4 | 24.2 | 61 | 12 | 2.9 | |
| Total % | 2.6 | 12.8 | 4.6 | 0.5 | 4.1 | 15.1 | 6.6 | 0.1 | 6.4 | 16.6 | 3.9 | 0.1 | 6.4 | 16.2 | 3.2 | 0.8 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 3 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 |
| Cars | 149 | 728 | 260 | 0 | 241 | 875 | 376 | 0 | 363 | 955 | 221 | 0 | 372 | 930 | 191 | 0 | 5661 |
| % Cars | 81.4 | 81.1 | 80 | 0 | 83.1 | 82.4 | 81.6 | 0 | 81 | 82 | 80.1 | 0 | 82.9 | 82 | 85.7 | 0 | 80.7 |
| Light Goods Vehicles | 21 | 136 | 57 | 0 | 43 | 152 | 69 | 0 | 79 | 182 | 45 | 0 | 65 | 185 | 31 | 0 | 1065 |
| % Light Goods Vehicles | 11.5 | 15.1 | 17.5 | 0 | 14.8 | 14.3 | 15 | 0 | 17.6 | 15.6 | 16.3 | 0 | 14.5 | 16.3 | 13.9 | 0 | 15.2 |
| Buses | 11 | 24 | 3 | 0 | 3 | 23 | 5 | 0 | 2 | 6 | 6 | 0 | 3 | 8 | 1 | 0 | 95 |
| % Buses | 6 | 2.7 | 0.9 | 0 | 1 | 2.2 | 1.1 | 0 | 0.4 | 0.5 | 2.2 | 0 | 0.7 | 0.7 | 0.4 | 0 | 1.4 |
| Single-Unit Trucks | 2 | 7 | 5 | 0 | 1 | 10 | 9 | 0 | 3 | 16 | 2 | 0 | 8 | 7 | 0 | 0 | 70 |
| % Single-Unit Trucks | 1.1 | 0.8 | 1.5 | 0 | 0.3 | 0.9 | 2 | 0 | 0.7 | 1.4 | 0.7 | 0 | 1.8 | 0.6 | 0 | 0 | 1 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Holt (PM)
Counted by: HRC

File Name : Cedar_&_Holt_23_PM_393458_03-23-2017
Site Code : Cedar & Holt 23/PM
Start Date : 3/23/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Holt Eastbound | | | | Holt Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|----------------|------|-------|------|----------------|------|-------|------|------------------|------|-------|------|------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 3 | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 3 | 2 | 0 | 1 | 3 | 0 | 0 | 19 |
| % Articulated Trucks | 0 | 0.3 | 0 | 0 | 0.7 | 0.2 | 0.4 | 0 | 0.2 | 0.3 | 0.7 | 0 | 0.2 | 0.3 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 0 |
| Pedestrians | 0 | 0 | 0 | 37 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 52 | 102 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 98.1 | 1.5 |

| | Holt Eastbound | | | | | Holt Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|----------------|------|-------|------|------------|----------------|------|-------|------|------------|------------------|------|-------|------|------------|------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 05:00 PM | 12 | 59 | 30 | 0 | 101 | 16 | 86 | 33 | 0 | 135 | 52 | 101 | 27 | 0 | 180 | 37 | 72 | 16 | 1 | 126 | 542 |
| 05:15 PM | 21 | 63 | 19 | 1 | 104 | 25 | 92 | 34 | 0 | 151 | 35 | 108 | 24 | 1 | 168 | 28 | 93 | 16 | 0 | 137 | 560 |
| 05:30 PM | 14 | 84 | 30 | 0 | 128 | 23 | 97 | 25 | 0 | 145 | 30 | 79 | 15 | 0 | 124 | 43 | 76 | 22 | 1 | 142 | 539 |
| 05:45 PM | 10 | 65 | 19 | 0 | 94 | 20 | 73 | 30 | 0 | 123 | 18 | 73 | 20 | 0 | 111 | 26 | 71 | 8 | 0 | 105 | 433 |
| Total Volume | 57 | 271 | 98 | 1 | 427 | 84 | 348 | 122 | 0 | 554 | 135 | 361 | 86 | 1 | 583 | 134 | 312 | 62 | 2 | 510 | 2074 |
| % App. Total | 13.3 | 63.5 | 23 | 0.2 | | 15.2 | 62.8 | 22 | 0 | | 23.2 | 61.9 | 14.8 | 0.2 | | 26.3 | 61.2 | 12.2 | 0.4 | | |
| PHF | .679 | .807 | .817 | .250 | .834 | .840 | .897 | .897 | .000 | .917 | .649 | .836 | .796 | .250 | .810 | .779 | .839 | .705 | .500 | .898 | .926 |

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824
Consulting Engineers Since 1915

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Keller (AM)
Counted by: HRC

File Name : Cedar_&_Keller_21_AM_393417_03-21-2017
Site Code : Cedar & Keller 21/AM
Start Date : 3/21/2017
Page No : 1

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Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Keller (AM)
Counted by: HRC

File Name : Cedar_&_Keller_21_AM_393417_03-21-2017
Site Code : Cedar & Keller 21/AM
Start Date : 3/21/2017
Page No : 2

| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 0 | 1 | 0 | 0 | 1 | 8 | 5 | 22 | 0 | 35 | 0 | 106 | 1 | 0 | 107 | 14 | 84 | 5 | 0 | 103 | 246 |
| 08:00 AM | 1 | 1 | 0 | 0 | 2 | 7 | 0 | 25 | 1 | 33 | 0 | 102 | 2 | 0 | 104 | 12 | 99 | 2 | 0 | 113 | 252 |
| 08:15 AM | 1 | 2 | 0 | 0 | 3 | 6 | 0 | 30 | 0 | 36 | 0 | 118 | 1 | 0 | 119 | 10 | 93 | 3 | 0 | 106 | 264 |
| 08:30 AM | 3 | 2 | 0 | 0 | 5 | 3 | 2 | 27 | 2 | 34 | 0 | 140 | 4 | 0 | 144 | 17 | 62 | 2 | 0 | 81 | 264 |
| Total Volume | 5 | 6 | 0 | 0 | 11 | 24 | 7 | 104 | 3 | 138 | 0 | 466 | 8 | 0 | 474 | 53 | 338 | 12 | 0 | 403 | 1026 |
| % App. Total | 45.5 | 54.5 | 0 | 0 | | 17.4 | 5.1 | 75.4 | 2.2 | | 0 | 98.3 | 1.7 | 0 | | 13.2 | 83.9 | 3 | 0 | | |
| PHF | .417 | .750 | .000 | .000 | .550 | .750 | .350 | .867 | .375 | .958 | .000 | .832 | .500 | .000 | .823 | .779 | .854 | .600 | .000 | .892 | .972 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Keller (PM)
Counted by: HRC

File Name : Cedar_&_Keller_21_PM_393420_03-21-2017
Site Code : Cedar & Keller 21/PM
Start Date : 3/21/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 1 | 0 | 0 | 1 | 2 | 1 | 22 | 0 | 0 | 111 | 2 | 4 | 20 | 96 | 4 | 0 | 264 |
| 02:15 PM | 0 | 1 | 0 | 1 | 6 | 3 | 27 | 1 | 0 | 97 | 3 | 0 | 17 | 107 | 3 | 0 | 266 |
| 02:30 PM | 3 | 2 | 0 | 0 | 4 | 1 | 28 | 0 | 0 | 92 | 1 | 0 | 17 | 98 | 5 | 0 | 251 |
| 02:45 PM | 2 | 1 | 0 | 0 | 3 | 2 | 30 | 1 | 0 | 94 | 6 | 2 | 23 | 86 | 3 | 1 | 254 |
| Total | 6 | 4 | 0 | 2 | 15 | 7 | 107 | 2 | 0 | 394 | 12 | 6 | 77 | 387 | 15 | 1 | 1035 |
| 03:00 PM | 0 | 5 | 1 | 1 | 9 | 0 | 27 | 1 | 1 | 109 | 3 | 0 | 21 | 102 | 12 | 0 | 292 |
| 03:15 PM | 0 | 2 | 0 | 0 | 3 | 3 | 26 | 1 | 0 | 105 | 2 | 0 | 20 | 112 | 1 | 0 | 275 |
| 03:30 PM | 0 | 1 | 0 | 1 | 6 | 1 | 44 | 0 | 0 | 126 | 4 | 0 | 18 | 99 | 4 | 0 | 304 |
| 03:45 PM | 1 | 1 | 0 | 0 | 7 | 2 | 31 | 0 | 0 | 156 | 3 | 0 | 22 | 86 | 2 | 0 | 311 |
| Total | 1 | 9 | 1 | 2 | 25 | 6 | 128 | 2 | 1 | 496 | 12 | 0 | 81 | 399 | 19 | 0 | 1182 |
| 04:00 PM | 0 | 2 | 0 | 0 | 5 | 2 | 19 | 1 | 0 | 122 | 4 | 2 | 10 | 98 | 8 | 0 | 273 |
| 04:15 PM | 3 | 1 | 0 | 0 | 2 | 0 | 24 | 0 | 0 | 92 | 1 | 0 | 9 | 76 | 3 | 0 | 211 |
| 04:30 PM | 1 | 2 | 0 | 0 | 4 | 0 | 18 | 3 | 1 | 145 | 2 | 0 | 18 | 110 | 8 | 0 | 312 |
| 04:45 PM | 1 | 0 | 0 | 0 | 3 | 2 | 39 | 1 | 0 | 96 | 5 | 0 | 17 | 122 | 4 | 0 | 290 |
| Total | 5 | 5 | 0 | 0 | 14 | 4 | 100 | 5 | 1 | 455 | 12 | 2 | 54 | 406 | 23 | 0 | 1086 |
| 05:00 PM | 0 | 3 | 0 | 0 | 4 | 3 | 37 | 0 | 0 | 147 | 7 | 0 | 22 | 103 | 1 | 0 | 327 |
| 05:15 PM | 0 | 0 | 0 | 0 | 3 | 0 | 28 | 0 | 0 | 144 | 3 | 0 | 13 | 143 | 4 | 0 | 338 |
| 05:30 PM | 1 | 2 | 0 | 1 | 8 | 0 | 23 | 0 | 0 | 123 | 5 | 0 | 25 | 98 | 2 | 0 | 288 |
| 05:45 PM | 0 | 1 | 0 | 0 | 2 | 0 | 28 | 0 | 0 | 88 | 4 | 0 | 20 | 86 | 5 | 0 | 234 |
| Total | 1 | 6 | 0 | 1 | 17 | 3 | 116 | 0 | 0 | 502 | 19 | 0 | 80 | 430 | 12 | 0 | 1187 |
| Grand Total | 13 | 24 | 1 | 5 | 71 | 20 | 451 | 9 | 2 | 1847 | 55 | 8 | 292 | 1622 | 69 | 1 | 4490 |
| Apprch % | 30.2 | 55.8 | 2.3 | 11.6 | 12.9 | 3.6 | 81.9 | 1.6 | 0.1 | 96.6 | 2.9 | 0.4 | 14.7 | 81.8 | 3.5 | 0.1 | |
| Total % | 0.3 | 0.5 | 0 | 0.1 | 1.6 | 0.4 | 10 | 0.2 | 0 | 41.1 | 1.2 | 0.2 | 6.5 | 36.1 | 1.5 | 0 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 1 | 0 | 6 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0.1 | 1.4 | 0 | 0.1 |
| Cars | 12 | 18 | 1 | 0 | 55 | 16 | 391 | 0 | 2 | 1540 | 54 | 0 | 244 | 1386 | 50 | 0 | 3769 |
| % Cars | 92.3 | 75 | 100 | 0 | 77.5 | 80 | 86.7 | 0 | 100 | 83.4 | 98.2 | 0 | 83.6 | 85.5 | 72.5 | 0 | 83.9 |
| Light Goods Vehicles | 1 | 6 | 0 | 0 | 14 | 4 | 54 | 0 | 0 | 261 | 1 | 0 | 38 | 207 | 18 | 0 | 604 |
| % Light Goods Vehicles | 7.7 | 25 | 0 | 0 | 19.7 | 20 | 12 | 0 | 0 | 14.1 | 1.8 | 0 | 13 | 12.8 | 26.1 | 0 | 13.5 |
| Buses | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 21 | 0 | 0 | 5 | 8 | 0 | 0 | 38 |
| % Buses | 0 | 0 | 0 | 0 | 1.4 | 0 | 0.7 | 0 | 0 | 1.1 | 0 | 0 | 1.7 | 0.5 | 0 | 0 | 0.8 |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 16 | 0 | 0 | 5 | 11 | 0 | 0 | 36 |
| % Single-Unit Trucks | 0 | 0 | 0 | 0 | 1.4 | 0 | 0.7 | 0 | 0 | 0.9 | 0 | 0 | 1.7 | 0.7 | 0 | 0 | 0.8 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/21/2017
Location: Cedar & Keller (PM)
Counted by: HRC

File Name : Cedar_&_Keller_21_PM_393420_03-21-2017
Site Code : Cedar & Keller 21/PM
Start Date : 3/21/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 8 | 0 | 0 | 14 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0.5 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Pedestrians | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 1 | 19 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 55.6 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.4 |

| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:30 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:30 PM | 1 | 2 | 0 | 0 | 3 | 4 | 0 | 18 | 3 | 25 | 1 | 145 | 2 | 0 | 148 | 18 | 110 | 8 | 0 | 136 | 312 |
| 04:45 PM | 1 | 0 | 0 | 0 | 1 | 3 | 2 | 39 | 1 | 45 | 0 | 96 | 5 | 0 | 101 | 17 | 122 | 4 | 0 | 143 | 290 |
| 05:00 PM | 0 | 3 | 0 | 0 | 3 | 4 | 3 | 37 | 0 | 44 | 0 | 147 | 7 | 0 | 154 | 22 | 103 | 1 | 0 | 126 | 327 |
| 05:15 PM | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 28 | 0 | 31 | 0 | 144 | 3 | 0 | 147 | 13 | 143 | 4 | 0 | 160 | 338 |
| Total Volume | 2 | 5 | 0 | 0 | 7 | 14 | 5 | 122 | 4 | 145 | 1 | 532 | 17 | 0 | 550 | 70 | 478 | 17 | 0 | 565 | 1267 |
| % App. Total | 28.6 | 71.4 | 0 | 0 | | 9.7 | 3.4 | 84.1 | 2.8 | | 0.2 | 96.7 | 3.1 | 0 | | 12.4 | 84.6 | 3 | 0 | | |
| PHF | .500 | .417 | .000 | .000 | .583 | .875 | .417 | .782 | .333 | .806 | .250 | .905 | .607 | .000 | .893 | .795 | .836 | .531 | .000 | .883 | .937 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Aurelius (AM)

Counted by: HRC

File Name : Cedar_&_Keller_22_AM_393423_03-22-2017

Site Code : Cedar & Keller 22/AM

Start Date : 3/22/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 4 | 0 | 0 | 0 | 2 | 1 | 16 | 0 | 0 | 66 | 1 | 0 | 8 | 48 | 8 | 0 | 154 |
| 07:15 AM | 0 | 1 | 0 | 1 | 2 | 3 | 23 | 3 | 0 | 73 | 1 | 1 | 9 | 48 | 0 | 0 | 165 |
| 07:30 AM | 1 | 1 | 0 | 3 | 2 | 1 | 30 | 0 | 0 | 106 | 0 | 0 | 4 | 75 | 4 | 3 | 230 |
| 07:45 AM | 1 | 4 | 0 | 0 | 7 | 4 | 18 | 0 | 1 | 90 | 1 | 0 | 15 | 99 | 3 | 0 | 243 |
| Total | 6 | 6 | 0 | 4 | 13 | 9 | 87 | 3 | 1 | 335 | 3 | 1 | 36 | 270 | 15 | 3 | 792 |
| 08:00 AM | 3 | 1 | 0 | 1 | 5 | 1 | 30 | 1 | 0 | 103 | 5 | 1 | 10 | 103 | 5 | 0 | 269 |
| 08:15 AM | 3 | 1 | 0 | 0 | 7 | 3 | 30 | 0 | 0 | 120 | 2 | 0 | 14 | 112 | 4 | 0 | 296 |
| 08:30 AM | 3 | 2 | 0 | 0 | 3 | 0 | 32 | 0 | 0 | 135 | 3 | 0 | 12 | 63 | 5 | 0 | 258 |
| 08:45 AM | 0 | 0 | 0 | 0 | 2 | 1 | 23 | 1 | 0 | 70 | 2 | 4 | 10 | 68 | 2 | 0 | 183 |
| Total | 9 | 4 | 0 | 1 | 17 | 5 | 115 | 2 | 0 | 428 | 12 | 5 | 46 | 346 | 16 | 0 | 1006 |
| Grand Total | 15 | 10 | 0 | 5 | 30 | 14 | 202 | 5 | 1 | 763 | 15 | 6 | 82 | 616 | 31 | 3 | 1798 |
| Apprch % | 50 | 33.3 | 0 | 16.7 | 12 | 5.6 | 80.5 | 2 | 0.1 | 97.2 | 1.9 | 0.8 | 11.2 | 84.2 | 4.2 | 0.4 | |
| Total % | 0.8 | 0.6 | 0 | 0.3 | 1.7 | 0.8 | 11.2 | 0.3 | 0.1 | 42.4 | 0.8 | 0.3 | 4.6 | 34.3 | 1.7 | 0.2 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 14 | 5 | 0 | 0 | 27 | 10 | 167 | 0 | 1 | 630 | 13 | 0 | 64 | 524 | 25 | 0 | 1480 |
| % Cars | 93.3 | 50 | 0 | 0 | 90 | 71.4 | 82.7 | 0 | 100 | 82.6 | 86.7 | 0 | 78 | 85.1 | 80.6 | 0 | 82.3 |
| Light Goods Vehicles | 1 | 5 | 0 | 0 | 3 | 4 | 22 | 0 | 0 | 113 | 1 | 0 | 14 | 71 | 6 | 0 | 240 |
| % Light Goods Vehicles | 6.7 | 50 | 0 | 0 | 10 | 28.6 | 10.9 | 0 | 0 | 14.8 | 6.7 | 0 | 17.1 | 11.5 | 19.4 | 0 | 13.3 |
| Buses | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 11 | 1 | 0 | 2 | 8 | 0 | 0 | 29 |
| % Buses | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 1.4 | 6.7 | 0 | 2.4 | 1.3 | 0 | 0 | 1.6 |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 9 | 0 | 0 | 2 | 7 | 0 | 0 | 24 |
| % Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1.2 | 0 | 0 | 2.4 | 1.1 | 0 | 0 | 1.3 |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 6 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 3 | 19 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 1.1 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Aurelius (AM)
Counted by: HRC

File Name : Cedar_&_Keller_22_AM_393423_03-22-2017
Site Code : Cedar & Keller 22/AM
Start Date : 3/22/2017
Page No : 2

| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 1 | 4 | 0 | 0 | 5 | 7 | 4 | 18 | 0 | 29 | 1 | 90 | 1 | 0 | 92 | 15 | 99 | 3 | 0 | 117 | 243 |
| 08:00 AM | 3 | 1 | 0 | 1 | 5 | 5 | 1 | 30 | 1 | 37 | 0 | 103 | 5 | 1 | 109 | 10 | 103 | 5 | 0 | 118 | 269 |
| 08:15 AM | 3 | 1 | 0 | 0 | 4 | 7 | 3 | 30 | 0 | 40 | 0 | 120 | 2 | 0 | 122 | 14 | 112 | 4 | 0 | 130 | 296 |
| 08:30 AM | 3 | 2 | 0 | 0 | 5 | 3 | 0 | 32 | 0 | 35 | 0 | 135 | 3 | 0 | 138 | 12 | 63 | 5 | 0 | 80 | 258 |
| Total Volume | 10 | 8 | 0 | 1 | 19 | 22 | 8 | 110 | 1 | 141 | 1 | 448 | 11 | 1 | 461 | 51 | 377 | 17 | 0 | 445 | 1066 |
| % App. Total | 52.6 | 42.1 | 0 | 5.3 | | 15.6 | 5.7 | 78 | 0.7 | | 0.2 | 97.2 | 2.4 | 0.2 | | 11.5 | 84.7 | 3.8 | 0 | | |
| PHF | .833 | .500 | .000 | .250 | .950 | .786 | .500 | .859 | .250 | .881 | .250 | .830 | .550 | .250 | .835 | .850 | .842 | .850 | .000 | .856 | .900 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/22/2017

Location: Cedar & Keller (PM)

Counted by: HRC

File Name : Cedar_&_Keller_22_PM_393442_03-22-2017

Site Code : Cedar & Keller 22/PM

Start Date : 3/22/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 0 | 0 | 0 | 0 | 4 | 0 | 30 | 0 | 0 | 98 | 3 | 1 | 27 | 109 | 2 | 2 | 276 |
| 02:15 PM | 3 | 0 | 0 | 1 | 2 | 1 | 10 | 2 | 0 | 94 | 1 | 1 | 17 | 104 | 3 | 2 | 241 |
| 02:30 PM | 1 | 1 | 0 | 0 | 0 | 2 | 31 | 1 | 0 | 116 | 1 | 0 | 16 | 99 | 3 | 0 | 271 |
| 02:45 PM | 2 | 1 | 1 | 0 | 4 | 0 | 20 | 1 | 0 | 98 | 5 | 2 | 10 | 86 | 4 | 1 | 235 |
| Total | 6 | 2 | 1 | 1 | 10 | 3 | 91 | 4 | 0 | 406 | 10 | 4 | 70 | 398 | 12 | 5 | 1023 |
| 03:00 PM | 1 | 0 | 0 | 0 | 2 | 2 | 30 | 0 | 0 | 104 | 2 | 0 | 20 | 83 | 3 | 1 | 248 |
| 03:15 PM | 0 | 1 | 0 | 0 | 3 | 0 | 23 | 2 | 1 | 79 | 4 | 0 | 18 | 78 | 3 | 0 | 212 |
| 03:30 PM | 2 | 3 | 0 | 0 | 8 | 3 | 40 | 0 | 0 | 93 | 2 | 2 | 19 | 96 | 5 | 0 | 273 |
| 03:45 PM | 0 | 3 | 0 | 1 | 4 | 2 | 23 | 0 | 0 | 91 | 4 | 2 | 17 | 91 | 2 | 0 | 240 |
| Total | 3 | 7 | 0 | 1 | 17 | 7 | 116 | 2 | 1 | 367 | 12 | 4 | 74 | 348 | 13 | 1 | 973 |
| 04:00 PM | 2 | 0 | 0 | 0 | 4 | 0 | 32 | 0 | 0 | 109 | 2 | 0 | 14 | 96 | 6 | 0 | 265 |
| 04:15 PM | 1 | 0 | 1 | 0 | 4 | 2 | 22 | 0 | 0 | 109 | 4 | 0 | 13 | 96 | 3 | 0 | 255 |
| 04:30 PM | 1 | 1 | 0 | 0 | 3 | 2 | 27 | 2 | 0 | 97 | 5 | 1 | 19 | 121 | 3 | 0 | 282 |
| 04:45 PM | 0 | 1 | 0 | 0 | 5 | 2 | 26 | 0 | 0 | 118 | 9 | 0 | 13 | 108 | 2 | 0 | 284 |
| Total | 4 | 2 | 1 | 0 | 16 | 6 | 107 | 2 | 0 | 433 | 20 | 1 | 59 | 421 | 14 | 0 | 1086 |
| 05:00 PM | 2 | 4 | 0 | 0 | 4 | 2 | 41 | 0 | 1 | 135 | 6 | 0 | 23 | 130 | 3 | 0 | 351 |
| 05:15 PM | 0 | 2 | 1 | 0 | 3 | 1 | 26 | 0 | 0 | 151 | 6 | 0 | 14 | 130 | 3 | 0 | 337 |
| 05:30 PM | 0 | 2 | 1 | 0 | 7 | 0 | 20 | 2 | 0 | 131 | 1 | 2 | 21 | 112 | 5 | 0 | 304 |
| 05:45 PM | 1 | 0 | 0 | 1 | 2 | 2 | 22 | 0 | 0 | 107 | 5 | 0 | 16 | 107 | 6 | 0 | 269 |
| Total | 3 | 8 | 2 | 1 | 16 | 5 | 109 | 2 | 1 | 524 | 18 | 2 | 74 | 479 | 17 | 0 | 1261 |
| Grand Total | 16 | 19 | 4 | 3 | 59 | 21 | 423 | 10 | 2 | 1730 | 60 | 11 | 277 | 1646 | 56 | 6 | 4343 |
| Apprch % | 38.1 | 45.2 | 9.5 | 7.1 | 11.5 | 4.1 | 82.5 | 1.9 | 0.1 | 96 | 3.3 | 0.6 | 14 | 82.9 | 2.8 | 0.3 | |
| Total % | 0.4 | 0.4 | 0.1 | 0.1 | 1.4 | 0.5 | 9.7 | 0.2 | 0 | 39.8 | 1.4 | 0.3 | 6.4 | 37.9 | 1.3 | 0.1 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 11 | 14 | 4 | 0 | 53 | 17 | 355 | 0 | 1 | 1413 | 52 | 0 | 222 | 1403 | 45 | 0 | 3590 |
| % Cars | 68.8 | 73.7 | 100 | 0 | 89.8 | 81 | 83.9 | 0 | 50 | 81.7 | 86.7 | 0 | 80.1 | 85.2 | 80.4 | 0 | 82.7 |
| Light Goods Vehicles | 5 | 4 | 0 | 0 | 5 | 4 | 56 | 0 | 1 | 281 | 7 | 0 | 49 | 215 | 9 | 0 | 636 |
| % Light Goods Vehicles | 31.2 | 21.1 | 0 | 0 | 8.5 | 19 | 13.2 | 0 | 50 | 16.2 | 11.7 | 0 | 17.7 | 13.1 | 16.1 | 0 | 14.6 |
| Buses | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 14 | 0 | 0 | 4 | 8 | 0 | 0 | 34 |
| % Buses | 0 | 5.3 | 0 | 0 | 0 | 0 | 1.7 | 0 | 0 | 0.8 | 0 | 0 | 1.4 | 0.5 | 0 | 0 | 0.8 |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 19 | 1 | 0 | 2 | 14 | 0 | 0 | 40 |
| % Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 1.1 | 1.7 | 0 | 0.7 | 0.9 | 0 | 0 | 0.9 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
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Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/22/2017
Location: Cedar & Keller (PM)
Counted by: HRC

File Name : Cedar_&_Keller_22_PM_393442_03-22-2017
Site Code : Cedar & Keller 22/PM
Start Date : 3/22/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 6 | 1 | 0 | 12 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 1.7 | 0 | 0.2 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0.4 | 1.8 | 0 | 0.3 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 6 | 29 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 90 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.7 |

| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 04:45 PM | | | | | | | | | | | | | | | | | | | | | |
| 04:45 PM | 0 | 1 | 0 | 0 | 1 | 5 | 2 | 26 | 0 | 33 | 0 | 118 | 9 | 0 | 127 | 13 | 108 | 2 | 0 | 123 | 284 |
| 05:00 PM | 2 | 4 | 0 | 0 | 6 | 4 | 2 | 41 | 0 | 47 | 1 | 135 | 6 | 0 | 142 | 23 | 130 | 3 | 0 | 156 | 351 |
| 05:15 PM | 0 | 2 | 1 | 0 | 3 | 3 | 1 | 26 | 0 | 30 | 0 | 151 | 6 | 0 | 157 | 14 | 130 | 3 | 0 | 147 | 337 |
| 05:30 PM | 0 | 2 | 1 | 0 | 3 | 7 | 0 | 20 | 2 | 29 | 0 | 131 | 1 | 2 | 134 | 21 | 112 | 5 | 0 | 138 | 304 |
| Total Volume | 2 | 9 | 2 | 0 | 13 | 19 | 5 | 113 | 2 | 139 | 1 | 535 | 22 | 2 | 560 | 71 | 480 | 13 | 0 | 564 | 1276 |
| % App. Total | 15.4 | 69.2 | 15.4 | 0 | | 13.7 | 3.6 | 81.3 | 1.4 | | 0.2 | 95.5 | 3.9 | 0.4 | | 12.6 | 85.1 | 2.3 | 0 | | |
| PHF | .250 | .563 | .500 | .000 | .542 | .679 | .625 | .689 | .250 | .739 | .250 | .886 | .611 | .250 | .892 | .772 | .923 | .650 | .000 | .904 | .909 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Keller (AM)

Counted by: HRC

File Name : Cedar_&_Keller_23_AM_393445_03-23-2017

Site Code : Cedar & Keller 23/AM

Start Date : 3/23/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 07:00 AM | 0 | 1 | 0 | 0 | 1 | 1 | 32 | 0 | 1 | 52 | 1 | 1 | 6 | 49 | 5 | 0 | 150 |
| 07:15 AM | 2 | 2 | 1 | 0 | 3 | 3 | 16 | 0 | 0 | 74 | 0 | 0 | 5 | 58 | 3 | 1 | 168 |
| 07:30 AM | 4 | 1 | 1 | 0 | 3 | 4 | 35 | 0 | 0 | 96 | 0 | 0 | 6 | 74 | 3 | 0 | 227 |
| 07:45 AM | 2 | 1 | 1 | 0 | 3 | 2 | 27 | 1 | 0 | 100 | 1 | 0 | 20 | 84 | 6 | 0 | 248 |
| Total | 8 | 5 | 3 | 0 | 10 | 10 | 110 | 1 | 1 | 322 | 2 | 1 | 37 | 265 | 17 | 1 | 793 |
| 08:00 AM | 0 | 0 | 0 | 0 | 2 | 4 | 22 | 0 | 0 | 83 | 1 | 0 | 16 | 106 | 2 | 0 | 236 |
| 08:15 AM | 1 | 3 | 0 | 0 | 5 | 1 | 25 | 0 | 0 | 130 | 1 | 0 | 16 | 110 | 4 | 0 | 296 |
| 08:30 AM | 0 | 4 | 0 | 1 | 1 | 3 | 28 | 0 | 0 | 130 | 1 | 0 | 16 | 57 | 6 | 0 | 247 |
| 08:45 AM | 2 | 1 | 0 | 0 | 3 | 0 | 23 | 0 | 0 | 63 | 1 | 0 | 14 | 60 | 3 | 0 | 170 |
| Total | 3 | 8 | 0 | 1 | 11 | 8 | 98 | 0 | 0 | 406 | 4 | 0 | 62 | 333 | 15 | 0 | 949 |
| Grand Total | 11 | 13 | 3 | 1 | 21 | 18 | 208 | 1 | 1 | 728 | 6 | 1 | 99 | 598 | 32 | 1 | 1742 |
| Apprch % | 39.3 | 46.4 | 10.7 | 3.6 | 8.5 | 7.3 | 83.9 | 0.4 | 0.1 | 98.9 | 0.8 | 0.1 | 13.6 | 81.9 | 4.4 | 0.1 | |
| Total % | 0.6 | 0.7 | 0.2 | 0.1 | 1.2 | 1 | 11.9 | 0.1 | 0.1 | 41.8 | 0.3 | 0.1 | 5.7 | 34.3 | 1.8 | 0.1 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 10 | 9 | 1 | 0 | 17 | 13 | 170 | 0 | 0 | 595 | 4 | 0 | 75 | 500 | 29 | 0 | 1423 |
| % Cars | 90.9 | 69.2 | 33.3 | 0 | 81 | 72.2 | 81.7 | 0 | 0 | 81.7 | 66.7 | 0 | 75.8 | 83.6 | 90.6 | 0 | 81.7 |
| Light Goods Vehicles | 1 | 4 | 2 | 0 | 3 | 5 | 34 | 0 | 1 | 113 | 1 | 0 | 20 | 76 | 3 | 0 | 263 |
| % Light Goods Vehicles | 9.1 | 30.8 | 66.7 | 0 | 14.3 | 27.8 | 16.3 | 0 | 100 | 15.5 | 16.7 | 0 | 20.2 | 12.7 | 9.4 | 0 | 15.1 |
| Buses | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 11 | 1 | 0 | 2 | 12 | 0 | 0 | 31 |
| % Buses | 0 | 0 | 0 | 0 | 4.8 | 0 | 1.9 | 0 | 0 | 1.5 | 16.7 | 0 | 2 | 2 | 0 | 0 | 1.8 |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 2 | 8 | 0 | 0 | 18 |
| % Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 0 | 0 | 2 | 1.3 | 0 | 0 | 1 |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 3 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0.2 |

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Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Keller (AM)
Counted by: HRC

File Name : Cedar_&_Keller_23_AM_393445_03-23-2017
Site Code : Cedar & Keller 23/AM
Start Date : 3/23/2017
Page No : 2

| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:45 AM | | | | | | | | | | | | | | | | | | | | | |
| 07:45 AM | 2 | 1 | 1 | 0 | 4 | 3 | 2 | 27 | 1 | 33 | 0 | 100 | 1 | 0 | 101 | 20 | 84 | 6 | 0 | 110 | 248 |
| 08:00 AM | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 22 | 0 | 28 | 0 | 83 | 1 | 0 | 84 | 16 | 106 | 2 | 0 | 124 | 236 |
| 08:15 AM | 1 | 3 | 0 | 0 | 4 | 5 | 1 | 25 | 0 | 31 | 0 | 130 | 1 | 0 | 131 | 16 | 110 | 4 | 0 | 130 | 296 |
| 08:30 AM | 0 | 4 | 0 | 1 | 5 | 1 | 3 | 28 | 0 | 32 | 0 | 130 | 1 | 0 | 131 | 16 | 57 | 6 | 0 | 79 | 247 |
| Total Volume | 3 | 8 | 1 | 1 | 13 | 11 | 10 | 102 | 1 | 124 | 0 | 443 | 4 | 0 | 447 | 68 | 357 | 18 | 0 | 443 | 1027 |
| % App. Total | 23.1 | 61.5 | 7.7 | 7.7 | | 8.9 | 8.1 | 82.3 | 0.8 | | 0 | 99.1 | 0.9 | 0 | | 15.3 | 80.6 | 4.1 | 0 | | |
| PHF | .375 | .500 | .250 | .250 | .650 | .550 | .625 | .911 | .250 | .939 | .000 | .852 | 1.00 | .000 | .853 | .850 | .811 | .750 | .000 | .852 | .867 |

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555 Hulet Drive
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Consulting Engineers Since 1915

Job Number: 20161043

Date: 3/23/2017

Location: Cedar & Aurelius (PM)

Counted by: HRC

File Name : Cedar_&_Keller_23_PM_393448_03-23-2017

Site Code : Cedar & Keller 23/PM

Start Date : 3/23/2017

Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| Start Time | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| 02:00 PM | 0 | 1 | 0 | 0 | 2 | 1 | 17 | 0 | 0 | 96 | 0 | 2 | 18 | 100 | 2 | 0 | 239 |
| 02:15 PM | 0 | 2 | 0 | 0 | 6 | 0 | 24 | 0 | 0 | 76 | 5 | 0 | 19 | 88 | 6 | 0 | 226 |
| 02:30 PM | 1 | 1 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 118 | 4 | 0 | 13 | 96 | 3 | 0 | 270 |
| 02:45 PM | 1 | 0 | 0 | 2 | 9 | 0 | 14 | 0 | 0 | 97 | 5 | 2 | 13 | 96 | 2 | 0 | 241 |
| Total | 2 | 4 | 0 | 2 | 17 | 1 | 89 | 0 | 0 | 387 | 14 | 4 | 63 | 380 | 13 | 0 | 976 |
| 03:00 PM | 1 | 1 | 0 | 0 | 3 | 2 | 29 | 0 | 0 | 95 | 2 | 0 | 19 | 117 | 2 | 0 | 271 |
| 03:15 PM | 1 | 1 | 0 | 1 | 8 | 0 | 29 | 0 | 0 | 98 | 3 | 1 | 17 | 100 | 3 | 0 | 262 |
| 03:30 PM | 1 | 2 | 0 | 0 | 4 | 1 | 44 | 0 | 2 | 140 | 3 | 0 | 25 | 107 | 5 | 0 | 334 |
| 03:45 PM | 1 | 1 | 0 | 0 | 3 | 1 | 28 | 0 | 0 | 141 | 1 | 0 | 20 | 94 | 2 | 0 | 292 |
| Total | 4 | 5 | 0 | 1 | 18 | 4 | 130 | 0 | 2 | 474 | 9 | 1 | 81 | 418 | 12 | 0 | 1159 |
| 04:00 PM | 1 | 1 | 1 | 0 | 4 | 1 | 20 | 0 | 0 | 110 | 3 | 1 | 23 | 103 | 8 | 0 | 276 |
| 04:15 PM | 1 | 1 | 0 | 0 | 7 | 2 | 33 | 0 | 0 | 98 | 3 | 0 | 24 | 114 | 8 | 0 | 291 |
| 04:30 PM | 1 | 2 | 0 | 0 | 3 | 0 | 24 | 0 | 0 | 132 | 1 | 0 | 22 | 100 | 4 | 0 | 289 |
| 04:45 PM | 2 | 1 | 0 | 0 | 2 | 3 | 37 | 0 | 0 | 92 | 4 | 1 | 19 | 107 | 2 | 0 | 270 |
| Total | 5 | 5 | 1 | 0 | 16 | 6 | 114 | 0 | 0 | 432 | 11 | 2 | 88 | 424 | 22 | 0 | 1126 |
| 05:00 PM | 3 | 3 | 1 | 1 | 7 | 4 | 23 | 4 | 0 | 123 | 7 | 0 | 24 | 128 | 5 | 1 | 334 |
| 05:15 PM | 0 | 3 | 0 | 1 | 1 | 2 | 26 | 0 | 0 | 164 | 9 | 2 | 20 | 125 | 3 | 0 | 356 |
| 05:30 PM | 0 | 1 | 0 | 0 | 7 | 3 | 28 | 0 | 0 | 126 | 2 | 1 | 29 | 120 | 2 | 0 | 319 |
| 05:45 PM | 0 | 3 | 0 | 0 | 6 | 2 | 27 | 2 | 0 | 118 | 3 | 1 | 26 | 97 | 5 | 0 | 290 |
| Total | 3 | 10 | 1 | 2 | 21 | 11 | 104 | 6 | 0 | 531 | 21 | 4 | 99 | 470 | 15 | 1 | 1299 |
| Grand Total | 14 | 24 | 2 | 5 | 72 | 22 | 437 | 6 | 2 | 1824 | 55 | 11 | 331 | 1692 | 62 | 1 | 4560 |
| Apprch % | 31.1 | 53.3 | 4.4 | 11.1 | 13.4 | 4.1 | 81.4 | 1.1 | 0.1 | 96.4 | 2.9 | 0.6 | 15.9 | 81.1 | 3 | 0 | |
| Total % | 0.3 | 0.5 | 0 | 0.1 | 1.6 | 0.5 | 9.6 | 0.1 | 0 | 40 | 1.2 | 0.2 | 7.3 | 37.1 | 1.4 | 0 | |
| Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| % Motorcycles | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cars | 11 | 23 | 2 | 0 | 65 | 19 | 386 | 0 | 2 | 1539 | 47 | 0 | 285 | 1429 | 54 | 0 | 3862 |
| % Cars | 78.6 | 95.8 | 100 | 0 | 90.3 | 86.4 | 88.3 | 0 | 100 | 84.4 | 85.5 | 0 | 86.1 | 84.5 | 87.1 | 0 | 84.7 |
| Light Goods Vehicles | 3 | 1 | 0 | 0 | 5 | 3 | 47 | 0 | 0 | 243 | 4 | 0 | 40 | 234 | 8 | 0 | 588 |
| % Light Goods Vehicles | 21.4 | 4.2 | 0 | 0 | 6.9 | 13.6 | 10.8 | 0 | 0 | 13.3 | 7.3 | 0 | 12.1 | 13.8 | 12.9 | 0 | 12.9 |
| Buses | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 20 | 1 | 0 | 5 | 13 | 0 | 0 | 44 |
| % Buses | 0 | 0 | 0 | 0 | 1.4 | 0 | 0.9 | 0 | 0 | 1.1 | 1.8 | 0 | 1.5 | 0.8 | 0 | 0 | 1 |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 17 | 1 | 0 | 1 | 12 | 0 | 0 | 32 |
| % Single-Unit Trucks | 0 | 0 | 0 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0.9 | 1.8 | 0 | 0.3 | 0.7 | 0 | 0 | 0.7 |

Hubbell, Roth & Clark, Inc.

555 Hulet Drive
P. O. Box 824
Bloomfield Hills, MI 48303-0824

Consulting Engineers Since 1915

Job Number: 20161043
Date: 3/23/2017
Location: Cedar & Aurelius (PM)
Counted by: HRC

File Name : Cedar_ & Keller_ 23_PM_393448_03-23-2017
Site Code : Cedar & Keller 23/PM
Start Date : 3/23/2017
Page No : 2

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

| | Eastbound Approach Eastbound | | | | Keller Westbound | | | | Cedar Northbound | | | | Cedar Southbound | | | | Int. Total |
|-------------------------|---------------------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|---------------------|------|-------|------|------------|
| | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | Left | Thru | Right | Peds | |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 4 | 0 | 0 | 9 |
| % Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0.2 |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bicycles on Road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| % Bicycles on Crosswalk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.2 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 1 | 21 |
| % Pedestrians | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 81.8 | 0 | 0 | 0 | 100 | 0.5 |























| | Eastbound Approach Eastbound | | | | | Keller Westbound | | | | | Cedar Northbound | | | | | Cedar Southbound | | | | | Int. Total |
|--|---------------------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|---------------------|------|-------|------|------------|------------|
| Start Time | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | Left | Thru | Right | Peds | App. Total | |
| Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | | | | | | | | | | |
| 05:00 PM | 3 | 3 | 1 | 1 | 8 | 7 | 4 | 23 | 4 | 38 | 0 | 123 | 7 | 0 | 130 | 24 | 128 | 5 | 1 | 158 | 334 |
| 05:15 PM | 0 | 3 | 0 | 1 | 4 | 1 | 2 | 26 | 0 | 29 | 0 | 164 | 9 | 2 | 175 | 20 | 125 | 3 | 0 | 148 | 356 |
| 05:30 PM | 0 | 1 | 0 | 0 | 1 | 7 | 3 | 28 | 0 | 38 | 0 | 126 | 2 | 1 | 129 | 29 | 120 | 2 | 0 | 151 | 319 |
| 05:45 PM | 0 | 3 | 0 | 0 | 3 | 6 | 2 | 27 | 2 | 37 | 0 | 118 | 3 | 1 | 122 | 26 | 97 | 5 | 0 | 128 | 290 |
| Total Volume | 3 | 10 | 1 | 2 | 16 | 21 | 11 | 104 | 6 | 142 | 0 | 531 | 21 | 4 | 556 | 99 | 470 | 15 | 1 | 585 | 1299 |
| % App. Total | 18.8 | 62.5 | 6.2 | 12.5 | | 14.8 | 7.7 | 73.2 | 4.2 | | 0 | 95.5 | 3.8 | 0.7 | | 16.9 | 80.3 | 2.6 | 0.2 | | |
| PHF | .250 | .833 | .250 | .500 | .500 | .750 | .688 | .929 | .375 | .934 | .000 | .809 | .583 | .500 | .794 | .853 | .918 | .750 | .250 | .926 | .912 |

Attachment B: Synchro Reports

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road





















AM Existing (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Traffic Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Future Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.98 | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.99 | | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | 1765 | 1863 | 1583 | 1770 | 1863 | 1550 | | 3445 | | | 3394 | |
| Flt Permitted | 0.48 | 1.00 | 1.00 | 0.10 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (perm) | 892 | 1863 | 1583 | 181 | 1863 | 1550 | | 3445 | | | 3394 | |
| Peak-hour factor, PHF | 0.81 | 0.81 | 0.81 | 0.84 | 0.84 | 0.84 | 0.91 | 0.91 | 0.91 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 56 | 526 | 132 | 110 | 283 | 114 | 79 | 246 | 32 | 55 | 261 | 79 |
| RTOR Reduction (vph) | 0 | 0 | 86 | 0 | 0 | 76 | 0 | 7 | 0 | 0 | 16 | 0 |
| Lane Group Flow (vph) | 56 | 526 | 46 | 110 | 283 | 38 | 0 | 350 | 0 | 0 | 379 | 0 |
| Confl. Peds. (#/hr) | 6 | | | | | 6 | 1 | | 3 | 3 | | 1 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 1 | | 2 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | | | | |
| Actuated Green, G (s) | 45.0 | 38.3 | 38.3 | 50.8 | 41.2 | 41.2 | | 18.0 | | | 36.1 | |
| Effective Green, g (s) | 45.0 | 38.3 | 38.3 | 50.8 | 41.2 | 41.2 | | 18.0 | | | 36.1 | |
| Actuated g/C Ratio | 0.36 | 0.31 | 0.31 | 0.41 | 0.33 | 0.33 | | 0.14 | | | 0.29 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 367 | 570 | 485 | 195 | 614 | 510 | | 496 | | | 980 | |
| v/s Ratio Prot | 0.01 | c0.28 | | c0.04 | 0.15 | | | c0.10 | | | c0.11 | |
| v/s Ratio Perm | 0.05 | | 0.03 | c0.19 | | 0.02 | | | | | | |
| v/c Ratio | 0.15 | 0.92 | 0.09 | 0.56 | 0.46 | 0.07 | | 0.71 | | | 0.39 | |
| Uniform Delay, d1 | 26.6 | 41.9 | 31.0 | 28.4 | 33.1 | 28.8 | | 51.0 | | | 35.6 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.2 | 20.6 | 0.1 | 3.7 | 0.6 | 0.1 | | 4.5 | | | 1.2 | |
| Delay (s) | 26.8 | 62.6 | 31.1 | 32.1 | 33.7 | 28.9 | | 55.5 | | | 36.7 | |
| Level of Service | C | E | C | C | C | C | | E | | | D | |
| Approach Delay (s) | | 53.9 | | | 32.3 | | | 55.5 | | | 36.7 | |
| Approach LOS | | D | | | C | | | E | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 45.2 | | | | HCM 2000 Level of Service | | | | D | |
| HCM 2000 Volume to Capacity ratio | | | 0.66 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 125.0 | | | | Sum of lost time (s) | | | 23.0 | | |
| Intersection Capacity Utilization | | | 79.8% | | | | ICU Level of Service | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























AM Existing (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | | |  |  | |  |  |
| Traffic Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 21 | 23 | 437 | 79 |
| Future Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 21 | 23 | 437 | 79 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 5.8 | 5.8 | | | 6.1 | 6.1 | | 6.1 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | | 0.95 | 1.00 | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.98 | | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1681 | 1736 | | 1770 | 1829 | | | 3535 | 1583 | | 3438 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (perm) | 1681 | 1736 | | 1770 | 1829 | | | 3535 | 1583 | | 3438 | |
| Peak-hour factor, PHF | 0.71 | 0.71 | 0.71 | 0.81 | 0.81 | 0.81 | 0.79 | 0.79 | 0.79 | 0.76 | 0.76 | 0.76 |
| Adj. Flow (vph) | 485 | 269 | 13 | 107 | 140 | 19 | 10 | 438 | 27 | 30 | 575 | 104 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 22 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 378 | 388 | 0 | 107 | 155 | 0 | 0 | 448 | 5 | 0 | 698 | 0 |
| Confl. Peds. (#/hr) | | | 2 | 2 | | | 4 | | 1 | 1 | | 4 |
| Turn Type | Split | NA | | Split | NA | | Split | NA | Prot | Split | NA | |
| Protected Phases | 3 | 3 | | 4 | 4 | | 2 | 2 | 2 | 1 | 1 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 27.8 | 27.8 | | 15.3 | 15.3 | | | 24.4 | 24.4 | | 28.5 | |
| Effective Green, g (s) | 27.8 | 27.8 | | 15.3 | 15.3 | | | 24.4 | 24.4 | | 28.5 | |
| Actuated g/C Ratio | 0.23 | 0.23 | | 0.13 | 0.13 | | | 0.20 | 0.20 | | 0.24 | |
| Clearance Time (s) | 6.0 | 6.0 | | 5.8 | 5.8 | | | 6.1 | 6.1 | | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 389 | 402 | | 225 | 233 | | | 718 | 321 | | 816 | |
| v/s Ratio Prot | c0.22 | 0.22 | | 0.06 | c0.08 | | | c0.13 | 0.00 | | c0.20 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.97 | 0.97 | | 0.48 | 0.66 | | | 0.62 | 0.02 | | 0.85 | |
| Uniform Delay, d1 | 45.7 | 45.6 | | 48.6 | 49.9 | | | 43.6 | 38.2 | | 43.8 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 38.0 | 35.7 | | 1.6 | 6.9 | | | 4.1 | 0.1 | | 8.7 | |
| Delay (s) | 83.7 | 81.3 | | 50.2 | 56.8 | | | 47.7 | 38.3 | | 52.5 | |
| Level of Service | F | F | | D | E | | | D | D | | D | |
| Approach Delay (s) | | 82.5 | | | 54.2 | | | 47.1 | | | 52.5 | |
| Approach LOS | | F | | | D | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 61.9 | | | HCM 2000 Level of Service | | | E | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.80 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 120.0 | | | Sum of lost time (s) | | | 24.0 | | | |
| Intersection Capacity Utilization | | | 70.2% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road























AM Existing - 3 Lane Cedar (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Future Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 4.5 | 5.7 | | 4.5 | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1760 | 1863 | 1549 | 1769 | 1863 | 1521 | 1767 | 1825 | | 1766 | 1786 | |
| Flt Permitted | 0.48 | 1.00 | 1.00 | 0.16 | 1.00 | 1.00 | 0.35 | 1.00 | | 0.47 | 1.00 | |
| Satd. Flow (perm) | 887 | 1863 | 1549 | 296 | 1863 | 1521 | 660 | 1825 | | 875 | 1786 | |
| Peak-hour factor, PHF | 0.86 | 0.86 | 0.86 | 0.88 | 0.88 | 0.88 | 0.92 | 0.92 | 0.92 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 52 | 495 | 124 | 105 | 270 | 109 | 78 | 243 | 32 | 58 | 273 | 83 |
| RTOR Reduction (vph) | 0 | 0 | 84 | 0 | 0 | 78 | 0 | 5 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 52 | 495 | 40 | 105 | 270 | 31 | 78 | 270 | 0 | 58 | 345 | 0 |
| Confl. Peds. (#/hr) | 11 | | 1 | 1 | | 11 | 5 | | 4 | 4 | | 5 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 39.9 | 29.3 | 29.3 | 31.7 | 25.2 | 25.2 | 32.4 | 27.5 | | 32.4 | 27.5 | |
| Effective Green, g (s) | 39.9 | 29.3 | 29.3 | 31.7 | 25.2 | 25.2 | 32.4 | 27.5 | | 32.4 | 27.5 | |
| Actuated g/C Ratio | 0.44 | 0.33 | 0.33 | 0.35 | 0.28 | 0.28 | 0.36 | 0.31 | | 0.36 | 0.31 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 4.5 | 5.7 | | 4.5 | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 496 | 606 | 504 | 210 | 521 | 425 | 297 | 557 | | 363 | 545 | |
| v/s Ratio Prot | c0.01 | c0.27 | | c0.04 | 0.14 | | c0.01 | 0.15 | | 0.01 | c0.19 | |
| v/s Ratio Perm | 0.03 | | 0.03 | 0.14 | | 0.02 | 0.08 | | | 0.05 | | |
| v/c Ratio | 0.10 | 0.82 | 0.08 | 0.50 | 0.52 | 0.07 | 0.26 | 0.48 | | 0.16 | 0.63 | |
| Uniform Delay, d1 | 18.1 | 27.9 | 21.0 | 35.1 | 27.3 | 23.8 | 27.3 | 25.5 | | 23.4 | 26.9 | |
| Progression Factor | 0.71 | 0.73 | 0.96 | 1.00 | 1.00 | 1.00 | 0.61 | 0.44 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 7.8 | 0.1 | 1.9 | 0.9 | 0.1 | 0.4 | 2.7 | | 0.2 | 5.5 | |
| Delay (s) | 12.9 | 28.2 | 20.2 | 37.0 | 28.2 | 23.9 | 17.1 | 13.8 | | 23.6 | 32.4 | |
| Level of Service | B | C | C | D | C | C | B | B | | C | C | |
| Approach Delay (s) | | 25.5 | | | 29.1 | | | 14.6 | | | 31.2 | |
| Approach LOS | | C | | | C | | | B | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 25.6 | | | HCM 2000 Level of Service | | | C | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.67 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | 21.8 | | | |
| Intersection Capacity Utilization | | | 72.5% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Steet/Cedar Street























AM Existing - 3 Lane Cedar (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Traffic Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Future Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1737 | | 1770 | 1828 | | 1767 | 1863 | 1543 | 1766 | 1813 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.17 | 1.00 | 1.00 | 0.37 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1737 | | 1770 | 1828 | | 311 | 1863 | 1543 | 682 | 1813 | |
| Peak-hour factor, PHF | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.84 | 0.84 | 0.84 | 0.86 | 0.86 | 0.86 |
| Adj. Flow (vph) | 420 | 233 | 11 | 106 | 138 | 18 | 10 | 412 | 239 | 27 | 508 | 92 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 147 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 328 | 335 | 0 | 106 | 150 | 0 | 10 | 412 | 92 | 27 | 594 | 0 |
| Confl. Peds. (#/hr) | 2 | | | | | 2 | 3 | | 2 | 2 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Perm | NA | Perm | Perm | NA | |
| Protected Phases | 2 | 2 | | 6 | 6 | | | 4 | | | 8 | |
| Permitted Phases | | | | | | | 4 | | 4 | 8 | | |
| Actuated Green, G (s) | 24.2 | 24.2 | | 13.1 | 13.1 | | 34.8 | 34.8 | 34.8 | 34.8 | 34.8 | |
| Effective Green, g (s) | 24.2 | 24.2 | | 13.1 | 13.1 | | 34.8 | 34.8 | 34.8 | 34.8 | 34.8 | |
| Actuated g/C Ratio | 0.27 | 0.27 | | 0.15 | 0.15 | | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 452 | 467 | | 257 | 266 | | 120 | 720 | 596 | 263 | 701 | |
| v/s Ratio Prot | c0.20 | 0.19 | | 0.06 | c0.08 | | | 0.22 | | | c0.33 | |
| v/s Ratio Perm | | | | | | | 0.03 | | 0.06 | 0.04 | | |
| v/c Ratio | 0.73 | 0.72 | | 0.41 | 0.56 | | 0.08 | 0.57 | 0.16 | 0.10 | 0.85 | |
| Uniform Delay, d1 | 29.9 | 29.8 | | 35.0 | 35.8 | | 17.5 | 21.7 | 18.0 | 17.6 | 25.2 | |
| Progression Factor | 1.02 | 1.02 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.89 | 1.00 | |
| Incremental Delay, d2 | 9.7 | 9.0 | | 1.1 | 2.7 | | 0.3 | 1.1 | 0.1 | 0.2 | 9.1 | |
| Delay (s) | 40.1 | 39.3 | | 36.0 | 38.5 | | 17.8 | 22.8 | 18.1 | 15.9 | 34.4 | |
| Level of Service | D | D | | D | D | | B | C | B | B | C | |
| Approach Delay (s) | | 39.7 | | | 37.5 | | | 21.1 | | | 33.6 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 32.1 | | | | | | | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.75 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 66.8% | | | | | | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road





















PM Existing (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Traffic Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Future Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.98 | | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 1770 | 1863 | 1583 | | 3432 | | | 3422 | |
| Flt Permitted | 0.23 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (perm) | 425 | 1863 | 1583 | 679 | 1863 | 1583 | | 3432 | | | 3422 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 | 0.94 | 0.95 | 0.95 | 0.95 | 0.76 | 0.76 | 0.76 |
| Adj. Flow (vph) | 59 | 235 | 109 | 107 | 371 | 133 | 122 | 372 | 61 | 171 | 487 | 116 |
| RTOR Reduction (vph) | 0 | 0 | 85 | 0 | 0 | 91 | 0 | 6 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 59 | 235 | 24 | 107 | 371 | 42 | 0 | 549 | 0 | 0 | 763 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | 4 | 4 | | |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 1 | | 2 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | | | | |
| Actuated Green, G (s) | 36.6 | 29.2 | 29.2 | 43.4 | 32.6 | 32.6 | | 41.1 | | | 28.9 | |
| Effective Green, g (s) | 36.6 | 29.2 | 29.2 | 43.4 | 32.6 | 32.6 | | 41.1 | | | 28.9 | |
| Actuated g/C Ratio | 0.28 | 0.22 | 0.22 | 0.33 | 0.25 | 0.25 | | 0.31 | | | 0.22 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 191 | 409 | 347 | 310 | 456 | 388 | | 1060 | | | 743 | |
| v/s Ratio Prot | 0.02 | 0.13 | | c0.03 | c0.20 | | | c0.16 | | | c0.22 | |
| v/s Ratio Perm | 0.07 | | 0.02 | 0.08 | | 0.03 | | | | | | |
| v/c Ratio | 0.31 | 0.57 | 0.07 | 0.35 | 0.81 | 0.11 | | 0.52 | | | 1.03 | |
| Uniform Delay, d1 | 37.3 | 46.4 | 41.1 | 32.8 | 47.3 | 38.9 | | 37.8 | | | 52.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.9 | 2.0 | 0.1 | 0.7 | 10.6 | 0.1 | | 1.8 | | | 40.1 | |
| Delay (s) | 38.2 | 48.3 | 41.2 | 33.5 | 58.0 | 39.0 | | 39.6 | | | 92.1 | |
| Level of Service | D | D | D | C | E | D | | D | | | F | |
| Approach Delay (s) | | 44.9 | | | 49.6 | | | 39.6 | | | 92.1 | |
| Approach LOS | | D | | | D | | | D | | | F | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 60.5 | | | | HCM 2000 Level of Service | | | E | | |
| HCM 2000 Volume to Capacity ratio | | | 0.74 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 133.0 | | | | Sum of lost time (s) | | | 23.0 | | |
| Intersection Capacity Utilization | | | 82.1% | | | | ICU Level of Service | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























PM Existing (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | | |  |  |  |  | |
| Traffic Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Future Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.0 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | | 0.95 | 1.00 | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.99 | | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1681 | 1720 | | 1770 | 1837 | | | 3530 | 1583 | | 3442 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (perm) | 1681 | 1720 | | 1770 | 1837 | | | 3530 | 1583 | | 3442 | |
| Peak-hour factor, PHF | 0.84 | 0.84 | 0.84 | 0.83 | 0.83 | 0.83 | 0.93 | 0.93 | 0.93 | 0.83 | 0.83 | 0.83 |
| Adj. Flow (vph) | 333 | 167 | 26 | 135 | 328 | 34 | 25 | 472 | 492 | 49 | 631 | 108 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 392 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 260 | 263 | 0 | 135 | 359 | 0 | 0 | 497 | 100 | 0 | 778 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 3 | | 1 | 1 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Split | NA | Prot | Split | NA | |
| Protected Phases | 3 | 3 | | 4 | 4 | | 2 | 2 | 2 | 1 | 1 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 22.4 | 22.4 | | 24.0 | 24.0 | | | 26.0 | 26.0 | | 31.2 | |
| Effective Green, g (s) | 22.4 | 22.4 | | 24.0 | 24.0 | | | 26.0 | 26.0 | | 31.2 | |
| Actuated g/C Ratio | 0.18 | 0.18 | | 0.19 | 0.19 | | | 0.20 | 0.20 | | 0.24 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 295 | 302 | | 333 | 345 | | | 719 | 322 | | 842 | |
| v/s Ratio Prot | c0.15 | 0.15 | | 0.08 | c0.20 | | | c0.14 | 0.06 | | c0.23 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.88 | 0.87 | | 0.41 | 1.04 | | | 0.69 | 0.31 | | 0.92 | |
| Uniform Delay, d1 | 51.3 | 51.1 | | 45.5 | 51.8 | | | 47.0 | 43.1 | | 47.0 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 25.0 | 22.4 | | 0.8 | 59.2 | | | 5.4 | 2.5 | | 15.6 | |
| Delay (s) | 76.2 | 73.5 | | 46.3 | 110.9 | | | 52.4 | 45.7 | | 62.6 | |
| Level of Service | E | E | | D | F | | | D | D | | E | |
| Approach Delay (s) | | 74.8 | | | 93.4 | | | 49.1 | | | 62.6 | |
| Approach LOS | | E | | | F | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 65.6 | | | HCM 2000 Level of Service | | | E | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.88 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 127.5 | | | Sum of lost time (s) | | | 23.9 | | | |
| Intersection Capacity Utilization | | | 79.9% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road























PM Existing - 3 Lane Cedar (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Future Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.2 | 4.0 | | 5.2 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1768 | 1863 | 1530 | 1764 | 1863 | 1527 | 1769 | 1817 | | 1769 | 1801 | |
| Flt Permitted | 0.20 | 1.00 | 1.00 | 0.40 | 1.00 | 1.00 | 0.13 | 1.00 | | 0.27 | 1.00 | |
| Satd. Flow (perm) | 381 | 1863 | 1530 | 743 | 1863 | 1527 | 234 | 1817 | | 503 | 1801 | |
| Peak-hour factor, PHF | 0.80 | 0.80 | 0.80 | 0.93 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 | 0.79 | 0.79 | 0.79 |
| Adj. Flow (vph) | 68 | 270 | 125 | 109 | 375 | 134 | 126 | 384 | 63 | 165 | 468 | 111 |
| RTOR Reduction (vph) | 0 | 0 | 96 | 0 | 0 | 97 | 0 | 6 | 0 | 0 | 9 | 0 |
| Lane Group Flow (vph) | 68 | 270 | 29 | 109 | 375 | 37 | 126 | 441 | 0 | 165 | 570 | 0 |
| Confl. Peds. (#/hr) | 9 | | 8 | 8 | | 9 | 2 | | 2 | 2 | | 2 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 24.6 | 19.3 | 19.3 | 32.6 | 23.3 | 23.3 | 38.4 | 31.4 | | 38.4 | 31.4 | |
| Effective Green, g (s) | 28.2 | 21.1 | 21.1 | 36.2 | 25.1 | 25.1 | 39.4 | 33.1 | | 39.4 | 33.1 | |
| Actuated g/C Ratio | 0.31 | 0.23 | 0.23 | 0.40 | 0.28 | 0.28 | 0.44 | 0.37 | | 0.44 | 0.37 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.7 | 5.7 | | 5.7 | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 228 | 436 | 358 | 424 | 519 | 425 | 230 | 668 | | 325 | 662 | |
| v/s Ratio Prot | 0.02 | 0.14 | | c0.03 | c0.20 | | c0.05 | 0.24 | | 0.04 | c0.32 | |
| v/s Ratio Perm | 0.07 | | 0.02 | 0.07 | | 0.02 | 0.19 | | | 0.18 | | |
| v/c Ratio | 0.30 | 0.62 | 0.08 | 0.26 | 0.72 | 0.09 | 0.55 | 0.66 | | 0.51 | 0.86 | |
| Uniform Delay, d1 | 33.4 | 30.9 | 26.9 | 23.7 | 29.3 | 24.0 | 34.0 | 23.8 | | 28.8 | 26.3 | |
| Progression Factor | 1.03 | 0.61 | 1.55 | 1.00 | 1.00 | 1.00 | 1.23 | 0.89 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 2.5 | 0.1 | 0.3 | 4.9 | 0.1 | 2.3 | 4.4 | | 1.2 | 13.8 | |
| Delay (s) | 35.2 | 21.3 | 41.6 | 24.0 | 34.2 | 24.1 | 44.2 | 25.6 | | 30.1 | 40.1 | |
| Level of Service | D | C | D | C | C | C | D | C | | C | D | |
| Approach Delay (s) | | 28.8 | | | 30.2 | | | 29.7 | | | 37.9 | |
| Approach LOS | | C | | | C | | | C | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 32.2 | | | HCM 2000 Level of Service | | | C | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.71 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | 17.2 | | | |
| Intersection Capacity Utilization | | | 70.5% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























PM Existing - 3 Lane Cedar (2017 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Traffic Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Future Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.8 | 3.8 | | 4.0 | 4.0 | | 4.3 | 4.3 | 4.3 | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1734 | | 1770 | 1834 | | 1770 | 1863 | 1547 | 1770 | 1815 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.11 | 1.00 | 1.00 | 0.25 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1734 | | 1770 | 1834 | | 212 | 1863 | 1547 | 462 | 1815 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 295 | 147 | 23 | 129 | 313 | 32 | 26 | 505 | 526 | 43 | 552 | 95 |
| RTOR Reduction (vph) | 0 | 6 | 0 | 0 | 4 | 0 | 0 | 0 | 320 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 295 | 164 | 0 | 129 | 341 | 0 | 26 | 505 | 206 | 43 | 640 | 0 |
| Confl. Peds. (#/hr) | 2 | | | | | 2 | 3 | | 1 | 1 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Perm | NA | Perm | Perm | NA | |
| Protected Phases | 2 | 2 | | 6 | 6 | | | 4 | | | 8 | |
| Permitted Phases | | | | | | | 4 | | 4 | 8 | | |
| Actuated Green, G (s) | 19.3 | 19.3 | | 19.4 | 19.4 | | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | |
| Effective Green, g (s) | 21.3 | 21.3 | | 21.4 | 21.4 | | 35.2 | 35.2 | 35.2 | 35.5 | 35.5 | |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.24 | 0.24 | | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 397 | 410 | | 420 | 436 | | 82 | 728 | 605 | 182 | 715 | |
| v/s Ratio Prot | c0.18 | 0.09 | | 0.07 | c0.19 | | | 0.27 | | | c0.35 | |
| v/s Ratio Perm | | | | | | | 0.12 | | 0.13 | 0.09 | | |
| v/c Ratio | 0.74 | 0.40 | | 0.31 | 0.78 | | 0.32 | 0.69 | 0.34 | 0.24 | 0.89 | |
| Uniform Delay, d1 | 31.8 | 29.0 | | 28.2 | 32.1 | | 19.0 | 22.9 | 19.2 | 18.2 | 25.5 | |
| Progression Factor | 1.18 | 1.21 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.71 | 0.87 | |
| Incremental Delay, d2 | 11.4 | 2.8 | | 0.4 | 8.9 | | 2.2 | 2.9 | 0.3 | 0.6 | 12.0 | |
| Delay (s) | 48.9 | 37.7 | | 28.6 | 41.0 | | 21.3 | 25.8 | 19.6 | 13.5 | 34.3 | |
| Level of Service | D | D | | C | D | | C | C | B | B | C | |
| Approach Delay (s) | | 44.8 | | | 37.6 | | | 22.6 | | | 33.0 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 31.8 | | | HCM 2000 Level of Service | | | C | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.82 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | 12.1 | | | |
| Intersection Capacity Utilization | | | 72.6% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road






















AM Future - 4 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  | |   | | |   | |
| Traffic Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Future Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.98 | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.99 | | | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | 1766 | 1863 | 1583 | 1770 | 1863 | 1553 | | 3446 | | | 3394 | |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.15 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (perm) | 940 | 1863 | 1583 | 273 | 1863 | 1553 | | 3446 | | | 3394 | |
| Peak-hour factor, PHF | 0.81 | 0.81 | 0.81 | 0.84 | 0.84 | 0.84 | 0.91 | 0.91 | 0.91 | 0.92 | 0.92 | 0.92 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 60 | 568 | 143 | 118 | 306 | 123 | 85 | 266 | 34 | 60 | 282 | 86 |
| RTOR Reduction (vph) | 0 | 0 | 79 | 0 | 0 | 75 | 0 | 6 | 0 | 0 | 19 | 0 |
| Lane Group Flow (vph) | 60 | 568 | 64 | 118 | 306 | 48 | 0 | 379 | 0 | 0 | 409 | 0 |
| Confl. Peds. (#/hr) | 6 | | | | | 6 | 1 | | 3 | 3 | | 1 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 1 | | 2 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | | | | |
| Actuated Green, G (s) | 44.9 | 38.6 | 38.6 | 50.5 | 41.4 | 41.4 | | 17.0 | | | 18.0 | |
| Effective Green, g (s) | 44.9 | 38.6 | 38.6 | 50.5 | 41.4 | 41.4 | | 17.0 | | | 18.0 | |
| Actuated g/C Ratio | 0.42 | 0.37 | 0.37 | 0.48 | 0.39 | 0.39 | | 0.16 | | | 0.17 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 448 | 680 | 578 | 259 | 729 | 608 | | 554 | | | 577 | |
| v/s Ratio Prot | 0.01 | c0.30 | | c0.04 | 0.16 | | | c0.11 | | | c0.12 | |
| v/s Ratio Perm | 0.05 | | 0.04 | c0.18 | | 0.03 | | | | | | |
| v/c Ratio | 0.13 | 0.84 | 0.11 | 0.46 | 0.42 | 0.08 | | 0.68 | | | 0.71 | |
| Uniform Delay, d1 | 18.2 | 30.6 | 22.2 | 19.7 | 23.4 | 20.2 | | 41.8 | | | 41.4 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 8.7 | 0.1 | 1.3 | 0.4 | 0.1 | | 3.5 | | | 4.0 | |
| Delay (s) | 18.3 | 39.4 | 22.3 | 21.0 | 23.8 | 20.2 | | 45.3 | | | 45.4 | |
| Level of Service | B | D | C | C | C | C | | D | | | D | |
| Approach Delay (s) | | 34.6 | | | 22.4 | | | 45.3 | | | 45.4 | |
| Approach LOS | | C | | | C | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | 35.6 | | | HCM 2000 Level of Service | | | D | | | | | |
| HCM 2000 Volume to Capacity ratio | 0.74 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 105.7 | | | Sum of lost time (s) | | | 23.0 | | | | | |
| Intersection Capacity Utilization | 72.0% | | | ICU Level of Service | | | C | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























AM Future - 4 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | | |  |  |  |  |  |
| Traffic Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Future Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.8 | 6.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.1 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | | 0.95 | 1.00 | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.98 | | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1681 | 1736 | | 1770 | 1830 | | | 3535 | 1583 | | 3439 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (perm) | 1681 | 1736 | | 1770 | 1830 | | | 3535 | 1583 | | 3439 | |
| Peak-hour factor, PHF | 0.71 | 0.71 | 0.71 | 0.81 | 0.81 | 0.81 | 0.79 | 0.79 | 0.79 | 0.76 | 0.76 | 0.76 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 523 | 291 | 14 | 116 | 151 | 20 | 11 | 473 | 275 | 33 | 621 | 112 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 227 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 408 | 419 | 0 | 116 | 167 | 0 | 0 | 484 | 48 | 0 | 755 | 0 |
| Confl. Peds. (#/hr) | | | 2 | 2 | | | 4 | | 1 | 1 | | 4 |
| Turn Type | Split | NA | | Split | NA | | Split | NA | Prot | Split | NA | |
| Protected Phases | 3 | 3 | | 4 | 4 | | 2 | 2 | 2 | 1 | 1 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 27.0 | 27.0 | | 15.3 | 15.3 | | | 20.0 | 20.0 | | 27.5 | |
| Effective Green, g (s) | 27.0 | 27.0 | | 15.3 | 15.3 | | | 20.0 | 20.0 | | 27.5 | |
| Actuated g/C Ratio | 0.24 | 0.24 | | 0.13 | 0.13 | | | 0.17 | 0.17 | | 0.24 | |
| Clearance Time (s) | 6.8 | 6.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 395 | 408 | | 235 | 243 | | | 615 | 275 | | 823 | |
| v/s Ratio Prot | c0.24 | 0.24 | | 0.07 | c0.09 | | | c0.14 | 0.03 | | c0.22 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 1.03 | 1.03 | | 0.49 | 0.69 | | | 0.79 | 0.17 | | 0.92 | |
| Uniform Delay, d1 | 43.9 | 43.9 | | 46.2 | 47.5 | | | 45.4 | 40.4 | | 42.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 54.0 | 51.8 | | 1.6 | 7.8 | | | 9.8 | 1.4 | | 14.8 | |
| Delay (s) | 97.9 | 95.7 | | 47.8 | 55.2 | | | 55.2 | 41.7 | | 57.3 | |
| Level of Service | F | F | | D | E | | | E | D | | E | |
| Approach Delay (s) | | 96.8 | | | 52.2 | | | 50.3 | | | 57.3 | |
| Approach LOS | | F | | | D | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 67.1 | | | HCM 2000 Level of Service | | | E | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.88 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 114.8 | | | Sum of lost time (s) | | | 25.0 | | | |
| Intersection Capacity Utilization | | | 74.6% | | | ICU Level of Service | | | D | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road























AM Future - 3 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Future Volume (vph) | 45 | 426 | 107 | 92 | 238 | 96 | 72 | 224 | 29 | 51 | 240 | 73 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.2 | 4.0 | | 5.2 | 4.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.96 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1762 | 1863 | 1549 | 1770 | 1863 | 1521 | 1768 | 1825 | | 1767 | 1786 | |
| Flt Permitted | 0.44 | 1.00 | 1.00 | 0.14 | 1.00 | 1.00 | 0.28 | 1.00 | | 0.40 | 1.00 | |
| Satd. Flow (perm) | 814 | 1863 | 1549 | 262 | 1863 | 1521 | 514 | 1825 | | 743 | 1786 | |
| Peak-hour factor, PHF | 0.86 | 0.86 | 0.86 | 0.88 | 0.88 | 0.88 | 0.92 | 0.92 | 0.92 | 0.88 | 0.88 | 0.88 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 57 | 535 | 134 | 113 | 292 | 118 | 85 | 263 | 34 | 63 | 295 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 86 | 0 | 0 | 81 | 0 | 5 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 57 | 535 | 48 | 113 | 292 | 37 | 85 | 292 | 0 | 63 | 374 | 0 |
| Confl. Peds. (#/hr) | 11 | | 1 | 1 | | 11 | 5 | | 4 | 4 | | 5 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 41.4 | 30.6 | 30.6 | 33.4 | 26.6 | 26.6 | 29.6 | 26.2 | | 29.6 | 26.2 | |
| Effective Green, g (s) | 45.0 | 32.4 | 32.4 | 37.0 | 28.4 | 28.4 | 30.6 | 27.9 | | 30.6 | 27.9 | |
| Actuated g/C Ratio | 0.50 | 0.36 | 0.36 | 0.41 | 0.32 | 0.32 | 0.34 | 0.31 | | 0.34 | 0.31 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.7 | 5.7 | | 5.7 | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 539 | 670 | 557 | 251 | 587 | 479 | 229 | 565 | | 296 | 553 | |
| v/s Ratio Prot | c0.01 | c0.29 | | c0.04 | 0.16 | | c0.02 | 0.16 | | 0.01 | c0.21 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.14 | | 0.02 | 0.11 | | | 0.06 | | |
| v/c Ratio | 0.11 | 0.80 | 0.09 | 0.45 | 0.50 | 0.08 | 0.37 | 0.52 | | 0.21 | 0.68 | |
| Uniform Delay, d1 | 16.4 | 25.9 | 19.0 | 33.3 | 25.0 | 21.6 | 31.8 | 25.5 | | 27.0 | 27.1 | |
| Progression Factor | 0.80 | 0.84 | 1.54 | 1.00 | 1.00 | 1.00 | 1.16 | 0.90 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.1 | 6.3 | 0.1 | 1.3 | 0.7 | 0.1 | 0.9 | 2.9 | | 0.4 | 6.5 | |
| Delay (s) | 13.2 | 28.0 | 29.4 | 34.6 | 25.7 | 21.7 | 37.8 | 25.8 | | 27.4 | 33.6 | |
| Level of Service | B | C | C | C | C | C | D | C | | C | C | |
| Approach Delay (s) | | 27.1 | | | 26.7 | | | 28.5 | | | 32.7 | |
| Approach LOS | | C | | | C | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | 28.5 | | | HCM 2000 Level of Service | | | C | | | | | |
| HCM 2000 Volume to Capacity ratio | 0.66 | | | | | | | | | | | |
| Actuated Cycle Length (s) | 90.0 | | | Sum of lost time (s) | | | 17.2 | | | | | |
| Intersection Capacity Utilization | 70.6% | | | ICU Level of Service | | | C | | | | | |
| Analysis Period (min) | 15 | | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























AM Future - 3 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Traffic Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Future Volume (vph) | 344 | 191 | 9 | 87 | 113 | 15 | 8 | 346 | 201 | 23 | 437 | 79 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 3.8 | 3.8 | | 4.0 | 4.0 | | 4.3 | 4.3 | 4.3 | 4.0 | 4.0 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1728 | | 1770 | 1827 | | 1770 | 1863 | 1543 | 1767 | 1813 | |
| Flt Permitted | 0.95 | 0.98 | | 0.95 | 1.00 | | 0.11 | 1.00 | 1.00 | 0.31 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1728 | | 1770 | 1827 | | 210 | 1863 | 1543 | 581 | 1813 | |
| Peak-hour factor, PHF | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.82 | 0.84 | 0.84 | 0.84 | 0.86 | 0.86 | 0.86 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 453 | 252 | 12 | 115 | 149 | 20 | 10 | 445 | 258 | 29 | 549 | 99 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 157 | 0 | 7 | 0 |
| Lane Group Flow (vph) | 281 | 435 | 0 | 115 | 163 | 0 | 10 | 445 | 101 | 29 | 641 | 0 |
| Confl. Peds. (#/hr) | 2 | | | | | 2 | 3 | | 2 | 2 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Perm | NA | Perm | Perm | NA | |
| Protected Phases | 2 | 2 | | 6 | 6 | | | 4 | | | 8 | |
| Permitted Phases | | | | | | | 4 | | 4 | 8 | | |
| Actuated Green, G (s) | 26.0 | 26.0 | | 12.5 | 12.5 | | 33.6 | 33.6 | 33.6 | 33.6 | 33.6 | |
| Effective Green, g (s) | 28.0 | 28.0 | | 14.5 | 14.5 | | 35.4 | 35.4 | 35.4 | 35.7 | 35.7 | |
| Actuated g/C Ratio | 0.31 | 0.31 | | 0.16 | 0.16 | | 0.39 | 0.39 | 0.39 | 0.40 | 0.40 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 522 | 537 | | 285 | 294 | | 82 | 732 | 606 | 230 | 719 | |
| v/s Ratio Prot | 0.17 | c0.25 | | 0.06 | c0.09 | | | 0.24 | | | c0.35 | |
| v/s Ratio Perm | | | | | | | 0.05 | | 0.07 | 0.05 | | |
| v/c Ratio | 0.54 | 0.81 | | 0.40 | 0.55 | | 0.12 | 0.61 | 0.17 | 0.13 | 0.89 | |
| Uniform Delay, d1 | 25.7 | 28.5 | | 33.9 | 34.8 | | 17.4 | 21.8 | 17.7 | 17.2 | 25.3 | |
| Progression Factor | 0.89 | 0.90 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.67 | 0.84 | |
| Incremental Delay, d2 | 3.9 | 12.3 | | 0.9 | 2.3 | | 0.7 | 1.4 | 0.1 | 0.2 | 13.0 | |
| Delay (s) | 26.7 | 37.9 | | 34.8 | 37.0 | | 18.1 | 23.2 | 17.9 | 11.7 | 34.3 | |
| Level of Service | C | D | | C | D | | B | C | B | B | C | |
| Approach Delay (s) | | 33.5 | | | 36.1 | | | 21.2 | | | 33.3 | |
| Approach LOS | | C | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 30.1 | | | HCM 2000 Level of Service | | | C | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.80 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 90.0 | | | Sum of lost time (s) | | | 12.1 | | | |
| Intersection Capacity Utilization | | | 65.3% | | | ICU Level of Service | | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road






















PM Future - 4 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  | |  |  | |  |  |
| Traffic Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Future Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.95 | | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.98 | | | 0.98 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (prot) | 1770 | 1863 | 1583 | 1770 | 1863 | 1583 | | 3432 | | | 3422 | |
| Flt Permitted | 0.22 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | | 0.99 | | | 0.99 | |
| Satd. Flow (perm) | 402 | 1863 | 1583 | 667 | 1863 | 1583 | | 3432 | | | 3422 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.94 | 0.94 | 0.94 | 0.95 | 0.95 | 0.95 | 0.76 | 0.76 | 0.76 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 63 | 254 | 117 | 116 | 401 | 144 | 132 | 401 | 66 | 185 | 526 | 125 |
| RTOR Reduction (vph) | 0 | 0 | 90 | 0 | 0 | 89 | 0 | 7 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 63 | 254 | 27 | 116 | 401 | 55 | 0 | 592 | 0 | 0 | 825 | 0 |
| Confl. Peds. (#/hr) | | | | | | | | | 4 | 4 | | |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | Split | NA | | Split | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 1 | | 2 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | | | | |
| Actuated Green, G (s) | 35.8 | 28.6 | 28.6 | 42.4 | 31.9 | 31.9 | | 30.2 | | | 30.2 | |
| Effective Green, g (s) | 35.8 | 28.6 | 28.6 | 42.4 | 31.9 | 31.9 | | 30.2 | | | 30.2 | |
| Actuated g/C Ratio | 0.29 | 0.23 | 0.23 | 0.35 | 0.26 | 0.26 | | 0.25 | | | 0.25 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | | 5.7 | | | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 197 | 434 | 369 | 325 | 485 | 412 | | 846 | | | 843 | |
| v/s Ratio Prot | 0.02 | 0.14 | | c0.03 | c0.22 | | | c0.17 | | | c0.24 | |
| v/s Ratio Perm | 0.07 | | 0.02 | 0.09 | | 0.03 | | | | | | |
| v/c Ratio | 0.32 | 0.59 | 0.07 | 0.36 | 0.83 | 0.13 | | 0.70 | | | 0.98 | |
| Uniform Delay, d1 | 33.1 | 41.7 | 36.6 | 28.8 | 42.7 | 34.7 | | 42.0 | | | 45.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.9 | 2.0 | 0.1 | 0.7 | 11.0 | 0.1 | | 4.8 | | | 26.3 | |
| Delay (s) | 34.0 | 43.7 | 36.7 | 29.5 | 53.7 | 34.8 | | 46.8 | | | 72.2 | |
| Level of Service | C | D | D | C | D | C | | D | | | E | |
| Approach Delay (s) | | 40.4 | | | 45.4 | | | 46.8 | | | 72.2 | |
| Approach LOS | | D | | | D | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 53.7 | | | | HCM 2000 Level of Service | | | D | | |
| HCM 2000 Volume to Capacity ratio | | | 0.81 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 122.5 | | | | Sum of lost time (s) | | | 23.0 | | |
| Intersection Capacity Utilization | | | 84.9% | | | | ICU Level of Service | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street























PM Future - 4 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | | |  |  |  |  |  |
| Traffic Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Future Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.1 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | | 0.95 | 1.00 | | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 0.98 | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.99 | | | 1.00 | 0.85 | | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (prot) | 1681 | 1720 | | 1770 | 1837 | | | 3530 | 1545 | | 3442 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Satd. Flow (perm) | 1681 | 1720 | | 1770 | 1837 | | | 3530 | 1545 | | 3442 | |
| Peak-hour factor, PHF | 0.84 | 0.84 | 0.84 | 0.83 | 0.83 | 0.83 | 0.93 | 0.93 | 0.93 | 0.83 | 0.83 | 0.83 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 360 | 180 | 28 | 146 | 354 | 36 | 27 | 510 | 532 | 53 | 682 | 117 |
| RTOR Reduction (vph) | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 425 | 0 | 10 | 0 |
| Lane Group Flow (vph) | 281 | 284 | 0 | 146 | 388 | 0 | 0 | 537 | 107 | 0 | 842 | 0 |
| Confl. Peds. (#/hr) | | | | | | | 3 | | 1 | 1 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Split | NA | Perm | Split | NA | |
| Protected Phases | 3 | 3 | | 4 | 4 | | 2 | 2 | | 1 | 1 | |
| Permitted Phases | | | | | | | | | 2 | | | |
| Actuated Green, G (s) | 23.3 | 23.3 | | 24.0 | 24.0 | | | 26.0 | 26.0 | | 32.0 | |
| Effective Green, g (s) | 23.3 | 23.3 | | 24.0 | 24.0 | | | 26.0 | 26.0 | | 32.0 | |
| Actuated g/C Ratio | 0.18 | 0.18 | | 0.19 | 0.19 | | | 0.20 | 0.20 | | 0.25 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | | 6.1 | 6.1 | | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | |
| Lane Grp Cap (vph) | 302 | 309 | | 328 | 340 | | | 709 | 310 | | 851 | |
| v/s Ratio Prot | c0.17 | 0.16 | | 0.08 | c0.21 | | | c0.15 | | | c0.24 | |
| v/s Ratio Perm | | | | | | | | | 0.07 | | | |
| v/c Ratio | 0.93 | 0.92 | | 0.45 | 1.14 | | | 0.76 | 0.35 | | 0.99 | |
| Uniform Delay, d1 | 52.2 | 52.1 | | 46.7 | 52.7 | | | 48.7 | 44.3 | | 48.5 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | | 1.00 | |
| Incremental Delay, d2 | 34.0 | 30.6 | | 1.0 | 92.3 | | | 7.4 | 3.0 | | 28.0 | |
| Delay (s) | 86.2 | 82.6 | | 47.7 | 145.0 | | | 56.1 | 47.4 | | 76.4 | |
| Level of Service | F | F | | D | F | | | E | D | | E | |
| Approach Delay (s) | | 84.4 | | | 118.5 | | | 51.8 | | | 76.4 | |
| Approach LOS | | F | | | F | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 76.7 | | | HCM 2000 Level of Service | | | E | | | |
| HCM 2000 Volume to Capacity ratio | | | 0.95 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 129.3 | | | Sum of lost time (s) | | | 24.0 | | | |
| Intersection Capacity Utilization | | | 84.3% | | | ICU Level of Service | | | E | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

6: Cedar Street & Holt Road























PM Future - 3 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  |  |  |  |  |  |  | |  |  | |
| Traffic Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Future Volume (vph) | 54 | 216 | 100 | 101 | 349 | 125 | 116 | 353 | 58 | 130 | 370 | 88 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.7 | 5.7 | | 5.7 | 5.7 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.97 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1768 | 1863 | 1527 | 1764 | 1863 | 1524 | 1770 | 1817 | | 1769 | 1801 | |
| Flt Permitted | 0.19 | 1.00 | 1.00 | 0.38 | 1.00 | 1.00 | 0.12 | 1.00 | | 0.27 | 1.00 | |
| Satd. Flow (perm) | 348 | 1863 | 1527 | 706 | 1863 | 1524 | 223 | 1817 | | 503 | 1801 | |
| Peak-hour factor, PHF | 0.80 | 0.80 | 0.80 | 0.93 | 0.93 | 0.93 | 0.92 | 0.92 | 0.92 | 0.79 | 0.79 | 0.79 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 73 | 292 | 135 | 117 | 405 | 145 | 136 | 414 | 68 | 178 | 506 | 120 |
| RTOR Reduction (vph) | 0 | 0 | 106 | 0 | 0 | 103 | 0 | 6 | 0 | 0 | 8 | 0 |
| Lane Group Flow (vph) | 73 | 292 | 29 | 117 | 405 | 42 | 136 | 476 | 0 | 178 | 618 | 0 |
| Confl. Peds. (#/hr) | 9 | | 8 | 8 | | 9 | 2 | | 2 | 2 | | 2 |
| Turn Type | pm+pt | NA | Perm | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 26.4 | 21.4 | 21.4 | 39.5 | 28.7 | 28.7 | 43.3 | 38.0 | | 43.3 | 38.0 | |
| Effective Green, g (s) | 26.4 | 21.4 | 21.4 | 39.5 | 28.7 | 28.7 | 43.3 | 38.0 | | 43.3 | 38.0 | |
| Actuated g/C Ratio | 0.26 | 0.21 | 0.21 | 0.40 | 0.29 | 0.29 | 0.43 | 0.38 | | 0.43 | 0.38 | |
| Clearance Time (s) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.7 | 5.7 | | 5.7 | 5.7 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 162 | 398 | 326 | 409 | 534 | 437 | 178 | 690 | | 284 | 684 | |
| v/s Ratio Prot | c0.02 | 0.16 | | 0.04 | c0.22 | | c0.04 | 0.26 | | 0.03 | c0.34 | |
| v/s Ratio Perm | 0.10 | | 0.02 | 0.08 | | 0.03 | 0.29 | | | 0.24 | | |
| v/c Ratio | 0.45 | 0.73 | 0.09 | 0.29 | 0.76 | 0.10 | 0.76 | 0.69 | | 0.63 | 0.90 | |
| Uniform Delay, d1 | 41.8 | 36.6 | 31.5 | 27.4 | 32.5 | 26.1 | 40.3 | 26.1 | | 33.7 | 29.3 | |
| Progression Factor | 0.79 | 0.88 | 1.69 | 1.00 | 1.00 | 1.00 | 0.70 | 1.05 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.9 | 6.5 | 0.1 | 0.4 | 6.1 | 0.1 | 14.8 | 4.7 | | 4.3 | 17.5 | |
| Delay (s) | 35.1 | 38.8 | 53.3 | 27.8 | 38.6 | 26.2 | 43.2 | 31.9 | | 38.0 | 46.8 | |
| Level of Service | D | D | D | C | D | C | D | C | | D | D | |
| Approach Delay (s) | | 42.2 | | | 34.0 | | | 34.4 | | | 44.9 | |
| Approach LOS | | D | | | C | | | C | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 39.0 | | | HCM 2000 Level of Service | | | | D | | |
| HCM 2000 Volume to Capacity ratio | | | 0.81 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | | 23.0 | | |
| Intersection Capacity Utilization | | | 78.9% | | | ICU Level of Service | | | | D | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

7: Aurelius Road & Cedar Street

PM Future - 3 Lane Cedar (2037 Vol)

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | NBL | NBT | NBR | SBL | SBT | SBR | SEL | SET | SER | NWL | NWT | NWR |
| Lane Configurations |  |  | |  |  | |  |  |  |  |  |  |
| Traffic Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Future Volume (vph) | 280 | 140 | 22 | 112 | 272 | 28 | 23 | 439 | 458 | 41 | 524 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1681 | 1720 | | 1770 | 1834 | | 1770 | 1863 | 1583 | 1770 | 1815 | |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.10 | 1.00 | 1.00 | 0.23 | 1.00 | |
| Satd. Flow (perm) | 1681 | 1720 | | 1770 | 1834 | | 187 | 1863 | 1583 | 426 | 1815 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.95 | 0.95 | 0.95 |
| Growth Factor (vph) | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% | 108% |
| Adj. Flow (vph) | 318 | 159 | 25 | 139 | 338 | 35 | 29 | 545 | 569 | 47 | 596 | 102 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 332 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 248 | 250 | 0 | 139 | 369 | 0 | 29 | 545 | 237 | 47 | 692 | 0 |
| Confl. Peds. (#/hr) | 2 | | | | | 2 | 3 | | 1 | 1 | | 3 |
| Turn Type | Split | NA | | Split | NA | | Perm | NA | Prot | Perm | NA | |
| Protected Phases | 2 | 2 | | 6 | 6 | | | 4 | 4 | | 8 | |
| Permitted Phases | | | | | | | 4 | | | 8 | | |
| Actuated Green, G (s) | 19.2 | 19.2 | | 23.1 | 23.1 | | 39.8 | 39.8 | 39.8 | 39.8 | 39.8 | |
| Effective Green, g (s) | 19.2 | 19.2 | | 23.1 | 23.1 | | 39.8 | 39.8 | 39.8 | 39.8 | 39.8 | |
| Actuated g/C Ratio | 0.19 | 0.19 | | 0.23 | 0.23 | | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | |
| Clearance Time (s) | 5.8 | 5.8 | | 6.0 | 6.0 | | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 322 | 330 | | 408 | 423 | | 74 | 741 | 630 | 169 | 722 | |
| v/s Ratio Prot | c0.15 | 0.15 | | 0.08 | c0.20 | | | 0.29 | 0.15 | | c0.38 | |
| v/s Ratio Perm | | | | | | | 0.15 | | | 0.11 | | |
| v/c Ratio | 0.77 | 0.76 | | 0.34 | 0.87 | | 0.39 | 0.74 | 0.38 | 0.28 | 0.96 | |
| Uniform Delay, d1 | 38.3 | 38.2 | | 32.1 | 37.0 | | 21.5 | 25.6 | 21.3 | 20.4 | 29.3 | |
| Progression Factor | 0.76 | 0.76 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.19 | 0.96 | |
| Incremental Delay, d2 | 15.4 | 14.2 | | 0.5 | 17.7 | | 3.4 | 3.8 | 0.4 | 0.7 | 20.7 | |
| Delay (s) | 44.6 | 43.1 | | 32.6 | 54.7 | | 24.9 | 29.4 | 21.7 | 25.0 | 48.9 | |
| Level of Service | D | D | | C | D | | C | C | C | C | D | |
| Approach Delay (s) | | 43.8 | | | 48.7 | | | 25.5 | | | 47.4 | |
| Approach LOS | | D | | | D | | | C | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | | 38.4 | | | HCM 2000 Level of Service | | | | D | | |
| HCM 2000 Volume to Capacity ratio | | | 0.89 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 100.0 | | | Sum of lost time (s) | | | 17.9 | | | |
| Intersection Capacity Utilization | | | 82.4% | | | ICU Level of Service | | | E | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |



**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**
2045 NORTH CEDAR STREET, SUITE 2
TELEPHONE (517) 699-3866
FACSIMILE (517) 699-3878
www.delhidda.com

Date: April 18, 2018

To: DDA Board Members

From: C. Howard Haas, Executive Director

Re: Bid Results and Recommendation: Realize Cedar Construction

At our March 27, 2018 meeting, the Board approved a Proposal for Construction Engineering Services for the Realize Cedar project from Hubbell, Roth & Clark, Inc (HRC). The bid documents were sent to a list of preferred contractors and on April 13, 2018, bids were opened at the Delhi Township Clerk's Office. A total of three bids were received (see attached). Please bear in mind that these bids included additional work to repave Cedar Street between Aurelius and Willoughby Road. Those costs will be borne by the Ingham County Road Department. Based on the low bid and subsequent recommendation from HRC, I offer the following recommended motion:

I move to award the bid for the Realize Cedar project to Leavitt & Starck Excavating, Inc. in the amount of \$5,831,715.42, subject to the Contractor supplying the requisite insurance certificates, bonds, and other contract documents. I further authorize HRC to notify the contractor on the behalf of the DDA.

**PRINCIPALS**

Daniel W. Mitchell
Nancy M.D. Faught
Keith D. McCormack
Jesse B. VanDeCreek
Roland N. Alix
Michael C. MacDonald
James F. Burton
Charles E. Hart

CONTROLLER

Donna M. Martin

SENIOR ASSOCIATES

Gary J. Tressel
Randal L. Ford
William R. Davis
Dennis J. Benoit
Robert F. DeFrain
Thomas D. LaCross
Albert P. Mickalich
Timothy H. Sullivan
Thomas G. Maxwell

ASSOCIATES

Marshall J. Grazioli
Colleen L. Hill-Stramsak
Bradley W. Shepler
Karyn M. Stickel
Jane M. Graham
Todd J. Sneathen
Aaron A. Uranga
Salvatore Conigliaro
Melissa A. Coatta
Michael P. Darga
Brian K. Davies
James E. Scholl
Matthew G. Slicker
James J. Surhigh
Trevor S. Wagenmaker

HUBBELL, ROTH & CLARK, INC.

STREET: 2101 Aurelius Road, Suite 2A
Holt, MI 48842

PHONE: 517-694-7760

WEBSITE: hrcengr.com

OTHER OFFICE LOCATIONS

Bloomfield Hills
Detroit
Grand Rapids
Howell
Jackson
Kalamazoo
Lansing

April 18, 2018

Delhi Charter Township Downtown Development Authority
2045 Cedar Street
Holt, Michigan 48842

Attn: Mr. Howard Haas, Executive Director

Re: Bid Results
Realize Cedar Street Project

HRC Job No. 20161043

Dear Mr. Haas:

On Friday, April 13, 2018, the DDA received and opened bids for the Realize Cedar Street Project in Delhi Charter Township. A total of three (3) contractors submitted bids which ranged from a low of \$5,831,715.42 to a high of \$6,548,792.06. The low bid was submitted by Leavitt & Starck Excavating, Inc. of Lansing, Michigan. Attached is one (1) copy of the bid tab for your records.

HRC has checked the references of Leavitt & Starck Excavating, Inc. and understands that they are a fair and reliable company. HRC recommends that the project be tentatively awarded to Leavitt & Stark Excavating, Inc. in the amount of \$5,831,715.42 subject to the Contractor supplying the requisite insurance certificates, bonds and other contract documents. Once these have been provided, HRC will provide all parties with executed contracts and issue a notice to proceed to the Contractor.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.

Lia Michaels, P.E., PTOE
Project Engineer

LFM/lfm
Attachment

pc: Delhi Township; T. Miller
HRC; T. Sneathen, J. Burton, File

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| Leavitt & Starck Excavating, Inc. | | | | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|--|----------|------|-------------|--------------|------------------------|--------------|---------------------|--------------|
| 16220 National Parkway | | | | | 8574 Verona Road | | 3097 Lansing Road | |
| Lansing, MI 48906 | | | | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| (517) 323-7630 | | | | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost |
| 1 Mobilization, (Max 10%) | 1 | Lsum | \$89,040.00 | \$89,040.00 | \$504,510.00 | \$504,510.00 | \$500,000.00 | \$500,000.00 |
| 2 Stump Rem, 6 inch to 18 inch | 6 | Ea | \$480.00 | \$2,880.00 | \$150.00 | \$900.00 | \$250.00 | \$1,500.00 |
| 3 Stump, Rem, 19 inch to 36 inch | 6 | Ea | \$720.00 | \$4,320.00 | \$250.00 | \$1,500.00 | \$250.00 | \$1,500.00 |
| 4 Dr Structure, Rem | 33 | Ea | \$648.50 | \$21,400.50 | \$228.75 | \$7,548.75 | \$500.00 | \$16,500.00 |
| 5 Sewer, Rem, Less than 24 inch | 1,802 | Ft | \$44.80 | \$80,729.60 | \$8.82 | \$15,893.64 | \$15.00 | \$27,030.00 |
| 6 Gas Main, Rem | 2,000 | Ft | \$9.12 | \$18,240.00 | \$0.58 | \$1,160.00 | \$12.00 | \$24,000.00 |
| 7 Curb and Gutter, Rem | 8,255 | Ft | \$5.74 | \$47,383.70 | \$3.17 | \$26,168.35 | \$12.00 | \$99,060.00 |
| 8 Pavt, Rem | 20,288 | Syd | \$6.96 | \$141,204.48 | \$6.06 | \$122,945.28 | \$15.00 | \$304,320.00 |
| 9 Sidewalk, Rem | 3,327 | Syd | \$4.64 | \$15,437.28 | \$6.88 | \$22,889.76 | \$12.00 | \$39,924.00 |
| 10 Exploratory Investigation, Vertical | 200 | Ft | \$62.00 | \$12,400.00 | \$18.37 | \$3,674.00 | \$45.00 | \$9,000.00 |
| 11 Embankment, CIP | 1,989 | Cyd | \$17.60 | \$35,006.40 | \$5.22 | \$10,382.58 | \$16.00 | \$31,824.00 |
| 12 Excavation, Earth | 13,334 | Cyd | \$13.34 | \$177,875.56 | \$12.24 | \$163,208.16 | \$16.00 | \$213,344.00 |
| 13 Granular Material, CI II, 10 inch | 7,048 | Cyd | \$17.82 | \$125,595.36 | \$19.51 | \$137,506.48 | \$24.00 | \$169,152.00 |
| 14 Non Haz Contaminated Material Handling and Disposal, LM | 333 | Cyd | \$36.84 | \$12,267.72 | \$34.72 | \$11,561.76 | \$60.00 | \$19,980.00 |
| 15 Erosion Control, Inlet Protection, Fabric Drop | 72 | Ea | \$237.50 | \$17,100.00 | \$113.92 | \$8,202.24 | \$100.00 | \$7,200.00 |
| 16 Erosion Control, Silt Fence | 200 | Ft | \$1.90 | \$380.00 | \$2.75 | \$550.00 | \$5.00 | \$1,000.00 |
| 17 Project Cleanup | 1 | Lsum | \$22,800.00 | \$22,800.00 | \$5,085.00 | \$5,085.00 | \$20,000.00 | \$20,000.00 |
| 18 Aggregate Base, 4 inch, CIP, 21AA | 4,915 | Syd | \$7.94 | \$39,025.10 | \$6.42 | \$31,554.30 | \$8.00 | \$39,320.00 |
| 19 Aggregate Base, 6 inch, CIP, 21AA | 2,550 | Syd | \$10.39 | \$26,494.50 | \$11.73 | \$29,911.50 | \$12.00 | \$30,600.00 |
| 20 Aggregate Base, 8 inch, CIP, 21AA | 24,744 | Syd | \$9.28 | \$229,624.32 | \$9.97 | \$246,697.68 | \$12.00 | \$296,928.00 |
| 21 Geotextile, Special | 20,035 | Syd | \$3.15 | \$63,110.25 | \$2.51 | \$50,287.85 | \$3.00 | \$60,105.00 |
| 22 Geosynthetic Paving Interlayer, Class I-560 | 27,828 | Syd | \$5.08 | \$141,366.24 | \$5.03 | \$139,974.84 | \$5.20 | \$144,705.60 |
| 23 Tack Coat, PG Asphalt | 47 | Ton | \$428.16 | \$20,123.52 | \$425.00 | \$19,975.00 | \$463.00 | \$21,761.00 |
| 24 Subgrade Undercutting, 1 x 3 | 1,000 | Cyd | \$73.41 | \$73,410.00 | \$47.84 | \$47,840.00 | \$65.00 | \$65,000.00 |
| 25 Maintenance Gravel | 2,000 | Ton | \$17.70 | \$35,400.00 | \$5.92 | \$11,840.00 | \$25.00 | \$50,000.00 |
| 26 Shoulder, CI I | 2 | Ton | \$290.00 | \$580.00 | \$39.30 | \$78.60 | \$500.00 | \$1,000.00 |
| 27 Sewer, CI IV, 12 inch, Tr Det B | 2,637 | Ft | \$70.77 | \$186,620.49 | \$78.00 | \$205,686.00 | \$65.00 | \$171,405.00 |
| 28 Sewer Tap, 12 inch | 10 | Ea | \$887.50 | \$8,875.00 | \$283.00 | \$2,830.00 | \$500.00 | \$5,000.00 |
| 29 Sewer Tap, 15 inch | 4 | Ea | \$887.50 | \$3,550.00 | \$380.00 | \$1,520.00 | \$500.00 | \$2,000.00 |
| 30 Sewer Bulkhead, 12 inch | 11 | Ea | \$456.00 | \$5,016.00 | \$102.00 | \$1,122.00 | \$500.00 | \$5,500.00 |
| 31 Sewer Bulkhead, 15 inch | 2 | Ea | \$456.00 | \$912.00 | \$112.00 | \$224.00 | \$500.00 | \$1,000.00 |
| 32 Trench Undercut and Backfill | 100 | Cyd | \$66.68 | \$6,668.00 | \$80.10 | \$8,010.00 | \$50.00 | \$5,000.00 |
| 33 Video Taping Sewer and Culv Pipe | 2,637 | Ft | \$0.95 | \$2,505.15 | \$1.31 | \$3,454.47 | \$1.00 | \$2,637.00 |
| 34 San Sewer Lead, PVC SDR 23.5, 6 inch, CSB | 189 | Ft | \$134.40 | \$25,401.60 | \$148.10 | \$27,990.90 | \$100.00 | \$18,900.00 |
| 35 Sewer Bulkhead, 10 inch or less | 27 | Ea | \$299.25 | \$8,079.75 | \$102.80 | \$2,775.60 | \$200.00 | \$5,400.00 |
| 36 Sump Pump Lead and Drain Tile Connection | 105 | Ft | \$36.74 | \$3,857.70 | \$29.70 | \$3,118.50 | \$50.00 | \$5,250.00 |
| 37 Dr Structure Cover, Adj, Case 1 | 29 | Ea | \$475.00 | \$13,775.00 | \$587.00 | \$17,023.00 | \$500.00 | \$14,500.00 |
| 38 Dr Structure Cover, Adj, Case 2 | 4 | Ea | \$332.50 | \$1,330.00 | \$534.90 | \$2,139.60 | \$500.00 | \$2,000.00 |
| 39 Dr Structure Cover, Type B | 14 | Ea | \$410.50 | \$5,747.00 | \$396.10 | \$5,545.40 | \$600.00 | \$8,400.00 |
| 40 San Manhole Cover, Special | 4 | Ea | \$547.50 | \$2,190.00 | \$508.60 | \$2,034.40 | \$600.00 | \$2,400.00 |
| 41 Dr Structure Cover, Type G | 4 | Ea | \$355.50 | \$1,422.00 | \$221.00 | \$884.00 | \$500.00 | \$2,000.00 |
| 42 Dr Structure Cover, Type K | 48 | Ea | \$598.50 | \$28,728.00 | \$583.70 | \$28,017.60 | \$800.00 | \$38,400.00 |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| | | | | Leavitt & Starck Excavating, Inc. | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|--|-----------------|-------------|-------------------|--|-------------------|----------------------------|-------------------|-------------------------------|---|
| | | | | 16220 National Parkway | | 8574 Verona Road | | 3097 Lansing Road | |
| | | | | Lansing, MI 48906 | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| | | | | (517) 323-7630 | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost | |
| 43 Dr Structure Lead, Cleaning, 6 inch | 100 | Ft | \$4.75 | \$475.00 | \$3.00 | \$300.00 | \$3.00 | \$300.00 | |
| 44 Dr Structure Lead, Cleaning, 12 inch | 120 | Ft | \$9.50 | \$1,140.00 | \$3.00 | \$360.00 | \$3.00 | \$360.00 | |
| 45 Dr Structure Lead, Cleaning, 15 inch | 80 | Ft | \$11.40 | \$912.00 | \$3.00 | \$240.00 | \$3.00 | \$240.00 | |
| 46 Dr Structure, 24 inch dia | 35 | Ea | \$1,278.50 | \$44,747.50 | \$1,111.00 | \$38,885.00 | \$1,000.00 | \$35,000.00 | |
| 47 Dr Structure, 48 inch dia | 25 | Ea | \$1,878.50 | \$46,962.50 | \$1,480.00 | \$37,000.00 | \$2,000.00 | \$50,000.00 | |
| 48 Dr Structure, 60 inch dia | 1 | Ea | \$2,198.50 | \$2,198.50 | \$2,723.00 | \$2,723.00 | \$3,000.00 | \$3,000.00 | |
| 49 Dr Structure, Add Depth of 48 inch dia, 8 foot to 15 foot | 8 | Ft | \$575.00 | \$4,600.00 | \$144.20 | \$1,153.60 | \$100.00 | \$800.00 | |
| 50 Dr Structure, Adj, Add Depth | 26 | Ft | \$432.50 | \$11,245.00 | \$163.20 | \$4,243.20 | \$100.00 | \$2,600.00 | |
| 51 Dr Structure, Cleaning | 33 | Ea | \$95.00 | \$3,135.00 | \$100.00 | \$3,300.00 | \$100.00 | \$3,300.00 | |
| 52 Dr Structure, Tap, 6 inch | 9 | Ea | \$744.00 | \$6,696.00 | \$92.20 | \$829.80 | \$250.00 | \$2,250.00 | |
| 53 San Manhole Tap 10 inch | 2 | Ea | \$982.50 | \$1,965.00 | \$216.30 | \$432.60 | \$2,500.00 | \$5,000.00 | |
| 54 Dr Structure, Tap, 12 inch | 12 | Ea | \$887.50 | \$10,650.00 | \$283.50 | \$3,402.00 | \$500.00 | \$6,000.00 | |
| 55 Public Utility Structure, Adj, Add Depth | 11 | Ft | \$432.50 | \$4,757.50 | \$320.70 | \$3,527.70 | \$100.00 | \$1,100.00 | |
| 56 Public Utility Structure Cover, Adj, Case I | 37 | Ea | \$475.00 | \$17,575.00 | \$408.30 | \$15,107.10 | \$500.00 | \$18,500.00 | |
| 57 Public Utility Structure Cover, Adj, Case II | 5 | Ea | \$332.50 | \$1,662.50 | \$408.30 | \$2,041.50 | \$500.00 | \$2,500.00 | |
| 58 Underdrain, Subgrade, Open-Graded, 6 inch | 8,268 | Ft | \$11.84 | \$97,893.12 | \$16.05 | \$132,701.40 | \$15.00 | \$124,020.00 | |
| 59 Cold Milling HMA Surface, Modified | 27,828 | Syd | \$1.10 | \$30,610.80 | \$0.76 | \$21,149.28 | \$2.00 | \$55,656.00 | * |
| 60 Surplus Material Deliver, (Mason) | 2,706 | Cyd | \$5.20 | \$14,071.20 | \$7.67 | \$20,755.02 | \$10.00 | \$27,060.00 | |
| 61 HMA Surface, Rem | 23,739 | Syd | \$4.89 | \$116,083.71 | \$3.58 | \$84,985.62 | \$2.50 | \$59,347.50 | |
| 62 HMA Surface, Rem Special | 25 | Syd | \$95.00 | \$2,375.00 | \$10.85 | \$271.25 | \$100.00 | \$2,500.00 | |
| 63 Hand Patching | 335 | Ton | \$100.80 | \$33,768.00 | \$100.00 | \$33,500.00 | \$95.00 | \$31,825.00 | |
| 64 HMA, 3C | 3,885 | Ton | \$72.02 | \$279,797.70 | \$71.45 | \$277,583.25 | \$63.00 | \$244,755.00 | |
| 65 HMA, 4E1 | 8,618 | Ton | \$65.38 | \$563,444.84 | \$64.85 | \$558,877.30 | \$63.00 | \$542,934.00 | * |
| 66 HMA, 5E03 | 1,531 | Ton | \$70.13 | \$107,369.03 | \$69.60 | \$106,557.60 | \$66.00 | \$101,046.00 | |
| 67 HMA Approach | 187 | Ton | \$89.39 | \$16,715.93 | \$88.70 | \$16,586.90 | \$113.00 | \$21,131.00 | |
| 68 HMA Approach (Commercial) | 153 | Ton | \$89.39 | \$13,676.67 | \$88.70 | \$13,571.10 | \$113.00 | \$17,289.00 | |
| 69 Conc Pavt with Integral Curb, Nonreinf, 8 inch | 1,243 | Syd | \$42.64 | \$53,001.52 | \$45.25 | \$56,245.75 | \$40.00 | \$49,720.00 | |
| 70 Driveway, Nonreinf, Concrete, 6 inch | 593 | Syd | \$33.56 | \$19,901.08 | \$37.50 | \$22,237.50 | \$30.00 | \$17,790.00 | |
| 71 Curb, Conc, Det E2 | 76 | Ft | \$23.01 | \$1,748.76 | \$23.90 | \$1,816.40 | \$12.00 | \$912.00 | |
| 72 Curb and Gutter, Conc, Det C4 | 8,059 | Ft | \$16.01 | \$129,024.59 | \$19.45 | \$156,747.55 | \$12.00 | \$96,708.00 | |
| 73 Curb and Gutter, Conc, Det F4 | 18 | Ft | \$25.03 | \$450.54 | \$33.85 | \$609.30 | \$12.00 | \$216.00 | |
| 74 Driveway Opening, Conc, Det M | 1,676 | Ft | \$18.98 | \$31,810.48 | \$22.10 | \$37,039.60 | \$14.00 | \$23,464.00 | |
| 75 Spillway, Conc | 7 | Ft | \$45.36 | \$317.52 | \$67.10 | \$469.70 | \$40.00 | \$280.00 | |
| 76 Curb Ramp Opening, Conc | 349 | Ft | \$23.01 | \$8,030.49 | \$27.35 | \$9,545.15 | \$20.00 | \$6,980.00 | |
| 77 Sidewalk Ramp, Conc, 6 inch | 2,646 | Sft | \$5.34 | \$14,129.64 | \$7.62 | \$20,162.52 | \$5.00 | \$13,230.00 | |
| 78 Sidewalk, Conc, 4 inch | 36,116 | Sft | \$3.13 | \$113,043.08 | \$4.63 | \$167,217.08 | \$2.75 | \$99,319.00 | |
| 79 Sidewalk Conc, 6 inch | 2,865 | Sft | \$3.73 | \$10,686.45 | \$5.42 | \$15,528.30 | \$4.00 | \$11,460.00 | |
| 80 Detectable Warning Surface, Cast Iron | 322 | Ft | \$60.48 | \$19,474.56 | \$60.00 | \$19,320.00 | \$60.00 | \$19,320.00 | |
| 81 Post, Mailbox | 2 | Ea | \$480.00 | \$960.00 | \$72.60 | \$145.20 | \$500.00 | \$1,000.00 | |
| 82 Post, Steel, 3 lb | 561 | Ft | \$6.80 | \$3,814.80 | \$5.35 | \$3,001.35 | \$5.75 | \$3,225.75 | |
| 83 Sign, Type III, Rem | 62 | Ea | \$20.16 | \$1,249.92 | \$5.00 | \$310.00 | \$27.50 | \$1,705.00 | |
| 84 Sign, Type IIIA | 134 | Sft | \$16.87 | \$2,260.58 | \$14.95 | \$2,003.30 | \$15.75 | \$2,110.50 | |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| Leavitt & Starck Excavating, Inc. | | | | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|--|----------|------|-------------|--------------|------------------------|-------------|---------------------|--------------|
| 16220 National Parkway | | | | | 8574 Verona Road | | 3097 Lansing Road | |
| Lansing, MI 48906 | | | | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| (517) 323-7630 | | | | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost |
| 85 Sign, Type IIIB | 245 | Sft | \$16.90 | \$4,140.50 | \$14.95 | \$3,662.75 | \$15.75 | \$3,858.75 |
| 86 Mast Arm Pole, Cat III | 9 | Ea | \$6,918.05 | \$62,262.45 | \$6,863.00 | \$61,767.00 | \$6,863.15 | \$61,768.35 |
| 87 Mast Arm, 25 foot, Cat III | 1 | Ea | \$5,708.42 | \$5,708.42 | \$5,663.00 | \$5,663.00 | \$5,663.12 | \$5,663.12 |
| 88 Mast Arm, 35 foot, Cat III | 1 | Ea | \$6,239.52 | \$6,239.52 | \$6,190.00 | \$6,190.00 | \$6,190.00 | \$6,190.00 |
| 89 Mast Arm, 40 foot, Cat III | 2 | Ea | \$6,397.09 | \$12,794.18 | \$6,346.00 | \$12,692.00 | \$6,346.33 | \$12,692.66 |
| 90 Mast Arm, 45 foot, Cat III | 2 | Ea | \$10,425.46 | \$20,850.92 | \$10,345.00 | \$20,690.00 | \$10,342.52 | \$20,685.04 |
| 91 Mast Arm, 50 foot, Cat III | 3 | Ea | \$10,645.33 | \$31,935.99 | \$10,560.00 | \$31,680.00 | \$10,560.85 | \$31,682.55 |
| 92 Mast Arm Pole Fdn, 6 Bolt | 126 | Ft | \$432.35 | \$54,476.10 | \$428.90 | \$54,041.40 | \$428.93 | \$54,045.18 |
| 93 Mast Arm, Rem | 11 | Ea | \$1,441.44 | \$15,855.84 | \$1,430.00 | \$15,730.00 | \$1,430.00 | \$15,730.00 |
| 94 Pavt Mrkg, Ovly Cold Plastic, 12 inch, Cross Hatching, White | 180 | Ft | \$6.00 | \$1,080.00 | \$5.95 | \$1,071.00 | \$5.95 | \$1,071.00 |
| 95 Pavt Mrkg, Ovly Cold Plastic, 12 inch, Cross Hatching, Yellow | 120 | Ft | \$6.00 | \$720.00 | \$5.95 | \$714.00 | \$5.95 | \$714.00 |
| 96 Pavt Mrkg, Ovly Cold Plastic, 12 inch, Crosswalk | 1,728 | Ft | \$6.00 | \$10,368.00 | \$5.95 | \$10,281.60 | \$5.95 | \$10,281.60 |
| 97 Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar | 460 | Ft | \$12.61 | \$5,800.60 | \$12.50 | \$5,750.00 | \$12.50 | \$5,750.00 * |
| 98 Pavt Mrkg, Ovly Cold Plastic, Direction Arrow Sym, Bike | 26 | Ea | \$110.88 | \$2,882.88 | \$110.00 | \$2,860.00 | \$110.00 | \$2,860.00 |
| 99 Pavt Mrkg, Ovly Cold Plastic, Bike, Small Sym | 26 | Ea | \$110.88 | \$2,882.88 | \$110.00 | \$2,860.00 | \$110.00 | \$2,860.00 |
| 100 Pavt Mrkg, Ovly Cold Plastic, Lt Turn Arrow Sym | 13 | Ea | \$166.32 | \$2,162.16 | \$165.00 | \$2,145.00 | \$165.00 | \$2,145.00 |
| 101 Pavt Mrkg, Ovly Cold Plastic, Only | 20 | Ea | \$166.32 | \$3,326.40 | \$165.00 | \$3,300.00 | \$165.00 | \$3,300.00 |
| 102 Pavt Mrkg, Ovly Cold Plastic, Rt Turn Arrow Sym | 9 | Ea | \$166.32 | \$1,496.88 | \$165.00 | \$1,485.00 | \$165.00 | \$1,485.00 |
| 103 Pavt Mrkg, Ovly Cold Plastic, Thru and Lt Turn Arrow Sym | 1 | Ea | \$196.56 | \$196.56 | \$195.00 | \$195.00 | \$195.00 | \$195.00 |
| 104 Pavt Mrkg, Ovly Cold Plastic, Thru and Rt Turn Arrow Sym | 3 | Ea | \$196.50 | \$589.50 | \$195.00 | \$585.00 | \$195.00 | \$585.00 |
| 105 Pavt Mrkg, Ovly Cold Plastic, Thru Arrow Sym | 4 | Ea | \$196.56 | \$786.24 | \$155.00 | \$620.00 | \$155.00 | \$620.00 |
| 106 Pavt Mrkg, Sprayable Thermopl, 4 inch, White | 13,560 | Ft | \$0.40 | \$5,424.00 | \$0.39 | \$5,288.40 | \$0.39 | \$5,288.40 |
| 107 Pavt Mrkg, Sprayable Thermopl, 4 inch Yellow | 22,865 | Ft | \$0.40 | \$9,146.00 | \$0.39 | \$8,917.35 | \$0.39 | \$8,917.35 |
| 108 Rem Spec Mrkg | 126 | Sft | \$2.98 | \$375.48 | \$2.95 | \$371.70 | \$2.95 | \$371.70 |
| 109 Pavt Mrkg, Wet Reflective, Type R Tape, 4 inch, Yellow, Temp | 9,000 | Ft | \$1.66 | \$14,940.00 | \$1.65 | \$14,850.00 | \$1.65 | \$14,850.00 |
| 110 Pavt Mrkg, Wet Reflective, Type NR, Paint, 4 inch, Yellow Temp | 1,000 | Ft | \$0.49 | \$490.00 * | \$0.49 | \$490.00 | \$0.49 | \$490.00 |
| 111 Barricade, Type III, High Intensity, Lighted, Furn | 23 | Ea | \$90.21 | \$2,074.83 | \$45.00 | \$1,035.00 | \$67.50 | \$1,552.50 |
| 112 Barricade, Type III, High Intensity, Lighted, Oper | 23 | Ea | \$1.80 | \$41.40 | \$2.00 | \$46.00 | \$5.50 | \$126.50 |
| 113 Channelizing Device, 42 inch, Furn | 100 | Ea | \$12.62 | \$1,262.00 | \$7.50 | \$750.00 | \$7.00 | \$700.00 |
| 114 Channelizing Device, 42 inch, Oper | 100 | Ea | \$0.92 | \$92.00 | \$0.25 | \$25.00 | \$1.45 | \$145.00 |
| 115 Lighted Arrow, Type C, Furn | 3 | Ea | \$721.73 | \$2,165.19 | \$225.00 | \$675.00 | \$250.00 | \$750.00 |
| 116 Lighted Arrow, Type C, Oper | 3 | Ea | \$18.05 | \$54.15 | \$15.00 | \$45.00 | \$45.00 | \$135.00 |
| 117 Minor Traf Devices | 1 | LSum | \$4,800.00 | \$4,800.00 | \$9,995.00 | \$9,995.00 | \$200,000.00 | \$200,000.00 |
| 118 Pavt Mrkg, Longit, 6 inch or Less Width, Rem | 4,350 | Ft | \$0.66 | \$2,871.00 | \$0.65 | \$2,827.50 | \$0.65 | \$2,827.50 * |
| 119 Pavt Mrkg, Longit, Greater than 6 inch Width, Rem | 100 | Ft | \$0.75 | \$75.00 | \$0.75 | \$75.00 | \$0.75 | \$75.00 |
| 120 Pavt Mrkg, Wet Reflective, Type NR, Paint, 4 inch, White, Temp | 5,200 | Ft | \$0.49 | \$2,548.00 * | \$0.49 | \$2,548.00 | \$0.49 | \$2,548.00 |
| 121 Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White , Temp | 2,000 | Ft | \$1.66 | \$3,320.00 | \$1.65 | \$3,300.00 | \$1.65 | \$3,300.00 |
| 122 Plastic Drum, High Intensity, Furn | 270 | Ea | \$16.24 | \$4,384.80 | \$10.00 | \$2,700.00 | \$8.00 | \$2,160.00 |
| 123 Plastic Drum, High Intensity, Oper | 270 | Ea | \$0.92 | \$248.40 | \$0.25 | \$67.50 | \$1.45 | \$391.50 |
| 124 Sign Cover | 100 | Ea | \$15.12 | \$1,512.00 | \$20.00 | \$2,000.00 | \$10.00 | \$1,000.00 |
| 125 Sign, Portable, Changeable Message, Furn | 2 | Ea | \$1,804.80 | \$3,609.60 | \$1,300.00 | \$2,600.00 | \$1,275.00 | \$2,550.00 |
| 126 Sign, Portable, Changeable Message, Oper | 2 | Ea | \$18.05 | \$36.10 | \$50.00 | \$100.00 | \$575.00 | \$1,150.00 |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| | | | | Leavitt & Starck Excavating, Inc. | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|--|-----------------|-------------|-------------------|--|-------------------|----------------------------|-------------------|-------------------------------|-------------------|
| | | | | 16220 National Parkway | | 8574 Verona Road | | 3097 Lansing Road | |
| | | | | Lansing, MI 48906 | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| | | | | (517) 323-7630 | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price |
| 127 Sign, Type A, Temp, Prismatic, Furn | 200 | Sft | \$3.61 | \$722.00 * | \$2.75 | \$550.00 | \$3.25 | \$650.00 | |
| 128 Sign, Type A, Temp, Prismatic, Oper | 200 | Sft | \$0.18 | \$36.00 | \$0.20 | \$40.00 | \$0.15 | \$30.00 | |
| 129 Sign, Type B, Temp Prismatic, Furn | 1,500 | Sft | \$3.61 | \$5,415.00 * | \$2.75 | \$4,125.00 | \$2.65 | \$3,975.00 | |
| 130 Sign, Type B, Temp Prismatic, Oper | 1,500 | Sft | \$0.18 | \$270.00 | \$0.20 | \$300.00 | \$0.15 | \$225.00 | |
| 131 Sign, Type B, Temp Prismatic, Special Furn | 700 | Sft | \$3.78 | \$2,646.00 | \$2.75 | \$1,925.00 | \$2.65 | \$1,855.00 | |
| 132 Sign, Type B, Temp Prismatic, Special Oper | 700 | Sft | \$0.18 | \$126.00 | \$0.20 | \$140.00 | \$0.45 | \$315.00 | |
| 133 Traf Regulator Control | 1 | LSum | \$19,000.00 | \$19,000.00 | \$23,005.00 | \$23,005.00 | \$12,000.00 | \$12,000.00 | |
| 134 Pedestrian Type II Barricade, Temp | 10 | Ea | \$99.26 | \$992.60 | \$30.00 | \$300.00 | \$100.00 | \$1,000.00 | |
| 135 Turf Establishment | 2,700 | Syd | \$3.72 | \$10,044.00 | \$7.10 | \$19,170.00 | \$10.00 | \$27,000.00 | |
| 136 Bioretention Swale | 1 | Lsum | \$2,324.00 | \$2,324.00 | \$1,747.00 | \$1,747.00 | \$15,000.00 | \$15,000.00 | |
| 137 Conduit, DB, 1, 1 1/2 inch | 220 | Ft | \$17.52 | \$3,854.40 | \$17.40 | \$3,828.00 | \$17.38 | \$3,823.60 | |
| 138 Conduit, DB, 1, 3 inch | 380 | Ft | \$13.94 | \$5,297.20 | \$13.85 | \$5,263.00 | \$13.83 | \$5,255.40 | |
| 139 Conduit, DB, 3, 3 inch | 85 | Ft | \$43.75 | \$3,718.75 | \$43.40 | \$3,689.00 | \$43.40 | \$3,689.00 | |
| 140 Conduit, DB, 4, 3 inch | 30 | Ft | \$60.48 | \$1,814.40 | \$60.00 | \$1,800.00 | \$60.00 | \$1,800.00 | |
| 141 Conduit, Rem | 765 | Ft | \$3.19 | \$2,440.35 | \$3.16 | \$2,417.40 | \$3.16 | \$2,417.40 | |
| 142 Conduit, Schedule 40, 1 inch | 4,410 | Ft | \$9.12 | \$40,219.20 | \$9.04 | \$39,866.40 | \$9.04 | \$39,866.40 | |
| 143 Conduit, Schedule 40, 1 1/2 inch | 60 | Ft | \$16.27 | \$976.20 | \$16.15 | \$969.00 | \$16.15 | \$969.00 | |
| 144 Conduit, Schedule 40, 2 inch | 3,970 | Ft | \$8.33 | \$33,070.10 | \$8.27 | \$32,831.90 | \$8.27 | \$32,831.90 | |
| 145 Conduit, Schedule 40, 4 inch | 2,500 | Ft | \$10.99 | \$27,475.00 | \$10.90 | \$27,250.00 | \$10.91 | \$27,275.00 | |
| 146 Db Cable, In Conduit, 600V, 1/C #10 | 8,805 | Ft | \$1.10 | \$9,685.50 | \$1.10 | \$9,685.50 | \$1.10 | \$9,685.50 | |
| 147 Db Cable, In Conduit, 600V, 1/C #2 | 6,635 | Ft | \$3.09 | \$20,502.15 | \$3.07 | \$20,369.45 | \$3.07 | \$20,369.45 | |
| 148 Db Cable, In Conduit, 600V, 1/C #4 | 35,635 | Ft | \$2.22 | \$79,109.70 | \$2.20 | \$78,397.00 | \$2.20 | \$78,397.00 | |
| 149 Db Cable, In Conduit, 600V, 1/C #6 | 3,300 | Ft | \$1.69 | \$5,577.00 * | \$1.68 | \$5,544.00 | \$1.68 | \$5,544.00 | |
| 150 Db Cable, In Conduit, 600V, 1/C #8 | 1,180 | Ft | \$1.46 | \$1,722.80 | \$1.45 | \$1,711.00 | \$1.45 | \$1,711.00 | |
| 151 Db Cable, In Conduit, Rem | 3,110 | Ft | \$0.93 | \$2,892.30 | \$0.93 | \$2,892.30 | \$0.93 | \$2,892.30 | |
| 152 Cable, Equipment Grounding Wire, 1/C #1 | 1,170 | Ft | \$3.55 | \$4,153.50 | \$3.53 | \$4,130.10 | \$3.53 | \$4,130.10 | |
| 153 Cable, Equipment Grounding Wire, 1/C #2 | 2,145 | Ft | \$2.92 | \$6,263.40 | \$2.90 | \$6,220.50 | \$2.90 | \$6,220.50 | |
| 154 Cable, Equipment Grounding Wire, 1/C #4 | 4,065 | Ft | \$2.21 | \$8,983.65 | \$2.19 | \$8,902.35 | \$2.19 | \$8,902.35 | |
| 155 Cable, Equipment Grounding Wire, 1/C #6 | 475 | Ft | \$1.69 | \$802.75 | \$1.68 | \$798.00 | \$1.68 | \$798.00 | |
| 156 Cable, Equipment Grounding Wire, 1/C #10 | 4,400 | Ft | \$1.10 | \$4,840.00 * | \$1.10 | \$4,840.00 | \$1.10 | \$4,840.00 | |
| 157 Hh, Polymer Conc | 43 | Ea | \$988.85 | \$42,520.55 | \$981.00 | \$42,183.00 | \$981.00 | \$42,183.00 | |
| 158 Hh, Polymer Conc, Install Salv | 8 | Ea | \$672.00 | \$5,376.00 | \$666.70 | \$5,333.60 | \$666.67 | \$5,333.36 | |
| 159 Hh, Rem and Salv | 9 | Ea | \$242.29 | \$2,180.61 | \$240.40 | \$2,163.60 | \$240.38 | \$2,163.42 | |
| 160 Light Std Fdn | 7 | Ea | \$1,753.17 | \$12,272.19 | \$1,739.00 | \$12,173.00 | \$1,739.26 | \$12,174.82 | |
| 161 Light Std Fdn, Rem | 19 | Ea | \$261.07 | \$4,960.33 | \$259.00 | \$4,921.00 | \$259.00 | \$4,921.00 | |
| 162 Light Std Shaft | 2 | Ea | \$4,125.12 | \$8,250.24 | \$4,092.00 | \$8,184.00 | \$4,092.41 | \$8,184.82 | |
| 163 Light Std Shaft, Install Salv | 17 | Ea | \$472.18 | \$8,027.06 | \$468.40 | \$7,962.80 | \$468.43 | \$7,963.31 | |
| 164 Light Std Shaft, Rem and Salv | 19 | Ea | \$261.07 | \$4,960.33 | \$234.20 | \$4,449.80 | \$234.22 | \$4,450.18 | |
| 165 Luminaire | 58 | Ea | \$2,648.02 | \$153,585.16 | \$2,627.00 | \$152,366.00 | \$2,627.00 | \$152,366.00 | |
| 166 Luminaire, Install Salv | 7 | Ea | \$178.56 | \$1,249.92 | \$177.20 | \$1,240.40 | \$177.21 | \$1,240.47 | |
| 167 Luminaire, Rem and Salv | 57 | Ea | \$63.68 | \$3,629.76 | \$63.20 | \$3,602.40 | \$63.18 | \$3,601.26 | |
| 168 Cable, Sec, 600V, 1, 3/C#6 | 450 | Ft | \$5.06 | \$2,277.00 | \$5.02 | \$2,259.00 | \$5.02 | \$2,259.00 | |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| Leavitt & Starck Excavating, Inc. | | | | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|---|----------|------|-------------|-------------|------------------------|-------------|---------------------|-------------|
| 16220 National Parkway | | | | | 8574 Verona Road | | 3097 Lansing Road | |
| Lansing, MI 48906 | | | | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| (517) 323-7630 | | | | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost |
| 169 Wood Pole, Fit Up, Sec Cable Pole | 2 | Ea | \$591.70 | \$1,183.40 | \$587.00 | \$1,174.00 | \$587.00 | \$1,174.00 |
| 170 Conduit, Directional Bore, 1, 3 inch | 350 | Ft | \$34.28 | \$11,998.00 | \$34.00 | \$11,900.00 | \$34.01 | \$11,903.50 |
| 171 Conduit, Rigid Galv Steel, 1 inch | 600 | Ft | \$24.80 | \$14,880.00 | \$24.60 | \$14,760.00 | \$24.60 | \$14,760.00 |
| 172 Case Sign, Rem | 17 | Ea | \$236.09 | \$4,013.53 | \$234.20 | \$3,981.40 | \$234.22 | \$3,981.74 |
| 173 Case Sign (LED), One Way, 24 inch by 30 inch | 3 | Ea | \$2,177.40 | \$6,532.20 | \$2,160.00 | \$6,480.00 | \$2,160.12 | \$6,480.36 |
| 174 Controller and Cabinet, Rem | 2 | Ea | \$242.31 | \$484.62 | \$240.40 | \$480.80 | \$240.38 | \$480.76 |
| 175 Controller and Cabinet, Digital Type | 2 | Ea | \$24,610.93 | \$49,221.86 | \$24,415.00 | \$48,830.00 | \$24,415.60 | \$48,831.20 |
| 176 Controller Fdn, Base Mount | 2 | Ea | \$2,063.04 | \$4,126.08 | \$2,047.00 | \$4,094.00 | \$2,046.71 | \$4,093.42 |
| 177 Controller Fdn, Rem | 2 | Ea | \$242.30 | \$484.60 | \$240.40 | \$480.80 | \$240.38 | \$480.76 |
| 178 Global Positioning System Module | 2 | Ea | \$1,497.22 | \$2,994.44 | \$1,485.00 | \$2,970.00 | \$1,485.34 | \$2,970.68 |
| 179 Fdn, Rem | 12 | Ea | \$490.83 | \$5,889.96 | \$486.90 | \$5,842.80 | \$486.94 | \$5,843.28 |
| 180 Pedestal, Alum | 16 | Ea | \$923.51 | \$14,776.16 | \$916.20 | \$14,659.20 | \$916.19 | \$14,659.04 |
| 181 Pedestal, Fdn | 21 | Ea | \$894.92 | \$18,793.32 | \$887.80 | \$18,643.80 | \$887.82 | \$18,644.22 |
| 182 Pedestal Fdn, Rem | 6 | Ea | \$127.36 | \$764.16 | \$126.40 | \$758.40 | \$126.35 | \$758.10 |
| 183 Pedestal, Rem | 2 | Ea | \$121.14 | \$242.28 | \$120.20 | \$240.40 | \$120.19 | \$240.38 |
| 184 Pushbutton and Sign | 25 | Ea | \$805.52 | \$20,138.00 | \$799.10 | \$19,977.50 | \$799.13 | \$19,978.25 |
| 185 Pushbutton, Rem | 19 | Ea | \$63.69 | \$1,210.11 | \$63.20 | \$1,200.80 | \$63.18 | \$1,200.42 |
| 188 Pushbutton and Sign, Salv | 3 | Ea | \$584.08 | \$1,752.24 | \$579.50 | \$1,738.50 | \$579.45 | \$1,738.35 |
| 186 Pushbutton Pedestal, Alum | 5 | Ea | \$526.18 | \$2,630.90 | \$522.00 | \$2,610.00 | \$522.00 | \$2,610.00 |
| 187 Pushbutton Pedestal, Rem | 2 | Ea | \$121.15 | \$242.30 | \$120.20 | \$240.40 | \$120.19 | \$240.38 |
| 189 Serv Disconnect | 2 | Ea | \$1,373.90 | \$2,747.80 | \$1,363.00 | \$2,726.00 | \$1,363.00 | \$2,726.00 |
| 190 TS, Mast Arm Mtd, Rem | 20 | Ea | \$116.17 | \$2,323.40 | \$115.30 | \$2,306.00 | \$115.25 | \$2,305.00 |
| 191 TS, Pedestrian, Bracket Arm Mtd, Rem | 9 | Ea | \$236.09 | \$2,124.81 | \$234.20 | \$2,107.80 | \$234.22 | \$2,107.98 |
| 192 TS, Pedestrian, Pedestal Mtd, Rem | 2 | Ea | \$236.09 | \$472.18 | \$234.20 | \$468.40 | \$234.22 | \$468.44 |
| 193 Cabinet, Rem | 1 | Ea | \$465.97 | \$465.97 | \$462.30 | \$462.30 | \$462.27 | \$462.27 |
| 194 TS, One Way Mast Arm Mtd, FYA (LED) | 6 | Ea | \$1,528.45 | \$9,170.70 | \$1,516.00 | \$9,096.00 | \$1,516.32 | \$9,097.92 |
| 195 TS, 4th Level, LTGA (LED) | 2 | Ea | \$569.30 | \$1,138.60 | \$564.80 | \$1,129.60 | \$564.79 | \$1,129.58 |
| 196 TS, Pedestrian, Two Way Bracket Arm Mtd (LED) Countdown | 3 | Ea | \$1,863.64 | \$5,590.92 | \$1,849.00 | \$5,547.00 | \$1,848.85 | \$5,546.55 |
| 197 TS, Pedestrian, One Way Bracket Arm Mtd (LED) Countdown | 4 | Ea | \$1,289.84 | \$5,159.36 | \$1,280.00 | \$5,120.00 | \$1,279.60 | \$5,118.40 |
| 198 TS, Pedestrian, One Way Pedestal Mtd (LED) Countdown | 4 | Ea | \$1,343.67 | \$5,374.68 | \$1,333.00 | \$5,332.00 | \$1,333.01 | \$5,332.04 |
| 199 TS, Pedestrian, Two Way Pedestal Mtd (LED) Countdown | 1 | Ea | \$1,864.07 | \$1,864.07 | \$1,849.00 | \$1,849.00 | \$1,849.28 | \$1,849.28 |
| 200 TS, One Way Mast Arm Mtd (LED) | 16 | Ea | \$1,311.57 | \$20,985.12 | \$1,301.00 | \$20,816.00 | \$1,301.16 | \$20,818.56 |
| 201 Sign Optical, Rem | 4 | Ea | \$231.11 | \$924.44 | \$229.30 | \$917.20 | \$229.20 | \$916.80 |
| 202 Video Traf Detection Camera, Rem | 4 | Ea | \$116.17 | \$464.68 | \$115.30 | \$461.20 | \$115.25 | \$461.00 |
| 203 Emergency Pre-emption, Rem | 5 | Ea | \$116.17 | \$580.85 | \$115.30 | \$576.50 | \$115.25 | \$576.25 |
| 204 Wireless Vehicle Detection System | 2 | Ea | \$7,220.23 | \$14,440.46 | \$7,163.00 | \$14,326.00 | \$7,162.93 | \$14,325.86 |
| 205 Wireless Vehicle Detection System, Rem | 1 | Ea | \$116.17 | \$116.17 | \$115.30 | \$115.30 | \$115.25 | \$115.25 |
| 206 Wireless Vehicle Sensor Node | 37 | Ea | \$923.11 | \$34,155.07 | \$915.80 | \$33,884.60 | \$915.78 | \$33,883.86 |
| 207 Wireless Vehicle Sensor Node, Rem | 18 | Ea | \$92.42 | \$1,663.56 | \$91.70 | \$1,650.60 | \$91.69 | \$1,650.42 |
| 208 TS, Bag | 13 | Ea | \$310.70 | \$4,039.10 | \$308.20 | \$4,006.60 | \$308.23 | \$4,006.99 |
| 209 TS, Bag, Rem | 13 | Ea | \$116.17 | \$1,510.21 | \$115.30 | \$1,498.90 | \$115.25 | \$1,498.25 |
| 210 TS Head, Temp | 1 | Ea | \$1,435.62 | \$1,435.62 | \$1,424.00 | \$1,424.00 | \$1,424.23 | \$1,424.23 |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| | | | | Leavitt & Starck Excavating, Inc. | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|---|-----------------|-------------|-------------------|--|-------------------|----------------------------|-------------------|-------------------------------|-------------------|
| | | | | 16220 National Parkway | | 8574 Verona Road | | 3097 Lansing Road | |
| | | | | Lansing, MI 48906 | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| | | | | (517) 323-7630 | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price |
| 211 Casing | 95 | Ft | \$184.16 | \$17,495.20 | \$182.70 | \$17,356.50 | \$182.70 | \$17,356.50 | \$182.70 |
| 212 Backplate, TS | 22 | Ea | \$238.90 | \$5,255.80 | \$237.00 | \$5,214.00 | \$237.00 | \$5,214.00 | \$237.00 |
| 213 Optical Priority Control System | 2 | Ea | \$10,797.81 | \$21,595.62 | \$10,710.00 | \$21,420.00 | \$10,712.11 | \$21,424.22 | \$10,712.11 |
| 214 St Name Sign, Two Way, (LED), 6 foot | 6 | Ea | \$2,931.38 | \$17,588.28 | \$2,908.00 | \$17,448.00 | \$2,908.12 | \$17,448.72 | \$2,908.12 |
| 215 St Name Sign, Two Way, (LED), 8 foot | 2 | Ea | \$3,466.57 | \$6,933.14 | \$3,439.00 | \$6,878.00 | \$3,439.06 | \$6,878.12 | \$3,439.06 |
| 216 Tremie Pour | 9 | Ea | \$1,492.02 | \$13,428.18 | \$1,480.00 | \$13,320.00 | \$1,480.18 | \$13,321.62 | \$1,480.18 |
| 217 Hydrant, Relocate, Case 1 | 5 | Ea | \$1,824.00 | \$9,120.00 | \$1,734.00 | \$8,670.00 | \$5,000.00 | \$25,000.00 | \$5,000.00 |
| 218 Water Shutoff, Adj, Case 1 | 49 | Ea | \$380.00 | \$18,620.00 | \$152.10 | \$7,452.90 | \$300.00 | \$14,700.00 | \$300.00 |
| 219 Water Shutoff, Adj, Case 2 | 22 | Ea | \$332.50 | \$7,315.00 | \$114.00 | \$2,508.00 | \$300.00 | \$6,600.00 | \$300.00 |
| 220 Sprinkler, Line | 600 | Ft | \$3.02 | \$1,812.00 | \$3.00 | \$1,800.00 | \$3.00 | \$1,800.00 | \$3.00 |
| 221 Sprinkler Head, Relocate | 30 | Ea | \$40.32 | \$1,209.60 | \$40.00 | \$1,200.00 | \$40.00 | \$1,200.00 | \$40.00 |
| 222 Sprinkler Head, Replace | 30 | Ea | \$60.48 | \$1,814.40 | \$60.00 | \$1,800.00 | \$60.00 | \$1,800.00 | \$60.00 |
| 223 Hydrant, Adjust | 2 | Ea | \$806.00 | \$1,612.00 | \$643.00 | \$1,286.00 | \$2,500.00 | \$5,000.00 | \$2,500.00 |
| 224 Water Main Crossing, Replacement | 6 | Ea | \$8,898.00 | \$53,388.00 | \$5,984.00 | \$35,904.00 | \$7,500.00 | \$45,000.00 | \$7,500.00 |
| 225 Bollard, Steel, 8 inch, Special | 5 | Ea | \$575.00 | \$2,875.00 | \$669.00 | \$3,345.00 | \$700.00 | \$3,500.00 | \$700.00 |
| 226 Color Audio Video Route Survey | 1 | Lsum | \$2,096.64 | \$2,096.64 | \$3,283.00 | \$3,283.00 | \$2,080.00 | \$2,080.00 | \$2,080.00 |
| 227 Reimbursed Permit Fees | 8,000 | Dlr | \$0.96 | \$7,680.00 | \$1.00 | \$8,000.00 | \$1.00 | \$8,000.00 | \$1.00 |
| 228 San Manhole, Rem | 5 | Ea | \$698.50 | \$3,492.50 | \$691.40 | \$3,457.00 | \$600.00 | \$3,000.00 | \$600.00 |
| 229 Sewer, Abandon | 867 | Ft | \$9.49 | \$8,227.83 | \$7.26 | \$6,294.42 | \$15.00 | \$13,005.00 | \$15.00 |
| 230 San Sewer, PVC SDR 26, 8 inch, CSB | 32 | Ft | \$142.79 | \$4,569.28 | \$115.10 | \$3,683.20 * | \$200.00 | \$6,400.00 | \$200.00 |
| 231 San Sewer, PVC SDR 26, 10 inch, CSB | 902 | Ft | \$139.56 | \$125,883.12 | \$154.10 | \$138,998.20 | \$150.00 | \$135,300.00 | \$150.00 |
| 232 San Service Connection, 6 inch | 9 | Ea | \$1,297.00 | \$11,673.00 | \$546.80 | \$4,921.20 | \$500.00 | \$4,500.00 | \$500.00 |
| 233 San Service Clean Out, Double Wye, 6 inch | 9 | Ea | \$748.50 | \$6,736.50 | \$1,009.00 | \$9,081.00 | \$1,000.00 | \$9,000.00 | \$1,000.00 |
| 234 Sanitary Manhole, Construct Over Ex Sewer, 48 inch dia, | 1 | Ea | \$7,188.00 | \$7,188.00 | \$3,828.00 | \$3,828.00 | \$10,000.00 | \$10,000.00 | \$10,000.00 |
| 235 Sanitary Manhole, 48 inch dia | 5 | Ea | \$3,330.00 | \$16,650.00 | \$4,015.00 | \$20,075.00 | \$2,500.00 | \$12,500.00 | \$2,500.00 |
| 236 San Manhole, Reconst | 16 | Ft | \$575.00 | \$9,200.00 | \$347.90 | \$5,566.40 | \$300.00 | \$4,800.00 | \$300.00 |
| 237 Remove and Reinstall Pavers, Special | 759 | Sft | \$20.16 | \$15,301.44 | \$10.00 | \$7,590.00 | \$25.00 | \$18,975.00 | \$25.00 |
| 238 Receptacle Pedestal | 67 | Ea | \$158.07 | \$10,590.69 | \$156.80 | \$10,505.60 | \$156.82 | \$10,506.94 | \$156.82 |
| 239 Lighting Panel | 1 | Ea | \$4,739.62 | \$4,739.62 | \$4,702.00 | \$4,702.00 | \$4,702.00 | \$4,702.00 | \$4,702.00 |
| 240 Lighting Control Enclosure | 1 | Ea | \$7,831.15 | \$7,831.15 | \$7,769.00 | \$7,769.00 | \$7,769.00 | \$7,769.00 | \$7,769.00 |
| 241 Electrical Work | 1 | Lsum | \$5,040.00 | \$5,040.00 | \$21,390.00 | \$21,390.00 | \$5,000.00 | \$5,000.00 | \$5,000.00 |
| 242 Perimeter Lit Flashing LED Sign Assembly | 12 | Ea | \$7,178.81 | \$86,145.72 | \$7,122.00 | \$85,464.00 | \$7,121.84 | \$85,462.08 | \$7,121.84 |
| 243 Sidewalk, Conc, Exposed Aggregate, 6 inch | 1,329 | Sft | \$8.27 | \$10,990.83 | \$8.79 | \$11,681.91 | \$7.00 | \$9,303.00 | \$7.00 |
| 244 Sidewalk Ramp, Exposed Aggregate | 991 | Sft | \$8.98 | \$8,899.18 | \$9.63 | \$9,543.33 | \$7.00 | \$6,937.00 | \$7.00 |
| 245 Fine Grade and Sodded lawn | 4,655 | Syd | \$6.96 | \$32,398.80 | \$5.66 | \$26,347.30 | \$10.00 | \$46,550.00 | \$10.00 |
| 246 Plant mix | 140 | Cyd | \$90.72 | \$12,700.80 | \$90.00 | \$12,600.00 | \$60.00 | \$8,400.00 | \$60.00 |
| 247 Import Sandy Loam Topsoil (incl. Supply, Install and Shaping) | 425 | Cyd | \$40.04 | \$17,017.00 | \$60.00 | \$25,500.00 | \$30.00 | \$12,750.00 | \$30.00 |
| 248 Shredded Hardwood Bark Mulch | 50 | Cyd | \$60.48 | \$3,024.00 | \$50.00 | \$2,500.00 | \$45.00 | \$2,250.00 | \$45.00 |
| 249 Aluminum Edging ("Permaloc" 3/16x 4", or appv'd eq.) | 385 | Ft | \$7.06 | \$2,718.10 | \$5.00 | \$1,925.00 | \$11.70 | \$4,504.50 | \$11.70 |
| 250 Plainwell Bench - 72", Aluminum Seat, Powder Coated Surface Mount | 24 | Ea | \$1,043.28 | \$25,038.72 | \$2,537.00 | \$60,888.00 | \$2,000.00 | \$48,000.00 | \$2,000.00 |
| 251 Plainwell Litter Receptacle - Aluminum Side Panel, 35 gal. Powder Coated, Surface Mount | 13 | Ea | \$1,437.22 | \$18,683.86 | \$1,970.00 | \$25,610.00 | \$1,800.00 | \$23,400.00 | \$1,800.00 |
| 252 Sorella Planter - 72", Aluminum Seat, Powder Coated Surface Mount | 25 | Ea | \$1,542.50 | \$38,562.50 | \$1,444.00 | \$36,100.00 | \$1,500.00 | \$37,500.00 | \$1,500.00 |

BID TABULATION
REALIZE CEDAR STREET
DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY
INGHAM COUNTY, MICHIGAN

Bids Due: Friday, April 13, 2018 at 2:00 p.m.
HRC Job # 20161043

| Leavitt & Starck Excavating, Inc. | | | | | Hoffman Bros., Inc. | | C & D Hughes, Inc. | |
|--|----------|------|-------------|------------------|------------------------|-------------|---------------------|-------------|
| 16220 National Parkway | | | | | 8574 Verona Road | | 3097 Lansing Road | |
| Lansing, MI 48906 | | | | | Battle Creek, MI 49014 | | Charlotte, MI 48813 | |
| (517) 323-7630 | | | | | (269) 965-1207 | | (517) 645-0111 | |
| Item Description | Quantity | Unit | Unit Price | Total Cost | Unit Price | Total Cost | Unit Price | Total Cost |
| 253 Ring Bike Rack- Embedded, Powder Coated | 9 | Ea | \$747.16 | \$6,724.44 | \$607.90 | \$5,471.10 | \$1,000.00 | \$9,000.00 |
| 254 Gleditsia t. ‘Skyline’, Skyline Honeylocust, 2.5” cal. | 11 | Ea | \$665.28 | \$7,318.08 | \$375.00 | \$4,125.00 | \$588.00 | \$6,468.00 |
| 255 Liriodendron tulipifera, Tulip Tree, 2.5” cal. | 31 | Ea | \$595.20 | \$18,451.20 | \$375.00 | \$11,625.00 | \$549.00 | \$17,019.00 |
| 256 Quercus bicolor, Swamp White Oak, 2.5” cal. | 37 | Ea | \$640.32 | \$23,691.84 | \$400.00 | \$14,800.00 | \$575.00 | \$21,275.00 |
| 257 Ulmus a. ‘Valley Forge’, Valley Forge Elm, 2.5” cal. | 40 | Ea | \$665.28 | \$26,611.20 | \$325.00 | \$13,000.00 | \$549.00 | \$21,960.00 |
| 258 Picea glauca, White Spruce, 23’-25” ht., spaded | 1 | Ea | \$2,167.68 | \$2,167.68 | \$2,000.00 | \$2,000.00 | \$1,500.00 | \$1,500.00 |
| 259 Ilex g. ‘Nordic’, Nordic Inkberry Holy, 24” ht. | 86 | Ea | \$113.28 | \$9,742.08 | \$60.00 | \$5,160.00 | \$62.00 | \$5,332.00 |
| 260 Taxus x m. ‘Densiformis’, Dense Yew 30” ht. | 49 | Ea | \$147.17 | \$7,211.33 | \$65.00 | \$3,185.00 | \$109.00 | \$5,341.00 |
| 261 Physocarpus o. ‘Summer Wine’, Summer Wine Ninebark 36” ht. | 14 | Ea | \$101.81 | \$1,425.34 | \$52.00 | \$728.00 | \$50.00 | \$700.00 |
| 262 Echinacea p. ‘Magnus’, Magnus Purple Coneflower, 1 gal. | 70 | Ea | \$21.17 | \$1,481.90 | \$12.00 | \$840.00 | \$15.00 | \$1,050.00 |
| 263 Liriope m. ‘Big Blue’, Big Blue Liriope, 1 gal. | 751 | Ea | \$24.19 | \$18,166.69 | \$12.00 | \$9,012.00 | \$15.00 | \$11,265.00 |
| 264 Miscanthus s. ‘Morning Light’, Morning Light Silver Grass, 3 gal. | 10 | Ea | \$68.04 | \$680.40 | \$20.00 | \$200.00 | \$38.00 | \$380.00 |
| 265 Nepeta f. ‘Walker’s Low’, Walker’s Low Catmint, 1 gal. | 62 | Ea | \$25.20 | \$1,562.40 | \$12.00 | \$744.00 | \$15.00 | \$930.00 |
| 266 Pennisetum a. ‘Viridescens’, Viridescens Dwarf Fountain Grass, 2 gal. | 101 | Ea | \$24.19 | \$2,443.19 | \$18.00 | \$1,818.00 | \$30.00 | \$3,030.00 |
| 267 Pannicum v. ‘North Wind’, North Wind Switchgrass, 2 gal. | 52 | Ea | \$24.24 | \$1,260.48 | \$18.00 | \$936.00 | \$30.00 | \$1,560.00 |
| 268 Rudbeckia f. ‘Goldstrum’, Goldstrum Black-eyed Susan, 1 gal. | 356 | Ea | \$18.91 | \$6,731.96 | \$12.00 | \$4,272.00 | \$15.00 | \$5,340.00 |
| 269 Sedum s. ‘Matrona’, Matrona Sedum, 1 gal. | 54 | Ea | \$21.67 | \$1,170.18 | \$12.00 | \$648.00 | \$15.00 | \$810.00 |
| 270 Masonry Gateway Sign complete, (include concrete footing, minimum 42" depth) | 2 | Ea | \$25,188.00 | \$50,376.00 | \$7,325.00 | \$14,650.00 | \$15,000.00 | \$30,000.00 |
| 271 Masonry Gateway Placards complete, (include concrete footing, minimum 42" depth) | 2 | Ea | \$24,180.00 | \$48,360.00 | \$3,182.00 | \$6,364.00 | \$10,000.00 | \$20,000.00 |
| 272 36" height Masonry Piers complete, (include concrete footing, minimum 42" depth) | 2 | Ea | \$22,164.00 | \$44,328.00 | \$3,345.00 | \$6,690.00 | \$10,000.00 | \$20,000.00 |
| 273 30" height Masonry Wall complete, (include concrete footing, minimum 42" depth) | 40 | Ft | \$1,008.30 | \$40,332.00 | \$637.30 | \$25,492.00 | \$800.00 | \$32,000.00 |
| 274 6" Concrete Planter Curb | 120 | Ft | \$125.71 | \$15,085.20 | \$37.80 | \$4,536.00 | \$40.00 | \$4,800.00 |
| 275 Irrigation System, Special | 1 | LSum | \$71,553.60 | \$71,553.60 | \$93,450.00 | \$93,450.00 | \$70,986.00 | \$70,986.00 |
| TOTAL BID AMOUNT | | | | \$5,831,715.42 * | \$5,898,474.72 * | | \$6,548,792.06 * | |



**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**
2045 NORTH CEDAR STREET, SUITE 2
TELEPHONE (517) 699-3866
FACSIMILE (517) 699-3878
www.delhidda.com

Date: April 18, 2018

To: DDA Board Members

From: C. Howard Haas, Executive Director

Re: Proposal for Professional Engineering Services – Cedar Street: Aurelius to Willoughby

At our March 27, 2018 meeting, we shared that the Ingham County Road Department (ICRD) wished to expand the Realize Cedar project to include the repaving of Cedar Street from Aurelius Road to Willoughby Road. This portion of the project will be funded by ICRD. To facilitate this, additional design and construction engineering services will be required. As the DDA is overseeing the project, Hubbell, Roth & Clark, Inc. has provided the attached proposal to us. Please bear in mind that these additional costs will not be borne by the DDA. We will be serving as the paying agent only.

I move to approve the Proposal for Professional Engineering Services for Cedar Street – Aurelius Road to Willoughby Road from Hubbell, Roth & Clark, Inc. in the amount of \$61,000.00.

**PRINCIPALS**

Daniel W. Mitchell
Nancy M. D. Faught
Keith D. McCormack
Jesse B. VanDeCreek
Roland N. Alix
Michael C. MacDonald
James F. Burton
Charles E. Hart

CONTROLLER

Donna M. Martin

SENIOR ASSOCIATES

Gary J. Tressel
Randal L. Ford
William R. Davis
Dennis J. Benoit
Robert F. DeFrain
Thomas D. LaCross
Albert P. Mickalich
Timothy H. Sullivan
Thomas G. Maxwell

ASSOCIATES

Marshall J. Grazioli
Colleen L. Hill-Stramsak
Bradley W. Shepler
Karyn M. Stickel
Jane M. Graham
Todd J. Sneathen
Aaron A. Uranga
Salvatore Conigliaro
Melissa A. Coatta
Michael P. Darga
Brian K. Davies
James E. Scholl
Matthew G. Slicker
James J. Surhigh
Trevor S. Wagenmaker

HUBBELL, ROTH & CLARK, INC.

STREET: 2101 Aurelius Road, Suite 2A
Holt, MI 48842

PHONE: 517-694-7760

WEBSITE: hrcengr.com

OTHER OFFICE LOCATIONS

Bloomfield Hills
Detroit
Grand Rapids
Howell
Jackson
Kalamazoo
Lansing

April 18, 2018

Delhi Charter Township Downtown Development Authority
2045 Cedar St.
Holt, Michigan 48842

Attn: Mr. Howard Haas, Executive Director

Re: Proposal for Professional Engineering Services HRC Job No. 20161043
Cedar Street – Aurelius Road to Willoughby Road

Dear Mr. Haas:

Hubbell, Roth & Clark, Inc. appreciates the opportunity to continue to provide professional engineering services for the re-development of the Cedar Street corridor in accordance with the Realize Cedar Street master plan. The limits of work on Cedar Street have extended from just north of Aurelius Road to Willoughby Road as suggested by the Ingham County Road Department (ICRD) and agreed to by Delhi Township.

Statement of Understanding

HRC has completed the final design of the Proposed Cedar Street project. During the bidding process, the ICRD suggested the bid date be pushed back and milling and re-paving of Cedar Street from Aurelius Road to Willoughby Road be added to the project. ICRD received additional road funds from the state to fund the construction of this additional work.

With information from ICRD, HRC modified the bid documents and prepared the design items for the additional work. As this was not included in the initial scope for the Cedar Street project, the additional design and construction engineering efforts are detailed below.

Design Engineering Services

An addendum was completed to add the additional work to the Proposed Cedar Street project. Work included developing design plans, estimating quantities, additional special provisions, delaying the bid opening, field reviews, and modifying the previously completed bid documents. HRC's time and materials cost for completing this work is \$12,000.

Construction Engineering Services

The project was bid on April 13, 2018. The bid price for the additional work discussed above came to \$616,902.52. Construction engineering costs are highly dependent on the contractor. Their efficiency, staffing, and scheduling are dependent on the weather, unforeseen conditions, subcontractor availability, etc. We have incorporated all available information into this proposal. But our assumptions are subject to change.

Once the construction contract is executed, we will review the proposed schedule from the Contractor and inform the Township and DDA of any foreseeable issues. We will also provide frequent updates to your office and will update the Township and DDA Boards monthly, or as requested. Our estimated construction engineering services budget is as follows:

| <u>Tasks</u> | <u>Proposal</u> |
|---|-----------------|
| Layout | \$5,000 |
| Materials Testing (SME) | \$9,000 |
| Observation and Field Engineering | \$20,000 |
| Construction Engineering and Administration | \$15,000 |
| Total | \$49,000 |

Summary of Fees

HRC's design costs for the additional work from Aurelius Road to Willoughby Road is **\$12,000**.

HRC is proposing a Construction Engineering Services budget of **\$49,000**.

We look forward to the opportunity to be of continued service. Please feel free to contact the undersigned at (248) 454-6363 should you have any comments or questions on this proposal.

Very truly yours,

HUBBELL, ROTH & CLARK, INC.



James F. Burton, P.E.
Vice President

LFM/tjs

pc: Delhi; Ms. Tracy Miller
HRC; T. Sneathen, L. Michaels, File



**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**
2045 NORTH CEDAR STREET, SUITE 2
TELEPHONE (517) 699-3866
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www.delhidda.com

Date: April 18, 2018

To: DDA Board Members

From: C. Howard Haas, Executive Director

Re: Sale of 2313 Cedar Street

In 2015, the DDA purchased, via tax sale, 2313 Cedar Street, the former Marathon gas station. We had environmental assessments done on the property and subsequently tore the building down.

Over the past several months, I have been in conversation with representatives of MSU Federal Credit Union regarding the possible purchase of this property. Their intent is to submit a Brownfield Plan addressing the environmental issues and build a branch on the site. MSUFCU constructs attractive buildings and carefully maintains their properties in neighboring communities. Further, following the terms of the Brownfield Plan, this property will return to the Delhi Township tax roll.

I have asked our attorney to draft a resolution for the sale of this property and have attached it for your review and approval.

Recommended Motion: I move to adopt Resolution No. 2018-002, a resolution for the sale of approximately 1.3 acres of real property located at 2313 Cedar Street within the Township of Delhi, Ingham County, Michigan to MSU Federal Credit Union.

**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**

RESOLUTION NO. 2018-002

**A RESOLUTION FOR THE SALE OF APPROXIMATELY 1.3 ACRES OF
REAL PROPERTY LOCATED AT 2313 CEDAR STREET WITHIN
THE TOWNSHIP OF DELHI, INGHAM COUNTY, MICHIGAN
TO MSU FEDERAL CREDIT UNION**

At a regular meeting of the Delhi Charter Township Downtown Development Authority Board of Trustees (the "Board") held at the Township Hall, 2074 Aurelius Road, Holt, Michigan on the 24th day of April, 2018.

PRESENT:

ABSENT:

The following Preamble and Resolution were offered by _____ and supported by _____.

WHEREAS, the Delhi Charter Township Downtown Development Authority (the "Delhi DDA") owns approximately 1.3 acres of real property located at 2313 Cedar Street within the Township of Delhi, Ingham County, Michigan (the "Cedar Street Property"); and

WHEREAS, the Delhi DDA received an offer from MSU Federal Credit Union, a federally chartered credit union ("MSUFCU"), to purchase the Cedar Street Property; and

WHEREAS, the Board has determined the Cedar Street Property is no longer necessary for Delhi DDA purposes; and

WHEREAS, the Board has determined that it would be in the best interests of the Delhi DDA to sell the Cedar Street Property to MSUFCU and to enter into a Purchase Agreement, a copy of which is attached hereto and made a part hereof as Attachment "1" (the "Purchase Agreement"); and

WHEREAS, the Board desires to authorize and direct C. Howard Haas, the Executive Director of the Delhi DDA, or his designee, to execute the Purchase Agreement and to take any other action necessary to sell the Cedar Street Property to MSUFCU, subject to review and approval by the Delhi DDA's legal counsel.

NOW, THEFORE, BE IT RESOLVED THAT:

1. The Board authorizes and directs C. Howard Haas, the Executive Director of the Delhi DDA, or his designee, to execute the Purchase Agreement and to take any other action necessary to sell the Cedar Street Property to MSUFCU, subject to review and approval by the Delhi DDA's legal counsel.

2. All resolutions and parts of resolutions insofar as the conflict with the provisions of this resolution be and the same are hereby rescinded.

AYES:

NAYS:

ABSENT:

This Resolution is declared adopted this 24th day of April, 2018.

Nanette Miller, Secretary



DISCLAIMER

These forms are not intended to be a substitute for the legal advice of competent counsel. The user has the responsibility to determine whether the forms are appropriate or effective in a particular situation. The user should make certain that the form complies with current law, both state and federal. The authors and CBOR and its employees disclaim any liability arising from the use of the forms. Any user of the form waives and releases all possible claims against the authors of the form and CBOR and its employees. The authors and CBOR wish to acknowledge the prior contribution of H. William Freeman in creating this form.



Gregg A. Nathanson

Couzens, Lansky, Fealk, Ellis, Roeder & Lazar, P.C.

39395 W. Twelve Mile, Suite 200

Farmington Hills, MI 48331

Ph. 248-489-8600

Fax 248-489-4156

gregg.nathanson@couzens.com



COMMERCIAL PURCHASE AGREEMENT

THIS COMMERCIAL PURCHASE AGREEMENT is made and entered into effective on the date determined according to Section 19 herein ("Effective Date") by and between Delhi Charter Township, a government agency in Michigan ("Seller"), whose address is 2074 Aurelius Road, Holt MI, Michigan, 48842, and MSU Federal Credit Union, a Credit Union, ("Purchaser"), whose address is 3777 West Road, East Lansing, MI, 48823, in the manner following:

1. **PROPERTY DESCRIPTION.** Purchaser offers and agrees to purchase the real property located in the Township of Delhi, County of Ingham, Michigan, commonly known as 2313 Cedar Street, Holt, MI 48842, tax parcel identification number(s) 33-25-05-15-278-009 and further described as: Approximately 1.3 Acres of Vacant Land, or see attached legal description as Exhibit A, together with Seller's interest in all easements, appurtenances, land division rights, timber, air, oil, gas and mineral, subsurface, riparian, and all other rights and interests pertaining to such property, and together with all buildings, structures and other physical improvements situated on such property (collectively, the "Property").

2. **PURCHASE PRICE.** The purchase price ("Purchase Price") for the Property shall be One Dollar and 00/ Cents (\$1.00) Dollars.

3. **PAYMENT OF PURCHASE PRICE.** The Purchase Price shall be paid as indicated by an "X" placed in the appropriate box below, with initials of Seller and Purchaser acknowledging Purchaser's method of payment, while the other unmarked terms of purchase shall not apply.

X **Cash.** Purchaser shall pay the full Purchase Price, including any adjustments and/or prorations contained herein, to Seller at closing by certified check or wire transfer of immediately available funds or another method acceptable to Seller and title company.

☐ **New Mortgage.** Purchaser shall obtain a mortgage from a financial institution to help finance the purchase and pay Seller at Closing the full Purchase Price, including any adjustments and/or prorations contained herein.

☐ **Land Contract.** Purchaser shall pay the full Purchase Price, including any adjustments and/or prorations contained herein, to Seller at Closing pursuant to a mutually acceptable Land Contract. The Land Contract shall provide for a down payment of \$_____ at closing and payment of the balance of \$_____ in monthly installments of \$_____, or more, at Purchaser's option, including interest at the rate of _____ percent (____%) per annum, amortized over _____ (____) years, with interest to start on the closing date. A final "balloon payment" consisting of the entire unpaid principal balance and all accrued and unpaid interest will become due and payable _____ (____) months after closing.

4. **DUE DILIGENCE CONTINGENCY.** Purchaser shall have 180 days after receipt of a fully accepted copy of this Agreement executed by Seller ("Inspection Period") to perform any and all due diligence desired by Purchaser.

All due diligence shall be performed by Purchaser at Purchaser's sole expense. Prior to expiration of the Inspection Period, if Purchaser notifies Seller that, in Purchaser's sole and absolute discretion, the Property is unsuitable for Purchaser's intended purposes, then this Commercial Purchase Agreement shall terminate and neither party shall have any further rights or obligations

under this Agreement, except for any obligations which, by the terms of this Agreement are intended to survive termination. In the event Purchaser does not provide Seller with written notice of termination prior to the expiration of the Inspection Period, then Purchaser shall be deemed to be satisfied with its inspections of the Property and this contingency shall be deemed fulfilled. Seller, at no expense to Seller, shall cooperate with Purchaser in providing reasonable access to the Property for Purchaser to perform its due diligence, and in obtaining all approvals desired or required from any federal, state or local government ("Governmental Approvals"), provided that no Governmental Approvals shall be binding upon Seller or the Property if Purchaser fails to close. Said Governmental Approvals shall be obtained during the Inspection Period unless the parties hereafter agree in writing that additional time is required to obtain them. Purchaser shall repair any damage to the Property caused by Purchaser or its agents, and Purchaser shall defend and indemnify and hold Seller harmless against any liability, loss, damage, cost or expense arising from Purchaser's negligence or intentional wrongful acts committed during any of Purchaser's due diligence activities; and these obligations of Purchaser shall survive termination of this Agreement. Within 5 business days after execution of this Agreement, Seller will provide Purchaser with copies of all title policies, surveys, leases, environmental reports, studies, site plans, certificates of occupancy and other documentation in the possession or control of Seller, which is material to Purchaser's decision whether to purchase the Property.

5. TITLE INSURANCE.

- (a) **Title Insurance:** Owner Policy of Title Insurance to be furnished hereunder, to be paid for by Purchaser. Within 5 days of the Effective Date of this Agreement, Seller shall order a commitment for a 2006 ALTA Owner's Policy of Title Insurance without Standard Exceptions (the "Title Commitment"), from the Transnation Title Insurance Agency of Michigan ("Title Company"), and shall provide a copy of the same to Purchaser upon receipt. Purchaser in its sole and absolute discretion shall determine whether all matters of title and survey are satisfactory. The Title Commitment shall be accompanied by copies of all recorded exceptions to title referred to therein. At Closing, the Title Company shall deliver to Purchaser a satisfactorily "marked up" Title Commitment. The Title Insurance Policy to be issued pursuant to the marked up Title Commitment shall contain such endorsements as Purchaser may reasonably require, provided, however Purchaser shall be responsible for the cost of such endorsements.
- (b) **Objections to Title and Survey.** Purchaser may terminate this Commercial Purchase Agreement without notifying Seller of objection to any matter whatsoever; however, if Purchaser objects to any matters of title or survey and Purchaser so notifies Seller in writing of such objection(s) ("Objection Notice") before expiration of the Inspection Period, then Seller shall have 30 days from the date Seller receives the Objection Notice to either: (i) remedy the title and survey objections described in Purchaser's Objection Notice and obtain and deliver to Purchaser a revised Title Commitment and/or survey which reflects that all such objections have been remedied to Purchaser's sole and absolute discretion; or (ii) notify Purchaser and Escrow Agent that Seller is unable or unwilling to remedy the objections, in which event Purchaser shall, at its option, within five (5) business days after receipt of such notice from Seller, either terminate this Agreement (subject to those obligations which by their terms survive termination) or waive Purchaser's title and survey objections, and proceed to Closing, subject to satisfaction or waiver of Purchaser's other pre-Closing contingencies. If Purchaser proceeds to Closing, all exceptions set forth in the Title Commitment, and all objectionable matters set forth in the Survey, shall be deemed "Permitted Exceptions."

6. ENVIRONMENTAL.

- (a) **Environmental.** Seller acknowledges that there are areas of the Property where hazardous substances or hazardous wastes, as such terms are defined by applicable Federal, State and local statutes and regulations, are present. Seller agrees to provide all environmental reports, Baseline Environmental Assessment and Due Care Plan to Purchaser.
- (b) **Due Diligence.** Purchaser shall have the right at Purchaser's expense to conduct a Phase I environmental site assessment, and if necessary a Phase II assessment, during the Inspection Period. If any Phase II subsurface investigation is required or recommended, Purchaser shall bear the cost. Purchaser agrees to repair and restore any damage to the Property caused by Purchaser's investigations or testing, at Purchaser's sole expense. Purchaser shall defend, indemnify and hold Seller harmless from all costs, expenses and liabilities arising out of Purchaser's negligence or intentional wrongful acts committed during inspection of the Property, including that of Purchaser's employees, agents, consultants, or contractors performing said inspection.

7. **CLOSING AND CLOSING ADJUSTMENTS.** Closing shall take place at the offices of the Title Company or another mutually acceptable location at the earlier of: (i) 10 days following the expiration of the Inspection Period ; or (ii) upon Purchaser's written notification to Seller that all of the Purchaser's conditions precedent and contingencies have been satisfied or waived; provided, however, in no event shall Closing occur later than November 30, 2018 (such date for Closing and performance being hereinafter sometimes referred to as the "Closing" or "Closing Date").

At Closing, Seller shall deliver to Purchaser a Warranty Deed conveying good and marketable fee simple title to the Property, subject to the Permitted Exceptions, and the lien of real estate taxes not yet due and payable, along with Seller's right to make any land divisions of the Property permitted to Seller, under the Michigan Land Division Act, MCL 560.101 *et seq* . Should any financial liens or encumbrances of a definite or ascertainable amount (such as a mortgage) be recorded against the Property, Seller shall pay and/or satisfy any such encumbrance prior to or simultaneously with the Closing. In addition, at Closing, Purchaser shall pay the base owner's title insurance policy premium, all state or county real estate transfer taxes. Seller will pay all outstanding water and sewer bills, and any other outstanding obligations which, if unpaid, may become a lien against the Property. Purchaser shall pay all Title Company closing fees and expenses. Current real estate taxes (i.e. the summer and winter tax bills issued for the year of Closing) shall be prorated as of the date of the Closing on a calendar year basis, with Seller receiving a credit for any prepaid taxes. All assessments, including, but not limited to any special assessments which have become a lien upon the land shall be paid in full by Seller. Each party shall pay their own attorney fees. At Closing, the Title Company may establish a water escrow, pending receipt of a final paid water bill for water and sewer charges incurred through Closing.

8. **SELLER'S WARRANTIES, REPRESENTATIONS AND COVENANTS.** Seller warrants, represents and covenants to Purchaser, as follows:

- (a) **Authority.** Seller: (i) if an entity, is a lawfully constituted entity, duly organized, validly existing, and in good standing under the laws of the State of Michigan or another state; (ii) has the authority and power to enter into this Agreement and to consummate the transactions contemplated herein; and (iii) upon execution hereof will be legally obligated to Purchaser in accordance with the terms and provisions of this Agreement. Before Closing, Seller shall provide the Title Company and Purchaser with satisfactory written evidence that all

necessary and appropriate action has been taken by Seller authorizing and approving the execution, delivery and performance by Seller of this Agreement and all closing documents, the performance by Seller of all other acts necessary or appropriate for the consummation of the purchase and sale of the Property as contemplated herein, and the authority of the signer to bind the Seller.

- (b) **Title.** Seller owns the Property in fee simple and has marketable and good title to the Property. Seller will not further encumber title to the Property before Closing without Purchaser's prior written consent, which consent shall not be unreasonably withheld.
- (c) **Conflicts.** The execution and entry into this Agreement by Seller, the execution and delivery of the documents and instruments to be executed and delivered by Seller on the Closing Date, and the performance by Seller of Seller's duties and obligations under this Agreement and of all other acts necessary and appropriate for the full consummation of the purchase and sale of the Property as contemplated herein, will not violate any contract, agreement or other instrument to which Seller is a party, or any judicial order or judgment of any nature by which Seller or the Property is bound.
- (d) **Litigation.** There is no action, suit or proceeding pending or, to the best of Seller's knowledge, threatened by or against or affecting Seller or the Property which does or will involve or affect the Property or title thereto. Seller will, promptly upon receiving any such notice or learning of any such contemplated or threatened action, give Purchaser written notice thereof.
- (e) **No Violations.** To the best of Seller's knowledge, Seller has not received notice of any existing violations of state or federal laws, municipal, or county ordinances, or other legal requirements with respect to the Property. In the event Seller receives notice of any such violation affecting the Property prior to the Closing, Seller shall promptly notify Purchaser thereof.
- (f) **Foreign Ownership.** Seller is not a "foreign person" as that term is defined in the U. S. Internal Revenue Code of 1986, as amended, and the regulations promulgated pursuant thereto, and Purchaser has no obligation under Section 1445 of the U. S. Internal Revenue Code of 1986, as amended, to withhold and pay over to the U. S. Internal Revenue Service any part of the "amount realized" by Seller in the transaction contemplated hereby (as such term is defined in the regulations issued under said Section 1445). Seller shall furnish Purchaser with a non-foreign person affidavit at Closing.
- (g) **Construction Liens.** On the Closing Date, neither Seller nor Seller's general contractor will be indebted to any contractor, laborer, materialmen, architect, or engineer for work, labor or services performed or rendered, or for materials supplied or furnished, in connection with the Property for which any person could claim a lien against the Property and shall execute a standard title company affidavit to this effect at Closing.

9. PURCHASER'S WARRANTIES, REPRESENTATIONS AND COVENANTS.

- (a) **Authority.** Purchaser: (i) if an entity, is a lawfully constituted entity, duly organized, validly existing, and in good standing under the laws of the State of Michigan or another state; (ii) has the authority and power to enter into this Agreement and to consummate the transactions contemplated herein; and (iii) upon execution hereof will be legally obligated to Seller in accordance with the terms and provisions of this Agreement. Before

Closing, Purchaser shall provide the Title Company and Seller with satisfactory written evidence that all necessary and appropriate action has been taken by Purchaser authorizing and approving the execution, delivery and performance by Purchaser of this Agreement, and all closing documents and the performance by Purchaser of all other acts necessary or as appropriate for the consummation of the purchase and sale of the Property as contemplated herein.

- (b) **Conflicts.** The execution and entry into this Agreement by Purchaser, the execution and delivery of the documents and instruments to be executed and delivered by Purchaser on the Closing Date, and the performance by Purchaser of Purchaser's duties and obligations under this Agreement and of all other acts necessary and appropriate for the full consummation of the purchase and sale of the Property as contemplated herein, will not violate any contract, agreement or other instrument to which Purchaser is a party, or any judicial order or judgment of any nature by which Purchaser is bound.

10. **DAMAGE TO PROPERTY.** If between the Effective Date of this Agreement and the Closing Date, all or any part of the Property is damaged by fire or natural elements or other causes, or any part of the Property is taken pursuant to any power of eminent domain, Seller shall immediately notify Purchaser of such occurrence, and Purchaser may terminate this Agreement with written notice to Seller within 15 days after the date Purchaser learns of such damage or taking, without further liability, except for those obligations of Purchaser which are intended to survive termination. If Purchaser does not elect to terminate this Agreement, there shall be no reduction of the purchase price and Seller shall assign to Purchaser whatever rights Seller may have with respect to any insurance proceeds or eminent domain award at Closing.

11. **AS IS.** Neither Seller nor any broker, nor any of their officers, directors, managers, members, employees or agents have made any representation, warranty or disclosure with respect to the Property, upon which Purchaser may rely, except as may be set forth in writing in this Agreement. By Closing, Purchaser agrees to accept the Property in "As Is" condition to the fullest extent permitted by law.

12. **SELLER'S CLOSING OBLIGATIONS.** At Closing, Seller shall execute and deliver the Warranty Deed, closing statement, standard title company owner's affidavit and all other usual and customary Title Company and other closing documents necessary or appropriate to consummate the sale.

13. **PURCHASER'S CLOSING OBLIGATIONS.** At closing, Purchaser shall pay to Seller the Purchase Price in the manner specified in Section 3 above, subject to agreed pro rations and adjustments, and execute and deliver a closing statement and all other usual and customary Title Company and other closing documents necessary or appropriate to consummate the sale.

14. **NOTICES.** Unless otherwise stated in this Agreement, a notice required or permitted by this Agreement shall be sufficient if in writing and either delivered personally, by email, or sent via Federal Express, UPS or a similar nationally recognized overnight delivery service, or by certified mail, return receipt requested, addressed to the parties at their addresses specified below or by email. Any notices given by personal service shall be effective upon delivery. Any notice given by Federal Express or UPS shall be deemed effective one business day after sending. Any notice given by certified mail, return receipt requested, shall be deemed given three business days after mailing, and any notice given by email shall be deemed effective upon receipt. Copies of all notices shall be made as follows:

X If to Purchaser:

| | |
|------------|------------------------|
| Name: | Erin Bowdell |
| Address: | 3777 West Road |
| Address: | East Lansing, MI 48823 |
| Telephone: | 517-333-2424 ext 2207 |
| Facsimile: | |
| Email: | ebowdell@msufcu.org |

With copy to:

| | |
|------------|--|
| Name: | |
| Address: | |
| Address: | |
| Telephone: | |
| Facsimile: | |
| Email: | |

X If to Seller :

| | |
|------------|--------------------------------|
| Name: | Tracy Miller |
| Address: | 2074 Aurelius Road |
| Address: | Holt, MI 48842 |
| Telephone: | 517-694-8281 |
| Facsimile: | |
| Email: | Tracy.miller@delhitownship.com |

With copy to:

| | |
|------------|--|
| Name: | |
| Address: | |
| Address: | |
| Telephone: | |
| Facsimile: | |
| Email: | |

15. **ADDITIONAL ACTS.** Purchaser and Seller agree to execute and deliver such additional documents and perform such additional acts as may become necessary or appropriate to effectuate the transfers contemplated by this Agreement.
16. **ENTIRE AGREEMENT.** This Agreement contains the entire agreement of the parties with respect to the sale of the Property. All contemporaneous or prior oral and written negotiations and agreements have been merged into this Agreement.
17. **MICHIGAN LAW.** This Agreement shall be governed by and construed in accordance with the laws of the State of Michigan, without regard to its conflict of laws principles.
18. **AMENDMENTS.** This Agreement may be modified or amended only by written instrument signed by the Purchaser and Seller.
19. **EFFECTIVE DATE.** For purposes of this Agreement, the phrase "Effective Date" shall be the date upon which Purchaser signs the Acknowledgment of Seller's Acceptance.
20. **BROKER.** Purchaser and Seller each acknowledge that real estate agent is Kelly Miller and is acting on behalf of both parties as a dual agent of the Purchaser and the Seller with written, informed consent of both Purchaser and Seller. Purchaser agrees to pay BHHS Tomie Raines, at Closing, a brokerage fee of 5% of the appraised value of the Property as determined by Vertalka & Vertalka based on market value in its present condition, including without limitation the presence of hazardous materials. The parties acknowledge that other than the parties' real estate agents disclosed herein, no other real estate brokers, salespersons, or agents are involved in this transaction and the parties hereby agree to indemnify and hold each other harmless from any and all such claims for brokerage fees. All brokers and their agents specifically disclaim responsibility for the condition of the Property and performance of this Agreement. All named brokers are third party beneficiaries of this Agreement.
21. **BROKER ENVIRONMENTAL LIMITED RELEASE.** Purchaser acknowledges that Purchaser shall be given the opportunity to make a competent environmental inspection, and the Purchaser and Seller each do hereby release each broker and real estate agent from claims based on the negligence of such brokers and agents concerning toxic and hazardous material or substance or other adverse environmental conditions on or about the Property.

22. **DEFAULT.**

- (a) **Seller's Default.** If the sale and purchase of the Property contemplated by this Agreement is not consummated on account of Seller's default or failure to perform hereunder, Purchaser shall be entitled to all remedies at law or in equity, including without limitation specific performance.
- (b) **Purchaser's Default.** If the sale and purchase of the Property contemplated by this Agreement is not consummated on account of Purchaser's default hereunder, Seller shall be entitled to all remedies at law or in equity, including without limitation specific performance.

23. **WAIVER.** The failure to enforce any particular provision of this Agreement on any particular occasion shall not be deemed a waiver by either party of any of its rights hereunder, nor shall it be deemed to be a waiver of subsequent or continuing breaches of that provision, unless such waiver be expressed in a writing signed by the party to be bound.

24. **DATE FOR PERFORMANCE.** If the time period by which any right, option or election provided under this Agreement must be exercised, or by which any act required hereunder must be performed, or by which the Closing must be held, expires on a Saturday, Sunday or legal or bank holiday, then such time period will be automatically extended through the close of business on the next following business day.

25. **FURTHER ASSURANCES.** The parties agree that they will each take such steps and execute such documents as may be reasonably required by the other party or parties to carry out the intent and purposes of this Agreement.

26. **SEVERABILITY.** In the event any provision or portion of this Agreement is held by any court of competent jurisdiction to be invalid or unenforceable, such holding will not affect the remainder hereof, and the remaining provisions shall continue in full force and effect to the same extent as would have been the case had such invalid or unenforceable provision or portion never been a part hereof.

27. **SUCCESSORS AND ASSIGNS.** The designation Seller and Purchaser as used herein shall include said parties, their heirs, successors, and assigns; provided, however, Purchaser may not assign its interest in this Agreement without the prior written consent of Seller, which consent shall not be unreasonably withheld.

28. **CONTACT WITH THIRD PARTIES.** During the pendency of this Agreement, Seller may discuss with, or receive the submission of written back up offers or letters of intent from any third party or entity relating to the purchase of the Property. Seller shall promptly notify Purchaser in the event Seller should receive a written offer or letter of intent, and Seller shall advise any such third party or entity of the existence and priority of this Agreement.

29. **ENTIRE AGREEMENT.** This Agreement constitutes the entire Agreement between the parties and shall become a binding and enforceable Agreement among the parties upon full and complete execution and delivery of this Agreement. No prior verbal or written Agreement shall survive the execution of this Agreement.

30. **AMENDMENT.** Any amendment to this Agreement shall be in writing and signed by all the parties in order to be binding and enforceable against the parties.

31. **RELATIONSHIP OF THE PARTIES.** Nothing contained herein shall be construed or interpreted as creating a partnership or joint venture between the parties. It is understood that the relationship is of arm's length and shall at all times be and remain that of Purchaser and Seller.

32. **NO RECORDING.** Neither this Agreement nor a memorandum hereof shall be recorded by either party or any of their representatives.

33. **CONFIDENTIALITY.** Subject to all other terms of this Agreement, each party agrees to maintain this Agreement, the information in this Agreement and all information delivered pursuant to this Agreement, as confidential, and each will not disclose any such information to any other person without the prior written consent of the other party. However, a party may disclose such confidential information to its legal counsel, to such party's lender, accountant, real estate broker, salesperson, or agent, to other professional advisors or agents of the party, provided the recipients of such information agree to keep such information confidential, and as required by law or legal process.

34. **COUNTERPARTS; ELECTRONIC TRANSMISSIONS.** This Agreement may be executed in counterpart originals, each of which when duly executed and delivered shall be deemed an original and all of which when taken together shall constitute one instrument. This Agreement may be executed and delivered by facsimile or electronic PDF signatures.

35. **OFFER.** This Agreement constitutes an offer by Purchaser to purchase the Property. Subject to Section 36.6), this offer shall remain valid until 5:00 pm. on May 1, 2018 and shall be deemed revoked if not accepted by Seller before such time and date.

36. **OTHER PROVISIONS.** In addition to the provisions outlined above, the following additional provisions shall apply to the transaction as contemplated herein.

- 1) Purchaser will pay for an appraisal of the property from Vertalka & Vertalka. Broker commission will be based on 5% of the appraised value as determined according to the parameters of Section 20.
- 2) Purchaser will pay all closing costs, including all title insurance expenses.
- 3) Purchaser agrees to close within 10 days after they are satisfied with all due diligence.
- 4) Subject to Delhi Township timely reviewing and approving Purchaser's site plan, Purchaser agrees to commence construction of a new member services facility prior to the end of 2019, further subject however to subparagraph 5) below.
- 5) If Purchaser decides not to build a member services facility of some kind on the property, then Purchaser will deed the Property to Delhi Township for \$1.00, and Delhi Township will accept such deed.
- 6) **Notwithstanding anything to the contrary herein, neither Seller nor Purchaser shall have any duties or obligations to the other regarding the Property unless the terms of this Commercial Purchase Agreement are approved by the Board of Directors of Purchaser and the Board of Seller on or before April 30, 2018.**

37. **ADVICE OF COUNSEL.** All parties are encouraged to seek the advice of independent legal counsel before executing this Agreement. Such independent counsel may help to determine the marketability of title; understand possible tax

consequences; ascertain that the terms of the sale are adhered to before the transaction is closed; and provide advice with respect to all notices and other important matters related to this Agreement. Purchaser and Seller acknowledge the importance of obtaining advice from independent counsel and acknowledge that no broker and/or real estate agent is acting as an attorney or providing legal advice.

Purchaser's Acknowledgement of Offer:

By signing below, Purchaser acknowledges having read and received a copy of this Purchase Agreement.

For Purchaser:

Witnesses:

By: _____

Its: _____

By: _____

Its: _____

Seller's Acceptance:

Seller accepts this Agreement on this _____ day of _____, 20____, at _____ (AM/PM) ☐ with the following conditions: _____

_____ ; or ☐ without qualification.

By signing below, Seller acknowledges having read and received a copy of this Agreement. If this Agreement is signed by Seller without any modification, the acceptance date stated herein shall be the Effective Date of the Agreement.

If additional conditions are stipulated herein, Seller gives Purchaser until the _____ of _____, 20____, at _____ (AM/PM) to provide its written acceptance of the counter conditions stated herein.

For Seller:

Witnesses:

By: _____

Its: _____

By: _____

Its: _____

By: _____

Its: _____

Purchaser's Acknowledgment of Seller's Acceptance:

Purchaser acknowledges receipt of Seller's acceptance of Purchaser's offer. If the acceptance was subject to changes from Purchaser's offer, Purchaser agrees to accept those changes, with all other terms and conditions remaining unchanged. If this Agreement is signed by Purchaser without any modification, then the date stated as Purchase's Receipt of Acceptance shall then become the Effective Date of this Agreement.

Seller has accepted this Agreement on this _____ day of _____, 20____, at _____ (AM/PM)

For Purchaser:

Witnesses:

By: _____

Its: _____

By: _____

Its: _____

Exhibits:

The following exhibits are attached hereto and shall become part of this Agreement by reference

| Exhibit Name | Exhibit Description | Provided By (Purchaser or Seller) | Attached By (Date) |
|-------------------------|--|--|-----------------------------------|
| Exhibit A | Property Survey and/or Legal Description | Seller | |
| Exhibit B | | | |
| Exhibit C | | | |
| Exhibit D | | | |
| Exhibit E | | | |
| Exhibit F | | | |
| Exhibit G | | | |

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EXHIBIT "A"

ADDENDUM #1 TO THE COMMERCIAL PURCHASE AGREEMENT

This Addendum #1 to the Commercial Purchase Agreement ("Addendum #1") is entered into this ____ day of _____, 2018, by and between Delhi Township Downtown Development Authority, a Michigan downtown development authority authorized and operating under the Downtown Development Authority Act, MCL 125.1651, *et seq.*, as amended (the "Seller") and MSU Federal Credit Union, a federally chartered credit union (the "Purchaser") (individually a "Party", and collectively, the "Parties").

WITNESSETH:

WHEREAS, the Seller and the Purchaser desire to enter into a certain Commercial Purchase Agreement for the purchase and sale of real property located at 2313 Cedar Street within the Township of Delhi, Ingham County, Michigan (the "Commercial Purchase Agreement") which property is more particularly described in the Commercial Purchase Agreement (the "Property"); and

WHEREAS, the Parties desire to amend the Commercial Purchase Agreement in certain respects, subject to and in accordance with, the terms of this Addendum #1;

NOW, THEREFORE, in consideration of the foregoing, the mutual promises and covenants contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties do hereby agree as follows:

1. The correct name of the Seller is "Delhi Township Downtown Development Authority, a Michigan downtown development authority".

2. The following language shall be added to Paragraph 5(a) of the Commercial Purchase Agreement:

"The Title Commitment will be issued without standard exceptions only if the Purchaser provides an ALTA Survey to the Title Company."

3. A new Paragraph 6(c) shall be inserted in the Commercial Real Estate Agreement which states:

"(c) Release and Indemnification. It is the intention and agreement of the Seller and Purchaser that following conveyance of the Property to the Purchaser, the Seller shall have no liability or exposure to the Purchaser with respect to any environmental remediation required on the Property, subsequent to such conveyance, to hazardous substances or other conditions known or unknown which may be in or about the Property, and as stated above, the Purchaser is accepting the Property in its "as is" condition with full liability therefor. Further, the Purchaser acknowledges that the Property may be a "Facility" as that term is defined in Section 20116 of NREPA, MCL 324.2116, *et seq.*, as amended.

(i) The Purchaser shall, at its sole expense, be responsible for and pay the cost of and indemnify the Seller from, including payment of Seller's actual attorneys' fees, any and all environmental assessments and remedial actions, if any, required by the local, state, or federal government, their agencies, and/or departments or other party, pursuant to the Comprehensive Environmental Response Compensation and Liability Act of 1980 (as amended), Act 451 of the Michigan Public Acts of 1994, as amended, or any and all other applicable Federal, State, or local statutes, laws, ordinances, codes, rules, regulations, and guidelines (including consent decrees and administrative orders) relating to public health and safety and the protection of the environment.

(ii) The Purchaser shall, at its sole expense, be responsible for and pay the cost of investigation, repairs, and modifications as are necessary to assure that the Property is safe and appropriate for its intended uses and that the Property complies with all applicable building codes or other applicable laws or regulations; and is not in violation of any Federal, State, or local statutes, laws, ordinances, codes, rules, regulations, and guidelines (including consent decrees and administrative orders) pertaining to the environment or use of the Property.

(iii) The Purchaser further agrees that it shall, at its expense, defend against any claims asserted by third parties and indemnify the Seller, including payment of Seller's actual attorneys' fees from any exposure in and about the Property after the date of closing to any hazardous waste as defined in Section 11103(3) of Act 1994 PA 451, as amended, or as defined in any other applicable Federal, State, or local statutes, laws, ordinances, codes, rules, regulations, and guidelines (including consent decrees and administrative orders), or as a result of any other allegedly dangerous conditions known or unknown existing in and about the Property as of the date of conveyance to the Purchaser.

(iv) The provisions of subparagraphs (i) through (iii), above, shall, in the case of any one or more of the same is deemed to be unenforceable, be severable, meaning that the unenforceability of any given provisions shall not affect the enforceability of the remaining provisions.

(v) This Paragraph 6(c) shall inure to the benefit and be binding upon the Purchaser, they Purchaser's successors and assigns, including any party to whom any of the Property is conveyed or leased in whole or in part, by the Purchaser.

(vi) The provisions of subparagraphs (i) through (v) above, shall survive closing. At the Seller's option, at the closing, the provisions of subparagraphs (i) through (v) shall be placed in recordable form, signed and acknowledged by the Purchaser and the Seller, and then recorded by the

Seller, at its expense, with the Ingham County, Michigan, Register of Deeds.”

4. The following shall be added to Paragraph 11 of the Purchase Agreement:

“The Seller has disclosed that the Property may be a Facility. At closing, the Purchaser will confirm, in writing, that it has inspected the Property and agrees to take the Property “as is” and in its present condition and that there are no other or additional or written or oral understandings. The Purchaser will also confirm and agree, in writing, that except for the warranties contained in the Commercial Purchase Agreement concerning the status of title of the Property, the Seller expressly disclaims all other warranties with regards to the Property.”

5. The following language shall be added to Paragraph 14 of the Commercial Purchase Agreement:

“With copies to: Lori Underhill
Delhi Township Downtown Development Authority
2045 Cedar Street
Holt, Michigan 48842

C. Howard Haas
Delhi Township Downtown Development Authority
2045 Cedar Street
Holt, Michigan 48842

Gordon W. VanWieren, Jr., Esq.
Thrun Law Firm, P.C.
2900 West Road, Suite 400
East Lansing, Michigan 48823”

6. Miscellaneous.

(a) Except as specifically modified hereby, the Commercial Purchase Agreement shall remain unchanged and is hereby ratified and confirmed by this Addendum #1.

(b) This Addendum #1 shall be construed, interpreted, and enforced under the laws of the State of Michigan.

(c) This Addendum #1 is binding upon and shall inure to the benefit of the Parties and their respective permitted successors and assigns under the Commercial Purchase Agreement.

(d) All capitalized terms not defined in this Addendum #1 shall have the same meaning ascribed to those terms in the Commercial Purchase Agreement.

(e) In the event of any conflict between the terms of this Addendum #1 and the terms of the Commercial Purchase Agreement and/or any prior amendments thereto, the terms of this Addendum #1 shall govern and control.

(f) The terms and conditions contained in this Addendum #1 shall survive closing.

(g) This Addendum #1 may be executed in several counterparts, each of which may be deemed as original, and all of such counterparts together shall constitute one and the same Addendum #1. Facsimile or emailed signatures shall be binding.

IN WITNESS WHEREOF, the Seller and the Purchaser have signed and delivered this Addendum #1 as of the date first set forth above.

SELLER:

**Delhi Township Downtown Development
Authority, a Michigan downtown development
Authority**

Dated: _____, 2018

By: _____

C. Howard Haas

Its: Executive Director

PURCHASER:

**MSU FEDERAL CREDIT UNION,
a Michigan federally chartered credit union**

Dated: _____, 2018

By: _____

Its: _____

CERTIFICATE OF SURVEY

The survey map depicts a 1.3-acre parcel bounded by Cedar Street to the north and east. The western boundary runs south from the intersection of Cedar Street and Highway 127, passing through a gas pump location under a canopy, a building (#2313), and an underground tank location. The southern boundary is defined by a point of beginning (P.O.B.) at an additional described parcel, a fire hydrant (FI) 1/2" pipe, and another P.O.B. near a 'KRAFT' iron nail. The eastern boundary follows Cedar Street. A north arrow and a graphic scale (1 inch = 80 feet) are provided. Bearings and distances are given in both degrees/minutes/seconds and meters.

CEDAR STREET

1.3 ACRES

GAS PUMP LOCATIONS UNDER CANOPY

Bldg. #2313

UNDERGROUND TANK LOCATION

P.O.B. (ADDITIONAL DESCRIBED PARCEL)

FI 1/2" PIPE

P.O.B.

KRAFT IRON NAIL

DESCRIPTION: (AS PER INGHAM COUNTY EQUALIZATION)

A PARCEL OF LAND IN THE NORTHEAST 1/4 OF SECTION 15, TOWN 3 NORTH, RANGE 2 WEST, DELHI TOWNSHIP, INGHAM COUNTY, MICHIGAN DESCRIBED AS:

COMMENCING 35 RODS AND 64.5 FEET (642.00 FEET) WEST OF THE EAST 1/4 CORNER OF SAID SECTION 5; THENCE NORTH 225 FEET TO THE POINT OF BEGINNING; THENCE NORTH 291.90 FEET TO THE SOUTHERLY RIGHT-OF-WAY OF US HIGHWAY 127 (NOW CEDAR STREET); THENCE NORTH 51°56'00"W 175.40 FEET ALONG THE SOUTHERLY RIGHT-OF-WAY LINE OF SAID HIGHWAY; THENCE SOUTH 00°14'00" WEST 398.60 FEET; THENCE EAST 140 FEET TO THE POINT OF BEGINNING; ALSO COMMENCING 35 RODS AND 64.5 FEET (642.00 FEET) WEST OF THE EAST 1/4 CORNER OF SECTION 5; THENCE NORTH 331.80 FEET TO THE POINT OF BEGINNING; THENCE NORTH 28°53'00" EAST 169.80 FEET TO THE SOUTHERLY RIGHT-OF-WAY OF US 127 (NOW CEDAR STREET); THENCE NORTH 51°03'00" WEST 105.50 FEET ON THE SOUTHERLY RIGHT-OF-WAY OF SAID HIGHWAY; THENCE SOUTH 215.1 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIBED PARCEL CONTAINS 1.3 ACRES OF LAND AND IS SUBJECT TO ALL EASEMENTS, RESTRICTIONS AND RIGHTS-OF-WAY OF RECORD.

LEGEND

ALL DIMENSIONS ARE IN FEET AND DECIMALS THEREOF

D= DEEDED
P= PLATTED
M= MEASURED

PROPERTY CORNER IRON •
CONCRETE MONUMENT ○
FENCE LINE — * * * * *

FI= FOUND IRON
SI= SET IRON

WOLVERINE
Engineers & Surveyors, Inc.
312 North Street
Mason, Michigan 48854
Ph: 517-676-9200
Fax: 517-676-9396
http://www.wolveng.com

SURVEY FOR:
DELHI CHARTER TWP. DDA
BOUNDARY SURVEY

FIELD SURVEY:
MJ & MC

DATE:
09/03/2015

DRAWN:
LDR

JOB NO.:
15-0575

SCALE:
1" = 80'

SHEET:
1 OF 1

STATE OF MICHIGAN
GREG VAUGHN
PROFESSIONAL SURVEYOR
No. 41113
LICENSED PROFESSIONAL SURVEYOR

GREG VAUGHN, P.S. #41113

| | | |
|---|---|---|
| <p>LEGEND</p> <p>ALL DIMENSIONS ARE IN FEET AND DECIMALS THEREOF</p> | | |
| <p>D= DEEDED</p> <p>P= PLATTED</p> <p>M= MEASURED</p> | <p>PROPERTY CORNER IRON ●</p> <p>CONCRETE MONUMENT ○</p> <p>FENCE LINE × × × × ×</p> | <p>FI= FOUND IRON</p> <p>SI= SET IRON</p> |



GREG VAUGHN, P.S. #41113

Agency Disclosure

This "Agency Disclosure" is provided to inform potential parties to a real estate transaction of the various agency choices available to them and to formally disclose the specific relationships of the brokerage agents in the transaction contemplated. Michigan licensing law requires real estate licensees who are acting as agents of any party to a real estate transaction to advise the parties in the transaction of the nature of their agency relationship with their client.

A real estate agent may function in any of the following capacities: (i) as a representative of the property owner, either as their direct agent or as a sub-agent of another direct agent; or (ii) as representative of the prospective user, whether that party is a buyer or tenant; or (iii) as an independent transaction coordinator, engaged not to represent or advocate for either party, but rather to facilitate a transaction; or (iv) as a disclosed dual agent, representing both parties in the transaction with their advance knowledge and authorization. Before you disclose confidential information to a real estate agent regarding a prospective transaction, you should understand what type of agency relationship you have with that licensee. Some of the agency relationships are defined in greater detail below.

SELLER'S AGENT

Under a listing agreement, a **"Seller's Agent"** (which includes landlord's agents) acts solely on behalf of its client, the Seller (which includes landlords). Under this arrangement, Seller's can authorize a Seller's Agent to work with sub-agents, "Buyer's Agents", and/or "Transaction Coordinators". A sub-agent is any real estate agent who has agreed to work with the Seller's direct Seller's Agent and, who like the Seller's Agent, also acts solely on behalf of the Seller. Seller's Agents and their sub-agents will disclose to the Seller all known information about prospective users, which may be used to the benefit of the Seller. The duties that a Seller's Agent and sub-agent owe to the Seller include: (i) promoting the best interests of the Seller; (ii) disclosing to the Seller all facts that might affect or influence the Seller's decision to accept any offer to sell or lease a property; (iii) not disclosing confidential information about the Seller, unless authorized by the Seller; (iv) presenting all written offers to the Seller; and (v) disclosing the identities of any prospective users and any information about a user's willingness to complete a transaction. In dealings with a prospective user, a Seller's Agent should: exercise reasonable skill and care in the performance of its duties; treat all prospects honestly; and answer to the best of their knowledge all questions raised by prospective users concerning the condition of the subject property.

BUYER'S AGENT

Under a buyer or tenant agency agreement, a **"Buyer's Agent"** (which includes tenants) acts solely on behalf of its client, the Buyer (which includes tenants). Buyer's Agents will disclose all known information about a Seller, the subject property and/or other related market conditions that may be used to benefit the Buyer. The duties that a Buyer's Agent owes to the Buyer include: (i) promoting the best interests of the Buyer; (ii) disclosing to the Buyer all facts that might affect or influence the Buyer's decision to tender an offer; (iii) not disclosing confidential information about the Buyer, unless authorized by the Buyer; (iv) presenting all written offers on behalf of the Buyer; and (v) disclosing to the Buyer all information about the willingness of a seller to complete the transaction contemplated. In dealings with a seller, a Buyer's Agent should exercise reasonable skill and care in the performance of its duties and deal with all prospective sellers honestly and in good faith.

TRANSACTION COORDINATOR

Under a transaction coordinator agreement, a **“Transaction Coordinator”** is a real estate agent who is not acting as an agent of either a Buyer or Seller, but rather is providing services to facilitate a real estate transaction between the parties. The responsibilities of a Transaction Coordinator typically include: (i) providing access to and showing a subject property; (ii) providing access to marketing information; (iii) providing assistance in the preparation and presentation of offers and/or agreements; (iv) and assisting the parties with the removal of any conditions which an agreement may be conditioned upon.

DUAL AGENTS

Under a dual agency agreement, a **“Dual Agent”** can be the agent of both the Seller and the Buyer in a transaction, but only with knowledge and informed consent, in writing, of both the Seller and the Buyer. In such a dual agency situation, the Dual Agent will not be able to disclose all known information to either the Seller or the Buyer. The obligations of a Dual Agent are subject to any specific provisions set forth in any agreement between the Dual Agent, the Seller, and the Buyer.

With respect to the property located at **2313 Cedar Street, Holt, Michigan**, the undersigned real estate agent hereby discloses an existing agency relationship with its client in the following capacity:

- ☐ Seller's Agent
- ☐ Buyer's Agent
- ☐ Transaction Coordinator
- ☒ Dual Agent

This Agency Disclosure has been provided to the undersigned parties prior to the disclosure of any potentially confidential information.

The parties acknowledge the agency relationship selected above in this transaction.

FOR: BROKER

BHHS Tomie Raines

By: _____
Kelly D. Miller

Its: Commercial Real Estate Advisor

1400 Abbot Road, East Lansing, MI 48823

517-351-3617

kmiller@tomieraines.com

Date: _____

FOR: SELLER

Delhi Township Downtown Development Authority

By: _____
C. Howard Haas

Its: Executive Director

2045 Cedar Street, Suite 2, Holt, MI 48842

517-699-3866

Howard.Haas@delhitownship.com

Date: _____



**DELHI CHARTER TOWNSHIP
DOWNTOWN DEVELOPMENT AUTHORITY**
2045 NORTH CEDAR STREET, SUITE 2
TELEPHONE (517) 699-3866
FACSIMILE (517) 699-3878
www.delhidda.com

Date: April 18, 2018

To: DDA Board Members

From: C. Howard Haas, Executive Director

Re: Reimburse Costs of Improvement – Esker Square

At our January 2018 Brownfield meeting, Amended Brownfield Plan #4 was approved for the 2000 Cedar Block (Esker Square). For past Brownfield Plans, the Downtown Development Authority and the Brownfield Redevelopment Authority have entered into agreements to reimburse the costs of the improvements. To that end, I have asked Township Attorney Chuck Barbieri to prepare the following Agreement. As this agreement is between the DDA and BRA, we will also be acting on this at the Brownfield meeting later this evening.

Recommended Motion: I move to approve the Delhi Charter Township Downtown Development Authority and Delhi Charter Township Brownfield Redevelopment Authority Agreement to Improve Land and Reimburse Costs of Improvement for the 2000 Cedar Block (Esker Square).

**DELHI CHARTER TOWNSHIP DOWNTOWN DEVELOPMENT AUTHORITY AND
DELHI CHARTER TOWNSHIP BROWNFIELD REDEVELOPMENT AUTHORITY
AGREEMENT TO IMPROVE LAND AND REIMBURSE COSTS OF IMPROVEMENT
OF THE 2000 CEDAR BLOCK**

This Agreement to Improve Land and Reimburse Costs of Improvement of the 2000 Cedar Block in Delhi Township is entered into this ____ day of _____, 2018, between the Delhi Charter Township Downtown Development Authority ("DDA") and the Delhi Charter Township Brownfield Redevelopment Authority ("Brownfield Authority").

RECITALS

WHEREAS, certain land on the 2000 Cedar Block of Delhi Township ("Subject Property") has been in need of improvement, and in particular additional investigation and/or response to environmental contamination at the Subject Property, including additional environmental response and due care activities, as provided for by 1996 PA 381, as amended;

WHEREAS, Delhi Township's Board of Trustees on February 20, 2018, approved Amended Brownfield Plan No. 4 for the redevelopment of the 2000 Cedar Block by 2000 Cedar, LLC; and

WHEREAS, the DDA and Brownfield Authority have previously entered into other agreements to improve other property in the Township and to reimburse the Brownfield Authority for its costs in respect thereto; and

AGREEMENTS

NOW, THEREFORE, the parties agree as follows:

1. Pursuant to MCL 125.1657, the DDA hereby contracts with the Brownfield Authority to improve the Subject Property by undertaking, contracting for or authorizing the necessary work to respond to the environmental contamination thereon, as provided for by the Michigan Brownfield Redevelopment Financing Act, ("Brownfield Act") 1996 PA 381, as amended.

2. In consideration for the Brownfield Authority undertaking, contracting for or authorizing such improvement of the Subject Property, the DDA agrees to annually pay the Brownfield Authority all tax incremental revenues that the DDA receives (except for those amounts if any that are provided to certain local taxing jurisdictions pursuant to separate agreements with the DDA) from the Subject Property, as long as those tax incremental revenues are authorized for recapture by the Brownfield Act 1996 PA 381, as amended, and as long as they are consistent with Amended Brownfield Plan No. 4 and any future amendment, applicable to the Subject Property. The DDA shall make such annual payments to the Brownfield Authority within thirty (30) days after receiving such tax incremental revenues attributable to the Subject Property.

3. For five years after tax incremental revenues are needed and paid to reimburse the designated Petitioner for expenses of eligible activities as called for in Amended Brownfield Plan No. 4 and any future amendment to that Plan, the annual payments that the DDA shall make to the Brownfield Authority may be deposited by the Brownfield Authority in its Local Brownfield Revolving Fund for uses and activities permitted by the Brownfield Act 1996 PA 381, as amended, except the Brownfield Authority retains the discretion to forego or waive some, all or any portion of the payments, in which case the DDA shall retain such tax incremental revenues.

4. After the five year period provided in paragraph 3, except as otherwise waived, the DDA shall be entitled to retain any and all tax incremental revenues that it receives with respect to the Subject Property, and shall have no further obligation to provide any part of those tax incremental revenues to the Brownfield Authority.

5. This Agreement does not affect those tax incremental revenues that the Brownfield Authority can receive which are not subject to capture by the DDA.

WHEREFORE, the respective parties have approved and executed this Agreement with the consent or approval of the respective boards as of the date first listed above.

DELHI CHARTER TOWNSHIP DOWNTOWN
DEVELOPMENT AUTHORITY

By: _____
Its: Chair

By: _____
Its: Secretary

DELHI CHARTER TOWNSHIP BROWNFIELD
REDEVELOPMENT AUTHORITY

By: _____
Its: Chair

By: _____
Its: Secretary

2017 HOLT FARMERS MARKET ANNUAL REPORT

The market was open all year long, with the exception of Thanksgiving weekend – November 24th and 25th. Market visitor attendance ranged from 500 to 800 during peak produce season. Outdoor musical entertainment was provided from May through October, as weather permitted. The market again participated in the Holt Hometown Festival with kid's activities and special entertainment, and had a decorated pumpkin contest at Halloween.

Debit/credit token sales totaled \$33,079 – a slight increase from the previous year. EBT token sales amounted to \$4569, a decrease of approximately 31% from 2016. This is consistent with the downward trend experienced at most Michigan farm markets due to changes/reductions in the program overall.

Holt Farmers Market also participated in the "Double Up" program (DUFb) in 2017. This program allows EBT/SNAP customers to double their fruit and vegetable purchasing power, and allows those customers to spend their regular EBT/SNAP dollars on other products not covered by the DUFb program. This program is now administered by MIFMA, while the Fair Food Network continues to provide the funding for these token sales. Our total DUFb token sales, following the same trend as EBT tokens, were down approximately 34% from 2016 at \$2740.

Returning anchor vendors included Aggie Mae's Bakery, Great Harvest Bread, Greenman Produce, Lonesome Pines Beef, Otto's Poultry, Rows Farm Market, Willow Blossom Farms. Returning ready-to-eat vendors included Big Daddy's Big Dawgs, Ofilia's El Burrito and Ming Dynasty. The market also welcomed Grampas Pastys and Laura's Outrageous Granola to our regular vendor lineup, as well a variety of new and returning cottage food vendors and artisan/crafters.

Approximately \$9400 was collected in Vendor Rent in 2017, which included \$1100 the 4% transaction fees assessed for all token sales.

The market continued weekly email outreach to approximately 150 subscribers, while Facebook continues to become more popular reaching 1996 followers. Vendor volunteers assisted in keeping Facebook current and updated through the year.

The market held its annual Holiday Open House on November 29th immediately following the Delhi Township Tree Lighting Ceremony. Approximately 250 guests enjoyed live entertainment, cookies and cider.

The Lions Club utilized the market again this year for their annual Easter lily fundraising, as well as hanging flower baskets at Mothers Day. The Boy Scouts and Girl Scouts also sold popcorn and cookies on various Saturdays throughout the year.

New in 2017

- The redesign of the Holt Farmers Market website was completed. In addition to the website having a great new look, the content now includes the weekly email vendor schedule, links to Facebook and our Twitter feed, recipes and vendor bios. Another popular new feature allows web visitors to send email inquiries to the market using the "Contact" page.

2017 HOLT FARMERS MARKET ANNUAL REPORT

- The Holt Farmers Market participated in WIC and Senior Project Fresh in 2017 for the first time with all four market farmers. These programs are administered by the county and are designed to encourage WIC recipients and seniors to buy fresh produce as part of a healthy diet.
- In spite of assuring vendors that reporting their individual sale amounts would not be disclosed, only 2/3 of the market vendors provided their monthly sales information. Based on the information that was collected, it is estimated that the market probably generates approximately \$200,000 in vendor sales annually.
- The Holt Farmers Market held the first “Food Frenzy” on Wednesday, June 21st from 5:00 to 8:00 pm featuring 10 ready-to-eat food vendors. Over 1,000 people attended to enjoy food, conversation and live music.
- Because this event was so popular, a 2nd “Food Frenzy” was held on Wednesday, September 13th. Again, this event was well attended and considered at capacity.

2017 Inventory

An inventory of items located at the HFM is attached part of this summary, and are considered the property of the Delhi Township Downtown Development Authority. This inventory does not include decorative items, farmer-owned tables, and coolers. See Pages 4 and 5 for detailed inventory. Note: The basement of the building is being used as additional storage for the Senior Center.

New for 2018

- Secure funding to replace garage doors with glass doors to increase street visibility during the winter markets, enhance the shopping experience and give the market an updated look consistent with the Cedar Street Corridor improvements.
- Submit Community Foundation Impact Grant to facilitate the design and construction of a commercial kitchen at the market.
- Purchase 3-year advertising space on the new indoor LED board at the South Lansing Flap Jack Restaurant.
- Hold five “Food Frenzy” events – one each the month of May, June, July, August and September.
- Continue the expansion of Friday Mini-Markets by adding new vendors and expanding customer offerings. This will include ready-to-eat food, i.e., mobile food vendors.
- Continue to identify and implement market fundraising initiatives to ensure the market’s longevity and sustainability. These initiatives may include sponsor advertising banners for display in the market, monetary and equipment donations, etc.

2017 HOLT FARMERS MARKET ANNUAL REPORT

- Continue outreach to seniors and EBT customers.
- Develop programs and educational classes at the new Holt Community Center utilizing the market's Demo Kitchen.

As Your Market Manager

As the market celebrates its 10th season in 2018, one the biggest challenges is finding and acquiring new farmers and produce vendors. Ingham County alone has 10 farmers markets, with Eaton and Clinton Counties adding another 9 markets at last count. It is possible that the number of farmers markets may have surpassed the number of growers in the area. While our market continues to offer a wonderful variety of products our customers want – beef, poultry, fresh baked goods and more, our primary focus is providing Michigan-grown, seasonal produce from our local farmers and growers.

Simultaneously, our customers continue to enjoy all kinds of ready-to-eat foods at the market – inside and outside. In fact, ready-to-eat food offerings have produced some of the largest growth for farmers markets across the country - our market is no exception. A recent study of consumer shopping indicates that by 2024, 70% of shoppers will be using online buying and delivery. With that in mind, it is important that the market continue to identify products and events that will continue to draw customers to the market.

As the Cedar Street Corridor project continues and our “walking district” becomes a reality, the market is in a great location to be an exciting destination for unique shopping and dining through the expansion of our ready-to-eat foods and effective promotion. Adding a commercial kitchen will allow existing and future vendors the opportunity to produce their food products by providing all the tools required from start to finish. This will result in successful local food producers, more healthy choices for our shoppers, and enhance our local economy.

2017 HOLT FARMERS MARKET ANNUAL REPORT

INVENTORY

| <u>Quantity</u> | <u>Item</u> |
|-----------------|---|
| 1 | Security System (6 cameras and monitor) |
| 1 | Flat screen television |
| 1 | BrightSign module |
| 1 | Lighted Open Sign |
| 1 | Large Beverage Cooler |
| 1 | Small Beverage Cooler |
| 2 | Metal Display Shelving |
| 1 | Wooden Display Cart |
| 3 | Decorative Milk Cans |
| 1 | Beverage Cooler |
| 1 | Lot miscellaneous items for sale (market booth) |
| 1 | Modular Demonstration Kitchen: (1) Stove/oven unit; (1) Sink/water unit; and (1) Prep unit |
| 1 | Lot pots, pans, utensils |
| 2 | Composting units |
| 4 | 33 gallon Recycling containers |
| 1 | Small Used PA System w/microphone |
| 1 | Brother 7460 Copier/Printer |
| 1 | Credit Card Processing Machine |
| 2 | Patio Umbrellas |
| 2 | Patio Umbrella Stands |
| 6 | 33-gallon Brute Trash Cans w/Lids |
| 1 | Snow Shovel |
| 1 | Ice Melt |
| 5 | Picnic Tables |
| 1 | RCA Stereo System |
| 1 | Dolly |
| 2 | 100' Rubber Hose |
| 1 | Eureka Vacuum Cleaner |
| 1 | Mop Bucket/Squeegee |
| 1 | 14' Stepladder |
| 1 | 12' Stepladder |
| 2 | Large Floor Pedestal Fans |
| 1 | American Flags w/Poles |
| 9 | Clamp-on Lights |
| 2 | 25' Extension Cords |
| Asst | Brooms & Mops |
| 1 | Desk, Desk Lamp & Chair |
| Asst | Cleaning Supplies |
| Asst | Paper Products |
| 1 | Carton Market Bags |
| 12 | Market Aprons |
| 1 | 2 x 5 "OPEN" Banner |
| 1 | Business Showcase Sign |
| 1 | A-Frame Crafts & Farm Market Sign |
| 10 | Wet Floor/Safety Signs |
| 16 | 4-foot Folding Tables |
| 32 | 8-foot Folding Tables |
| 24 | Metal Folding Chairs |
| 9 | Large Black Door/Floor Mats |
| 2 | Wall clocks |
| 2 | Fire Extinguishers |
| 3 | 74 oz. Coffee Holder |
| 1 | 12.5 gallon Shop Vac Pro |

2017 HOLT FARMERS MARKET ANNUAL REPORT

INVENTORY (continued)

| <u>Quantity</u> | <u>Item</u> |
|-----------------|---|
| 1 | 5-gallon Ace Floor Wax |
| 1 | V-Tech Answering Machine & Phones System |
| 4 | Outdoor Large Flower Pots |
| 3 | Power strips |
| 1 | Toolbox |
| 2 | 100-foot Food Service White Hose |
| 1 | Heart Defibrillator |
| 2 | Swoofer Flags and Stands |
| 1 | 100' measuring tape |
| 4 | Pkgs of Oversized Christmas Ornaments (for ceiling) |

STORED IN BASEMENT

Asst Round banquet tables, chairs, miscellaneous from Senior Center