



CITY of NOVI CITY COUNCIL

Agenda Item F
October 28, 2013

SUBJECT: Approval to award an engineering services agreement with URS Corporation for design engineering services related to the 2014 Chip Seal Program in the amount of \$17,000.

SUBMITTING DEPARTMENT: Department of Public Services, Engineering Division *BIC*

CITY MANAGER APPROVAL: *[Signature]*

EXPENDITURE REQUIRED	\$ 17,000
AMOUNT BUDGETED	\$245,824 (including 2012-13 rollover)
LINE ITEM NUMBER	203-203.00-866.500

BACKGROUND INFORMATION:

As part of the City's ongoing asset management approach to maintaining roads, a report was recently completed by URS that evaluated the City's 6.7 miles of streets that have a chip sealed surface treatment. (Chip sealing is the application of an asphalt emulsion to seal the road's surface, followed by placement and compaction of small diameter crushed gravel.) The report identified \$806,200 of capital improvements necessary to improve and maintain the chip seal streets in good condition. The attached memo and report provide additional information regarding the evaluation and recommended improvements.

In anticipation of this report and the deferred capital maintenance on chip sealed roads, the approved FY2013-14 budget for annual local street capital preventative maintenance (CPM) was increased from \$50,000 to \$200,000 to include some chip seal improvements. The findings of the report show that a funding level of approximately \$200,000 each year specifically for chip seal capital maintenance should be maintained through the FY2016-17 budget to make the necessary improvements to chip sealed roads to get them back into good condition. The report recommends an annual budget of \$90,000 beginning in FY2017-18 for preventative maintenance, which includes crack sealing and patching in addition to reapplication of chip seal as needed to maintain the roads in good condition.

The scope of the 2014 Chip Seal Program includes CPM, such as drainage improvements, base repair and new chip seal on the following streets:

- Buffington
- Henning
- Pembine
- Summit Ct.
- Summit Dr.
- Crown
- Pleasant Cove Dr.
- Shamrock Hill
- Shawood

URS' engineering fees are based on the fixed fee schedule established in the Agreement for Professional Engineering Services for Public Projects. The design fees for this project will be \$17,000 (8.5% of the estimated construction cost of \$200,000). The construction phase engineering fees will be awarded at the time of construction award and will be based on the contractor's bid price and the fee percentage established in the Agreement for Professional Engineering Services for Public Projects. A draft of the Supplemental

Professional Engineering Services Agreement for this project is enclosed and includes the project scope and schedule.

It is anticipated that the project would be ready for construction in summer 2014.

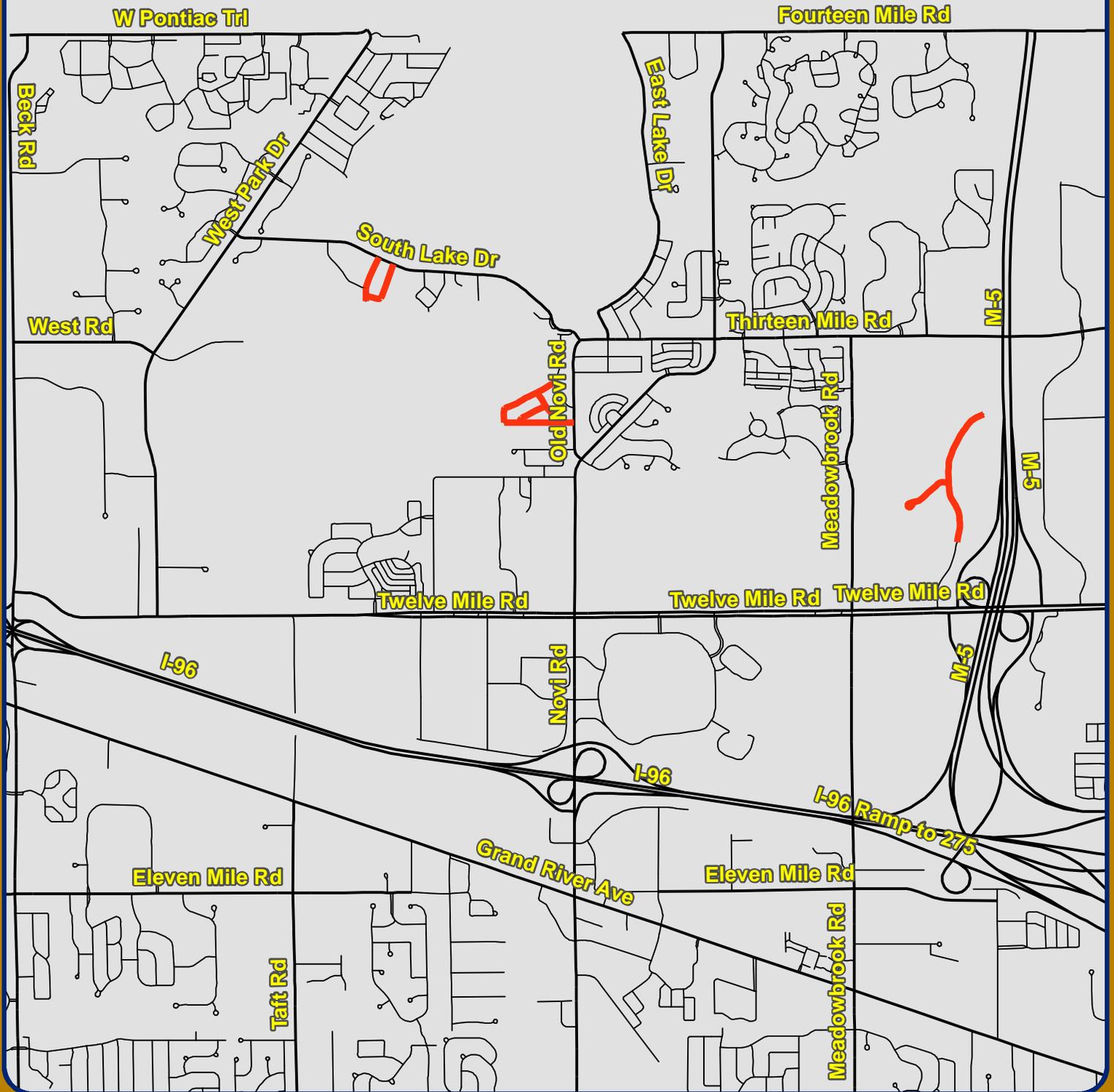
RECOMMENDED ACTION: Approval to award an engineering services agreement with URS Corporation for design engineering services related to the 2014 Chip Seal Program in the amount of \$17,000.

	1	2	Y	N
Mayor Gatt				
Mayor Pro Tem Staudt				
Council Member Casey				
Council Member Fischer				

	1	2	Y	N
Council Member Margolis				
Council Member Mutch				
Council Member Wrobel				

2014 Chip Seal Program

Location Map



Map Author: Coburn
 Date: 10/15/13
 Project: 2013 Chip Seal
 Version #: v2.0



MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

Legend

Chip Seal Streets

2014



City of Novi
 Engineering Division
 Department of Public Services
 26300 Lee BeGole Drive
 Novi, MI 48375
cityofnovi.org



1 inch = 2,664 feet

SUPPLEMENTAL PROFESSIONAL ENGINEERING SERVICES AGREEMENT

2014 CHIP SEAL PROGRAM

This Agreement shall be considered as made and entered into as of the date of the last signature hereon, and is between the City of Novi, 45175 W. Ten Mile Road, Novi, MI 48375-3024, hereafter, "City," and URS Corporation – Great Lakes., whose address is 27777 Franklin Road, Suite 2000, Southfield, MI 48034, hereafter, "Consultant."

RECITALS:

This Agreement shall be supplemental to, and hereby incorporates the terms and conditions of the AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES FOR PUBLIC PROJECTS, and attached exhibits, entered into between the City and the Consultant on December 17, 2012.

The project includes the design and the preparation of plans and specifications for the 2014 Chip Seal Program. Each of the selected road segments will be designed for chip seal application, including the identification of any repair/rehabilitation required prior to applying the chip seal. The most cost-effective construction method will be implemented for each road segment, based on the available budget and the City's asset management philosophy.

NOW, THEREFORE, in consideration of the foregoing, the City and Consultant agree as follows:

Section 1. Professional Engineering Services.

For and in consideration of payment by the City as provided under the "Payment for Engineering Services" section of this Agreement, Consultant shall perform the work described in the manner provided or required by the following Scope of Services, which is attached to and made a part of this Agreement as Exhibit A, all of said services to be done in a competent, efficient, timely, good and workmanlike manner and in compliance with all terms and conditions of this Agreement.

Exhibit A Scope of Services

Section 2. Payment for Professional Engineering Services.

1. Basic Fee.

- a. Design Phase Services: The Consultant shall complete the design phase services as described herein for a lump sum fee of \$17,000, which is 8.5% of the estimated construction cost (\$200,000) as indicated on the Design and Construction Engineering Fee Curve.

- b. Construction Phase Services will be awarded at the time of construction award, should it occur.

2. Payment Schedule for Professional Engineering Services Fee.

Consultant shall submit monthly statements for professional engineering services rendered. The statements shall be based on Consultant's estimate of the proportion of the total services actually completed for each task at the time of billing. The City shall confirm the correctness of such estimates, and may use the City's own engineer for such purposes. The monthly statements should be accompanied by such properly completed reporting forms and such other evidence of progress as may be required by the City. Upon such confirmation, the City shall pay the amount owed within 30 days.

Final billing under this agreement shall be submitted in a timely manner but not later than three (3) months after completion of the services. Billings for work submitted later than three (3) months after completion of services will not be paid. Final payment will be made upon completion of audit by the City.

3. Payment Schedule for Expenses.

All expenses required to complete the scope of services described herein, including but not limited to costs related to mileage, vehicles, reproduction, computer use, etc., shall be included in the basic fee and shall not be paid separately. However, as compensation for expenses that are not included in the standard scope of services, when incurred in direct connection with the project, and approved by the City, the City shall pay the Consultant its actual cost times a factor of 1.15.

Section 4. Ownership of Plans and Documents; Records.

1. Upon completion or termination of this agreement, all documents prepared by the Consultant, including tracings, drawings, estimates, specifications, field notes, investigations, studies, etc., as instruments of service shall become the property of the City.

2. The City shall make copies, for the use of the Consultant, of all of its maps, records, laboratory tests, or other data pertinent to the work to be performed by the Consultant under this Agreement, and also make available any other maps, records, or other materials available to the City from any other public agency or body.

3. The Consultant shall furnish to the City, copies of all maps, records, field notes, and soil tests that were developed in the course of work for the City and for which compensation has been received by the Consultant.

Section 5. Termination.

1. This Agreement may be terminated by either party upon 7- days' prior written notice to the other party in the event of substantial failure by the other party to fulfill its obligations under this agreement through no fault of the terminating party.

2. This Agreement may be terminated by the City for its convenience upon 90 days' prior written notice to the Consultant.

3. In the event of termination, as provided in this Article, the Consultant shall be paid as compensation in full for services performed to the date of that termination, an amount calculated in accordance with Section 2 of this Agreement. Such amount shall be paid by the City upon the Consultant's delivering or otherwise making available to the City, all data, drawings, specifications, reports, estimates, summaries, and that other information and materials as may have been accumulated by the Consultant in performing the services included in this Agreement, whether completed or in progress.

Section 6. Disclosure.

The Consultant affirms that it has not made or agreed to make any valuable gift whether in the form of service, loan, thing, or promise to any person or any of the person's immediate family, having the duty to recommend, the right to vote upon, or any other direct influence on the selection of consultants to provide professional engineering services to the City within the two years preceding the execution of this Agreement. A campaign contribution, as defined by Michigan law shall not be considered as a valuable gift for the purposes of this Agreement.

Section 7. Insurance Requirements.

1. The Consultant shall maintain at its expense during the term of this Agreement, the following insurance:

- A. Worker's Compensation insurance relative to all Personnel engaged in performing services pursuant to this Agreement, with coverage not less than that required by applicable law.
- B. Comprehensive General Liability insurance with maximum bodily injury limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate and minimum Property Damage limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate.
- C. Automotive Liability insurance covering all owned, hired, and non-owned vehicles with Personal Protection insurance to comply with the provisions of the Michigan No Fault Insurance Law including Residual Liability insurance with minimum bodily injury limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate minimum property damage limits of \$1,000,000 (One Million Dollars) each occurrence and/or aggregate.
- D. The Consultant shall provide proof of Professional Liability coverage in the amount of not less than \$1,000,000 (One Million Dollars) per claim and/or aggregate, and Environmental Impairment coverage. The retroactive date indicated on the policy shall either be unlimited, or, shall be the date that the Consultant established its initial coverage.

In the event that Consultant is sold or dissolved, Consultant shall provide purchase, at its expense, a "tail" or extended reporting period for the professional liability coverage for a period not less than 5 years.

2. The Consultant shall be responsible for payment of all deductibles contained in any insurance required hereunder.

3. If during the term of this Agreement changed conditions or other pertinent factors should in the reasonable judgment of the City render inadequate insurance limits, the Consultant will furnish on demand such additional coverage as may reasonably be required under the circumstances. All such insurance shall be effected at the Consultant's expense, under valid and enforceable policies, issued by the insurers of recognized responsibility which are well-rated by national rating organizations and are acceptable to the City.

4. All policies shall name the Consultant as the insured and shall be accompanied by a commitment from the insurer that such policies shall not be canceled or reduced without at least thirty (30) days prior notice to the City.

With the exception of professional liability, all insurance policies shall name the City of Novi, its officers, agents, and employees as additional insured. Certificates of Insurance evidencing such coverage shall be submitted to Sue Morianti, Purchasing Manager, City of Novi, 45175 West Ten Mile Road, Novi, MI 48375-3024 prior to commencement of performance under this Agreement and at least fifteen (15) days prior to the expiration dates of expiring policies.

5. If any work is sublet in connection with this Agreement, the Consultant shall require each subconsultant to effect and maintain at least the same types and limits of insurance as fixed for the Consultant.

6. The provisions requiring the Consultant to carry said insurance shall not be construed in any manner as waiving or restricting the liability of the Consultant under this Agreement.

Section 8. Indemnity and Hold Harmless.

A. The Consultant agrees to hold harmless and indemnify the City, its officers, agents, employees from and against all claims, demands, suits liability, losses, damages or costs (including reasonable attorney fees and costs) arising out, of or resulting from the Consultant's tortious or negligent acts, errors, or omissions in performing this Agreement.

B. The City agrees, to the extent permitted by law, to indemnify and hold harmless the Consultant, its officers, partners, employees, stockholders, and sub-consultants (collectively Consultant) from and against any and all claims, suits, demands, liability, losses, damages or costs, including reasonable attorney's fees and costs arising out of or resulting from the City's tortious or negligent acts or errors in performing this Agreement.

C. Section 8(B) of this Agreement shall not apply to individual design and/or construction management projects.

The Consultant agrees that it is its responsibility and not the responsibility of the City to safeguard the property and materials used in performing this Agreement. Further, this

Consultant agrees to hold the City harmless for any loss of such property and materials used pursuant to the Consultant's performance under this Agreement.

Section 9. Nondiscrimination.

The Consultant shall not discriminate against any employee, or applicant for employment because of race, color, sex, age or handicap, religion, ancestry, marital status, national origin, place of birth, or sexual preference. The Consultant further covenants that it will comply with the Civil Rights Act of 1973, as amended; and the Michigan Civil Rights Act of 1976 (78. Stat. 252 and 1976 PA 4563) and will require a similar covenant on the part of any consultant or subconsultant employed in the performance of this Agreement.

Section 10. Applicable Law.

This Agreement is to be governed by the laws of the State of Michigan and the City of Novi Charter and Ordinances.

Section 11. Approval; No Release.

Approval of the City shall not constitute nor be deemed release of the responsibility and liability of Consultant, its employees, associates, agents and subconsultants for the accuracy and competency of their designs, working drawings, and specifications, or other documents and services; nor shall that approval be deemed to be an assumption of that responsibility by the City for any defect in the designs, working drawings and specifications or other documents prepared by Consultant, its employees, subconsultants, and agents.

After acceptance of final plans and special provisions by the City, Consultant agrees, prior to and during the construction of this project, to perform those engineering services as may be required by City to correct errors or omissions on the original plans prepared by Consultant and to change the original design as required.

Section 12. Compliance With Laws.

This Contract and all of Consultants professional services and practices shall be subject to all applicable state, federal and local laws, rules or regulations, including without limitation, those which apply because the City is a public governmental agency or body. Consultant represents that it is in compliance with all such laws and eligible and qualified to enter into this Agreement.

Section 13. Notices.

Written notices under this Agreement shall be given to the parties at their addresses on page one by personal or registered mail delivery to the attention of the following persons:

City: Rob Hayes, P.E., Director of Public Services and Maryanne
Cornelius, Clerk, with a copy to Thomas R. Schultz, City Attorney

Consultant: Jan M. Hauser, P.E., Vice President Water/Wastewater

Section 14. Waivers.

No waiver of any term or condition of this Agreement shall be binding and effective unless in writing and signed by all parties, with any such waiver being limited to that circumstance only and not applicable to subsequent actions or events.

Section 15. Inspections, Notices, and Remedies Regarding Work.

During the performance of the professional services by Consultant, City shall have the right to inspect the services and its progress to assure that it complies with this Agreement. If such inspections reveal a defect in the work performed or other default in this Agreement, City shall provide Consultant with written notice to correct the defect or default within a specified number of days of the notice. Upon receiving such a notice, Consultant shall correct the specified defects or defaults within the time specified. Upon a failure to do so, the City may terminate this Agreement by written notice and finish the work through whatever method it deems appropriate, with the cost in doing so being a valid claim and charge against Consultant; or, the City may preserve the claims of defects or defaults without termination by written notice to Consultant.

All questions which may arise as to the quality and acceptability of work, the manner of performance and rate of progress of the work, and the interpretation of plans and specifications shall be decided by the City. All questions as to the satisfactory and acceptable fulfillment of the terms of this agreement shall be decided by the City.

Section 16. Delays.

No charges or claims for damages shall be made by the Consultant for delays or hindrances from any cause whatsoever during the progress of any portions of the services specified in this agreement, except as hereinafter provided.

In case of a substantial delay on the part of the City in providing to the Consultant either the necessary information or approval to proceed with the work, resulting, through no fault of the Consultant, in delays of such extent as to require the Consultant to perform its work under changed conditions not contemplated by the parties, the City will consider supplemental compensation limited to increased costs incurred as a direct result of such delays. Any claim for supplemental compensation must be in writing and accompanied by substantiating data.

When delays are caused by circumstances or conditions beyond the control of the Consultant as determined by the City, the Consultant shall be granted an extension of time for such reasonable period as may be mutually agreed upon between the parties, it being understood, however, that the permitting of the Consultant to proceed to complete the services, or any part of them, after the date to which the time of completion may have been extended, shall in no way operate as a waiver on the part of the City of any of its rights herein set forth.

Section 17. Assignment.

No portion of the project work, heretofore defined, shall be sublet, assigned, or otherwise disposed of except as herein provided or with the prior written consent of the City. Consent to sublet, assign, or otherwise dispose of any portion of the services shall not be construed to relieve the Consultant of any responsibility for the fulfillment of this agreement.

Section 18. Dispute Resolution.

The parties agree to try to resolve any disputes as to professional engineering services or otherwise in good faith. In the event that the parties cannot resolve any reasonable dispute, the parties agree to seek alternative dispute resolution methods agreeable to both parties and which are legally permissible at the time of the dispute. The parties agree to use their best efforts to resolve any good faith dispute within 90 (ninety) days notice to the other party. In the event the parties cannot resolve that dispute as set forth above, they may seek such remedies as may be permitted by law.

WITNESSES

URS Corporation – Great Lakes

By:

Its:

The foregoing _____ was acknowledged before me this ____ day of _____, 20____, by _____ on behalf of _____.

Notary Public

County, Michigan

My Commission Expires: _____

WITNESSES

CITY OF NOVI

By:

Its:

The foregoing _____ was acknowledged before me this ____ day of _____, 20____, by _____ on behalf of the City of Novi.

Notary Public

Oakland County, Michigan

My Commission Expires: _____

EXHIBIT A - SCOPE OF SERVICES

Consultant shall provide the City professional engineering services in all phases of the Project to which this Agreement applies as hereinafter provided. These services will include serving as the City's professional engineering representative for the Project, providing professional engineering consultation and advice and furnishing customary civil, structural, mechanical and electrical engineering services and customary engineering services incidental thereto, as described below.

A. Basic Services.

[see attached]

B. Performance.

1. The Consultant agrees that, immediately upon the execution of this Agreement, it will enter upon the duties prescribed in this agreement, proceed with the work continuously, and make the various submittals on or before the dates specified in the attached schedule. The City is not liable and will not pay the Consultant for any services rendered before written authorization is received by the Consultant.
2. The Consultant shall submit, and the City shall review and approve a timeline for submission of plans and/or the completion of any other work required pursuant to this Scope of Services. The Consultant shall use its best efforts to comply with the schedule approved by the City.
3. If any delay is caused to the Consultant by order of the City to change the design or plans; or by failure of the city to designate right-of-way, or to supply or cause to be supplied any data not otherwise available to the Consultant that is required in performing the work described; or by other delays due to causes entirely beyond the control of the Consultant; then, in that event, the time schedules will be adjusted equitably in writing, as mutually agreed between the City and the Consultant at the moment a cause for delay occurs.
4. Since the work of the Consultant must be coordinated with the activities of the City (including firms employed by and governmental agencies and subdivisions working with the City), the Consultant shall advise the City in advance, of all meetings and conferences between the Consultant and any party, governmental agency, political subdivision, or third party which is necessary to the performance of the work of the Consultant.



October 21, 2013

Mr. Ben Croy, PE
City of Novi
Field Services Complex
26300 Delwal Drive
Novi, MI 48375

Reference: 2014 Chip Seal Program Design Services

Dear Mr. Croy,

URS is pleased to submit this proposal for the above referenced project. The following tasks will be completed for the project:

Initial Meeting and Scope Verification

The intent of this task is to meet with the City and verify the limits and scope of work for the project. The need for and location of soil borings and pavement cores will also be discussed and determined at the scope verification meeting.

Upon completion of this task, the URS team will move forward with the surveying and preliminary design.

Survey and Base Plans

The intent of this task is to provide topographic survey and base mapping as needed for the proposed design work. A full topographic survey will be completed for project areas where reconstruction or drainage improvements are needed. Base drawings will be created using available photography for areas where only chip sealing is planned and no drainage issues are evident.

As the necessary survey is completed, URS will prepare base plans (30%-40% complete) to identify the major design features. These plans will also be used to further the utility investigation and resolution of potential conflicts and geotechnical investigations.

Base plans will include the results of the survey information, utility information from response to our solicitations, and a preliminary estimate.

URS will distribute the base plan design set to the utility companies that have indicated that they have facilities in the project area. URS will incorporate the additional information that utility companies provide to URS into the plan set. On-site meetings may be necessary to further clarify coordination and clearance of particular overhead and underground utility facilities.

Preliminary Plans

Incorporating the information obtained from the above tasks, URS will prepare the preliminary plan set (90%) and proposal package. This submission will include items such as the utility locations, typical cross sections, materials/quantities and boring logs. The preliminary plan submittal will also include the Project Manual, including specifications.



Mr. Ben Croy, PE
October 21, 2013

Final Plans and Proposal

Incorporating comments from the City, URS will develop the Final plans and Project Manual.

Advertising

URS will respond to any final comments received from the City and will prepare the advertisement for bids. URS will distribute the contract documents to plan rooms and prospective bidders and answer questions and prepare addenda, as required, during the bidding.

Bid Opening and Award

URS will attend the bid opening, if requested, and analyze the bids received. A tabulation of bids and a letter with recommendations on award of a contract will then be prepared and submitted.

Construction

URS will provide full time inspection, contract administration, staking and materials testing as required for the project.

Schedule

Upon notification to proceed, it is estimated that the following schedule could be maintained:

Task 1 – Scope Verification Meeting	November 15, 2013
Task 2 – Survey & Base Plans Submittal	January 10, 2014
Task 3 – Preliminary Plans Submittal	February 28, 2014
Task 4 – Final Plans Submittal	March 25, 2014
Task 6 – Advertise for Bids	April 3, 2014
Task 7 – Contract Award (By City)	May 11, 2014
Task 8 – Begin Construction	July, 2014
Task 9 – End Construction	August, 2014

Estimated Cost of Construction and Design Fees

We understand that the construction cost is to be \$200,000 and the scope set to meet this cost.

The design fee (using the Engineering Fee Chart) is 8.50% of construction cost.

8.50% x \$200,000 = \$17,000

We understand that the fees for construction services will be determined after a construction contract is awarded.

Please contact our project manager, Sean Kelsch, if you have any questions or wish to discuss this submittal. .

Sincerely

URS Corporation -- Great Lakes

Jan Hauser, PE
Vice President

Sean Kelsch, PE
Manager, Highway Engineering Services

10/16/2013
To: Mayor and City Council members
Background for upcoming engineering award for 2014 chip seal program. Clay

MEMORANDUM



TO: ROB HAYES, P.E.; DIRECTOR OF PUBLIC SERVICES/CITY ENGINEER
FROM: BRIAN COBURN, P.E.; ENGINEERING MANAGER *BTC*
SUBJECT: CHIP SEAL ROAD EVALUATION AND RECOMMENDATIONS
DATE: OCTOBER 14, 2013

There are approximately 6.7 miles of streets in the City of Novi that have a chip sealed surface, representing approximately 4% of the center line miles of roads under Novi's jurisdiction. These roads were gravel surfaced before the chip seal was applied during the time period between 2004 and 2008. Since that time, DPS' Field Operations staff have performed some routine maintenance, but no capital preventative maintenance (CPM) has been completed by the City to keep the chip seal roads in good condition. All of the City's chip sealed roads are classified as local streets on the Act 51 map and are shown on the attached location map.

In keeping with the City's asset management approach to roads, we contracted with URS Corporation to prepare the attached report on chip sealed roads. The report provides an inventory of chip sealed streets, documents existing conditions and deficiencies, provides recommendations for capital maintenance of the roads over the next four years, and provides recommendations and a budget for ongoing maintenance. In general, the chip seal has performed well where adequate drainage exists. The report provides recommendations to improve discrete locations with poor drainage, but generally recommends an additional chip seal treatment in most other areas. This report will serve as a guide to assist staff with budget requests and maintenance activities over the next several years.

In anticipation of this report and the deferred capital maintenance on chip sealed roads, the approved FY2013-14 budget for annual local street CPM was increased from \$50,000 to \$200,000 to include some chip seal improvements. The findings of the report show that a funding level of approximately \$200,000 each year specifically for chip seal capital maintenance should be maintained through the FY2016-17 budget to make the necessary improvements to chip sealed roads to get them back into good condition. The report recommends an annual budget of \$90,000 beginning in FY2017-18 for preventative maintenance, which includes crack sealing and patching in addition to reapplication of chip seal as needed to maintain the good condition of the road.

In addition to the existing chip sealed roads, the consultant was also asked to review three gravel road segments as candidates for chip seal: Dixon Road, 12-1/2 Mile Road, and Sixth Gate. Dixon Road and 12-1/2 Mile Roads were chip sealed around 2007. In 2012, the condition of the chip seal was no longer serviceable and the road was pulverized back to gravel. Sixth Gate was previously chip sealed, but is in very poor condition due to evident drainage problems that were noted in the report. The report included a review of these segments as possible candidates for chip seal, but recommends reconstruction as a paved road in the long term. Our past experience has shown that the poor drainage for these roads has contributed to the premature deterioration of the previously installed chip seal surface. A reconstructed paved roadway would have drainage improvements, including edge drain

and storm sewer, to extend the life of the roadway. The report suggests that a double application of chip seal could be applied as a short term solution for Dixon and 12-1/2 Mile, but would likely deteriorate again within a few years. Staff recommends that if a chip seal treatment is considered for Dixon or 12-1/2 Mile that it occur after the construction of Liberty Park is complete to limit the occurrence of heavier loads and prolong the life of the treatment.

The table on the next page summarizes the report's recommended schedule for making improvements to the chip sealed roads over the next four construction seasons beginning in 2014. The ranking was based on the consultant's observations, PASER ratings, resident complaints received by staff, and location (to complete all streets in a neighborhood in the same construction season). The proposed work for 2014 exceeds the current budget, but we will structure the bidding to include alternates so that decisions can be made later based on actual bid prices.

We will prepare the engineering design award for consideration by City Council at an upcoming meeting so the work can be bid this spring for late spring/early summer construction.

cc: Matt Wiktorowski, Field Operations Senior Manager
Ben Croy, P.E.; Civil Engineer

**Summary of Chip Seal Road Recommendations
4-year Schedule and Construction Cost Estimates**

2014 Construction Year (FY13-14)

Street Name	2013 PASER Rating	Cost Estimate
Buffington	5	\$13,000
Henning	3	\$13,700
Pembine	4	\$4,800
Summit Ct (overlay)	1	\$42,500
Summit Dr	3	\$60,000
Crown	4	\$12,200
Pleasant Cove Dr	4	\$30,800
Shamrock Hill	1	\$9,100
Shawood Drive	5	\$26,600
2014 Total Construction Cost Estimate		\$212,700

2015 Construction Year (FY14-15)

Street Name	2013 PASER Rating	Cost Estimate
Chapman	3	\$11,300
Endwell	2	\$11,900
Herman	4	\$4,400
Lashbrook	6	\$4,300
Monticello	2	\$8,100
Paramount	6	\$82,600
Parklow	5	\$4,100
Bernstadt	4	\$44,500
Eubank	5	\$13,500
Lemay	2	\$12,100
Maudlin	4	\$6,800
Owenton	5	\$6,200
2015 Total Construction Cost Estimate		\$209,800

2016 Construction Year (FY15-16)

Street Name	2013 PASER Rating	Cost Estimate
Penhill	6	\$13,800
Pickford	3	\$27,800
South Lake Ct	3	\$12,700
West Lake Dr	3	\$16,300
Garfield Rd	2	\$29,800
11 Mile Rd	4	\$8,400
Taft Rd	3	\$33,000
Austin	2	\$25,400
Charlotte	5	\$4,500
Duana	4	\$5,600
Elm Ct	2	\$5,000
2016 Total Construction Cost Estimate		\$182,300

2017 Construction Year (FY16-17)

Street Name	2013 PASER Rating	Cost Estimate
Burton Dr	5	\$19,100
Faywood	3	\$30,000
Lebenta	2	\$3,800
West Lake Dr	2	\$3,400
Amis	7	\$4,000
North Haven Dr	7	\$11,500
Rexton	7	\$7,600
Brenda Ln	4	\$4,600
Joseph Dr	4	\$16,400
Flint St	6	\$24,100
Delmont	3	\$18,200
Dinser	4	\$58,700
2017 Total Construction Cost Estimate		\$201,400

Other Report Recommendations for Gravel Roads

Gravel Road	Short Term Recommendations		Long Term Recommendations	
12-1/2 Mile Rd	Chip Seal*	\$46,900.00	Reconstruct as Paved Road	\$812,900
Dixon Rd	Chip Seal*	\$42,600.00	Reconstruct as Paved Road	\$746,700
Sixth Gate	n/a	n/a	Reconstruct as Paved Road	\$79,300

*Chip seal would have a limited life of only a few years

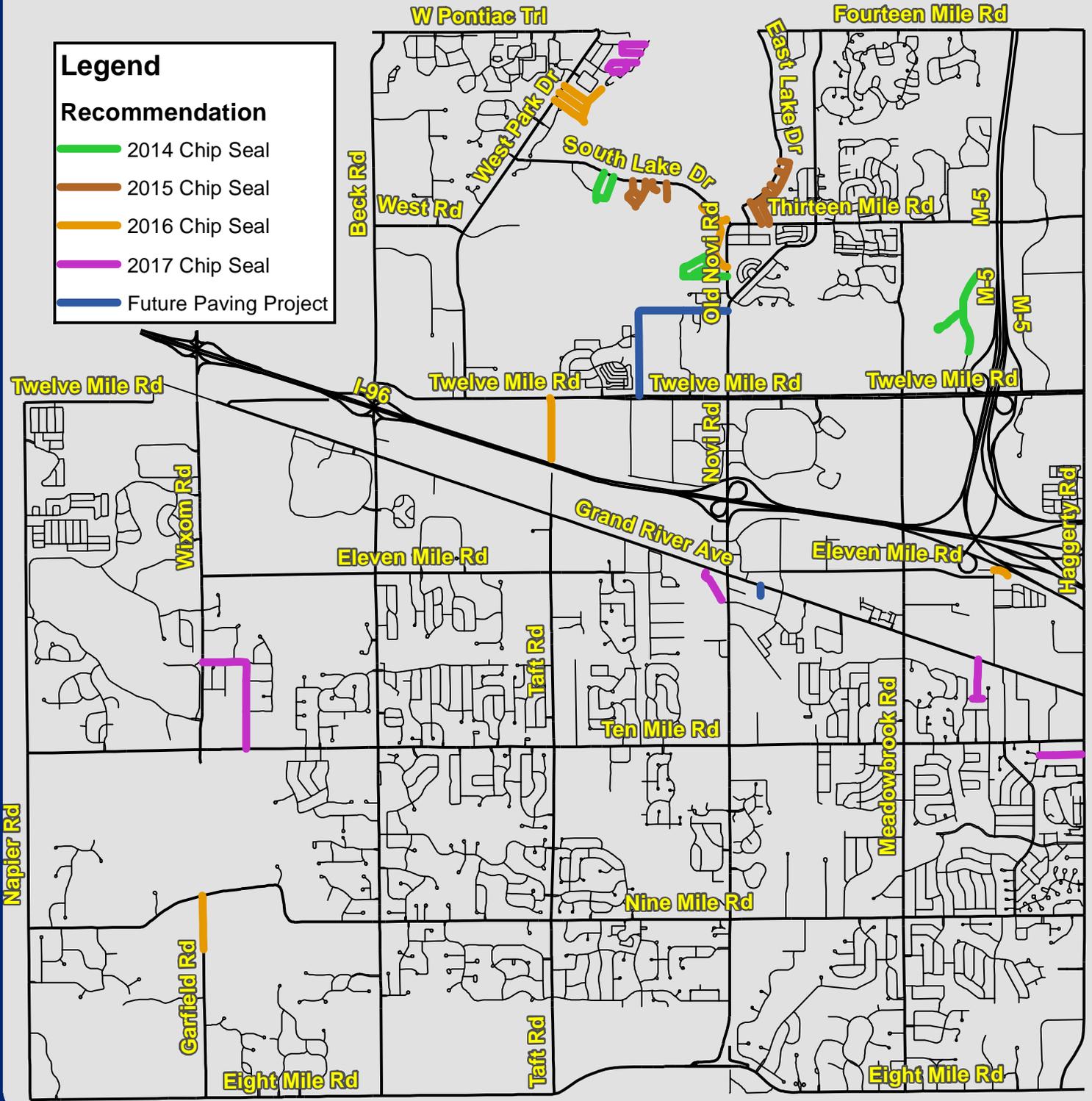
Chip Seal Recommendations

Location Map

Legend

Recommendation

- █ 2014 Chip Seal
- █ 2015 Chip Seal
- █ 2016 Chip Seal
- █ 2017 Chip Seal
- █ Future Paving Project



Map Author: Coburn
 Date: 10/15/13
 Project: 2013 Chip Seal
 Version #: v2.0

MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.



1 inch = 4,255 feet



City of Novi
 Engineering Division
 Department of Public Services
 26300 Lee BeGole Drive
 Novi, MI 48375
cityofnovi.org

SCOPING REPORT

CHIP SEAL STREET EVALUATION

CITY OF NOVI
OAKLAND COUNTY, MICHIGAN

URS Project Number 12943934

Prepared For:

CITY OF NOVI ENGINEERING DEPARTMENT

Prepared By:

URS

GRAND RAPIDS – SOUTHFIELD – TRAVERSE CITY

October 7, 2013

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Section 1 Summary and Recommendations

1.1 Summary

The City of Novi is developing a chip seal program. 47 different roadway segments were identified by the City of Novi Engineering Department as candidates for the program. URS has performed a field inspection/review of each segment of roadway to determine specific needs and provide recommendations for each roadway.

1.2 Recommendations

A chip seal can preserve the condition of a good road for several more years. A chip seal does not fix problems in the pavement like potholes or large cracks, and it does not fix subgrade problems.

Most of the roads in this project are in good condition with potholes or failed pavements in spot locations. These roads are currently good candidates for a chip seal. For these roads, we recommend the following process:

1. Reconstruct pavement at potholes and other failed sections with new asphalt pavement and aggregate base (where needed).
2. Improve drainage where there is evidence that the existing drainage is inadequate and has contributed to pavement failures. Add edge drains in these areas where feasible.
3. Repair remaining cracks and clean the pavement.
4. Apply the chip seal.
5. Spray on a fog seal. The fog seal covers the surface of the chip seal aggregate with a thin layer of asphalt that helps hold the aggregate in place and provides an attractive finish.

Most of the roadways have been previously chip sealed and the chip seals are approaching the end of their life. Therefore, we recommend constructing a chip seal on most of the roads in 2014 and 2015. Delaying longer may result in the roadways needing a more expensive treatment than a chip seal. **Table 1** displays the roadways, recommended improvement, year of improvement, and the cost of that improvement. Cost are shown in 2014 dollars in the estimates in the appendix and in the writeup for each road section. **Table** includes a 3% per year inflation factor for 2015-2017, so cost estimates in the table will be greater than those found in the following sections.

More extensive work may be appropriate for some roadways. Recommendations and estimates for these improvements are summarized in **Table 2**.

Use of a Cape Seal in lieu of a chip seal was investigated for some roadways. A Cape Seal includes placing a layer of Fiberbat on the existing pavement followed by Microsurfacing. The Fiberbat layer includes polymer modified asphalt emulsion, chopped fiberglass strands and fine crushed aggregate. The Fiberbat provides many of the same benefits as a geotextile interlayer fabric. The microsurfacing layer is approximately 0.25 inches thick and consists of specially blended aggregate and asphalt emulsion.

The Cape Seal has a longer service life than a chip seal. Because specialized equipment would need to be mobilized and likely only one contractor will be able to bid the work, the cost for a Cape Seal would be substantially higher than with a chip seal, particularly if only a small amount is done. Several area contractors have the capability to do chip seals and competition in bidding would likely be better than with the Cape Seal process. For this reason, standard chip seals are proposed for this program.

TABLE 1: CHIP SEAL PROJECT SUMMARY

Roadway Name	Recommended Improvement	Construction Year/Estimated Cost			
		2014	2015	2016	2017
2.0 Bloomfield Subdivision and Bentley Subdivision					
2.1 Pickford St	Chip seal			\$ 13,800	
2.2 South Lake Ct	Chip seal			\$ 27,800	
2.3 Penhill St	Chip seal			\$ 12,700	
2.4 West Lake Dr	Chip seal			\$ 16,300	
3.0 CENAQUA SHORES SUBDIVISION, CHAPMANS WALLED LAKE SUBDIVISION, AND CZENKUSCH'S ADDITION					
3.1 Chapman Dr	Chip seal		\$ 11,300		
3.2 Endwell St	Chip seal		\$ 11,900		
3.3 Herman St	Chip seal		\$ 4,400		
3.4 Lashbrook St	Chip seal		\$ 4,300		
3.5 Monticello St	Chip seal		\$ 8,100		
3.6 Paramount Ave	Chip seal & Partial Reconst.		\$ 82,600		
3.7 Parklow St	Chip seal		\$ 4,100		
4.0 Delmont and Dinser Drives					
4.1 Delmont Dr	Chip seal				\$ 18,200
4.2 Dinser Dr	Chip Seal				\$ 58,700
5.0 Dixon and Twelve 1/2 Mile Roads					
5.1 Dixon Rd	Double Chipseal	\$ 42,600			
5.2 Twelve 1/2 Mile Rd	Double Chipseal	\$ 46,900			
6.0 Greys Subdivision					
6.1 Burton Dr	Chip seal				\$19,100
7.0 Idlemere Park					
7.1 Bernstadt St	Chip seal & Partial Reconst		\$ 44,500		
7.2 Eubank St	Chip seal		\$ 13,500		
7.3 Maudlin St	Chip seal		\$ 12,100		
7.4 Lemay St	Chip seal		\$ 6,800		
7.5 Owenton St	Chip seal		\$ 6,200		
8.0 Garfield Rd	Chip Seal			\$29,800	
9.0 JW Hawthorne's Sub #2					
9.1 Faywood St	HMA Overlay – see next table				
9.2 Lebenta St	Chip seal				\$ 3,800
9.3 West Lake Dr	Chip seal				\$ 3,400
10.0 Lakewall Subdivision					
10.1 Amis Ave	Chip seal				\$ 4,000
10.2 North Haven Dr	Chip seal				\$ 11,500
10.3 Rexton St	Chip seal				\$ 7,600
11.0 Lakewoods Subdivision					
11.1 Buffington Dr	Chip seal	\$13,000			
11.2 Henning Dr	Chip seal	\$13,700			
11.3 Pembine St	Chip seal	\$4,800			

Roadway Name	Recommended Improvement	Construction Year/Estimated Cost			
		2014	2015	2016	2017
12.0 Leslie Park Subdivision					
12.1 Brenda Ln	Chip seal				\$4,600
12.2 Joseph Dr	Chip seal				\$16,400
13.0 Novi Manor					
13.1 Sixth Gate Dr	Reconstruct – see next table				
14.0 Railroad Subdivision					
14.1 Flint St	Chip seal				\$24,100
15.0 Seeleys Golden Acres					
15.1 Eleven Mile Rd	Chip seal			\$ 8,400	
16.0 Shawood Walled Lake Heights, Pratt's Subdivision and Walled Lake Shores					
16.1 Austin Dr	Chip seal			\$ 25,400	
16.2 Charlotte St	Chip seal			\$ 4,500	
16.3 Crown Dr	Chip seal	\$ 12,200			
16.4 Duana Ave	Chip seal			\$ 5,600	
16.5 Elm Ct	Chip seal			\$ 5,000	
16.6 Pleasant Cove Dr	Chip seal	\$ 30,800			
16.7 Shamrock HI	Chip seal	\$ 9,100			
16.8 Shawood Dr	Chip seal	\$ 26,600			
17.0 Summit Hills, Spring Valley and Wildwood Hills					
17.1 Summit Dr	Chip seal	\$ 42,500			
17.2 Summit Ct	HMA Overlay – see next table				
18.0 Taft Road	Chip seal			\$ 33,000	
Total Escalated Yearly Cost		\$ 242,200	\$ 209,800	\$ 182,300	\$ 171,400
Total Yearly Cost in 2014 Dollars	All years \$ 774,800	\$ 242,200	\$ 203,700	\$ 171,900	\$ 157,000
Estimates are rounded					

TABLE 2: LONG TERM IMPROVEMENTS

Roadway Name	Recommended Improvement	Estimated Cost
5.0 Dixon and Twelve 1/2 Mile Roads		
5.1 Dixon Rd	Reconstruct	\$746,700
5.2 Twelve ½ Mile Rd	Reconstruct	\$812,900
9.0 JW Hawthorne's Sub #2		
9.1 Faywood St	HMA Overlay	\$30,000
13.0 Novi Manor		
13.1 Sixth Gate Dr	Reconstruct	\$79,300
17.0 Summit Hills, Spring Valley and Wildwood Hills		
17.2 Summit Ct.	HMA Overlay	60,000
Long Term Improvement Estimates are rounded and are in 2014 dollars		

1.2 Maintenance Schedule

Table 1 shows improvements recommended for the years 2014 through 2017. This work is needed to restore the roadways studied to good condition.

For future planning, beyond, 2018, a budget figure for an annual chip seal program needs to be developed. In order to do this, the roadways that should be included in the chip seal program need to be determined. All of the subject roadways appear to be candidates for this program, excepting for:

- Dixon Road
- 12 ½ Mile Road
- Sixth Gate Drive

Chip sealing could be expanded to cover all of the asphalt roadways in the City; however, this is not recommended. Neighborhoods that have roadways that have never been chip sealed would likely not be satisfied with the appearance, roughness, and loose gravel inherent in the chip seal process. For neighborhoods which are currently chip sealed, doing additional chip seals would not be viewed as lowering the quality of the roadway.

The total cost for the work needed to restore the studied roadways to good condition is \$774,800, as shown in Table 1. This figure includes base repair/reconstruction and drainage improvements totaling approximately \$90,000 for Paramount Road, Bernstadt Street, and Shawood Drive. This work should not need to be repeated in future years. The cost for the chip sealing work excluding this reconstruction and drainage improvement work is approximately \$700,000

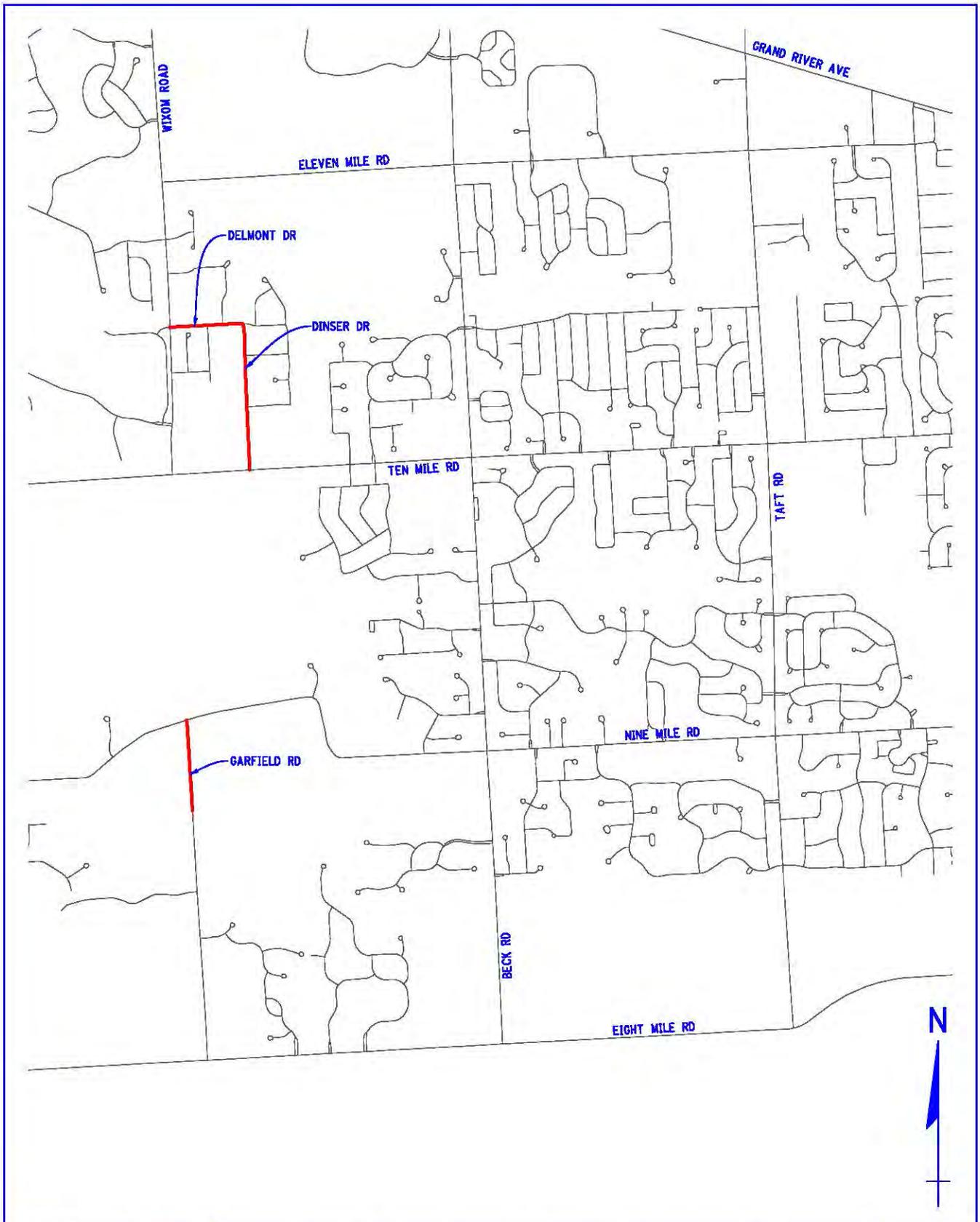
If 12 ½ Mile Road and Dixon Road are reconstructed with curb and gutter in the future, then they may not be good candidates for including in the Chip Seal program. The chip seal work on these roadways *and* included in Table 1 is \$89,500. The cost of improvements in Table 1 excluding the one-time base/drainage improvements and the one-time double chip seal work on Dixon and 12 ½ Mile Road comes to approximately \$610,000.

Other roadways not evaluated as part of this study, but which have previously been chip sealed also may be candidates for including into the chip seal program. If 10% is added to cover additional roadways, then total cost to chip seal all of the roadways in the program once would be perhaps \$700,000 (in 2014 dollars).

The design life of a chip seal is typically 4 to 6 years, but varies significantly depending upon the traffic volumes, truck volumes, and underlying soil/roadway conditions. The roadways evaluated for this project are in much better condition than what would be expected given the dates that the last chip seals were performed. This likely is due to the low traffic volumes and favorable underlying roadway conditions. 8 years between chip seals appears to be reasonable for keeping these roadways in good condition.

Using a cost for one cycle of \$700,000 and an 8 year cycle, an average annual budget of \$90,000 per year (in current dollars) should be adequate to establish a chip seal program once the initial improvements are completed. Each of the roadways included in the program should be evaluated at least once every two years. To maximize design life, crack sealing and patching should be done between chip seals.

To increase efficiency, large contracts with a large amount of chip sealing and/or crack sealing/patching should be used. To ensure this is done, a small contract with just crack sealing and patching could be done on odd numbered years (approximately \$10,000), and a larger contract with crack sealing and chip sealing (approximately \$170,000) done on even numbered years.



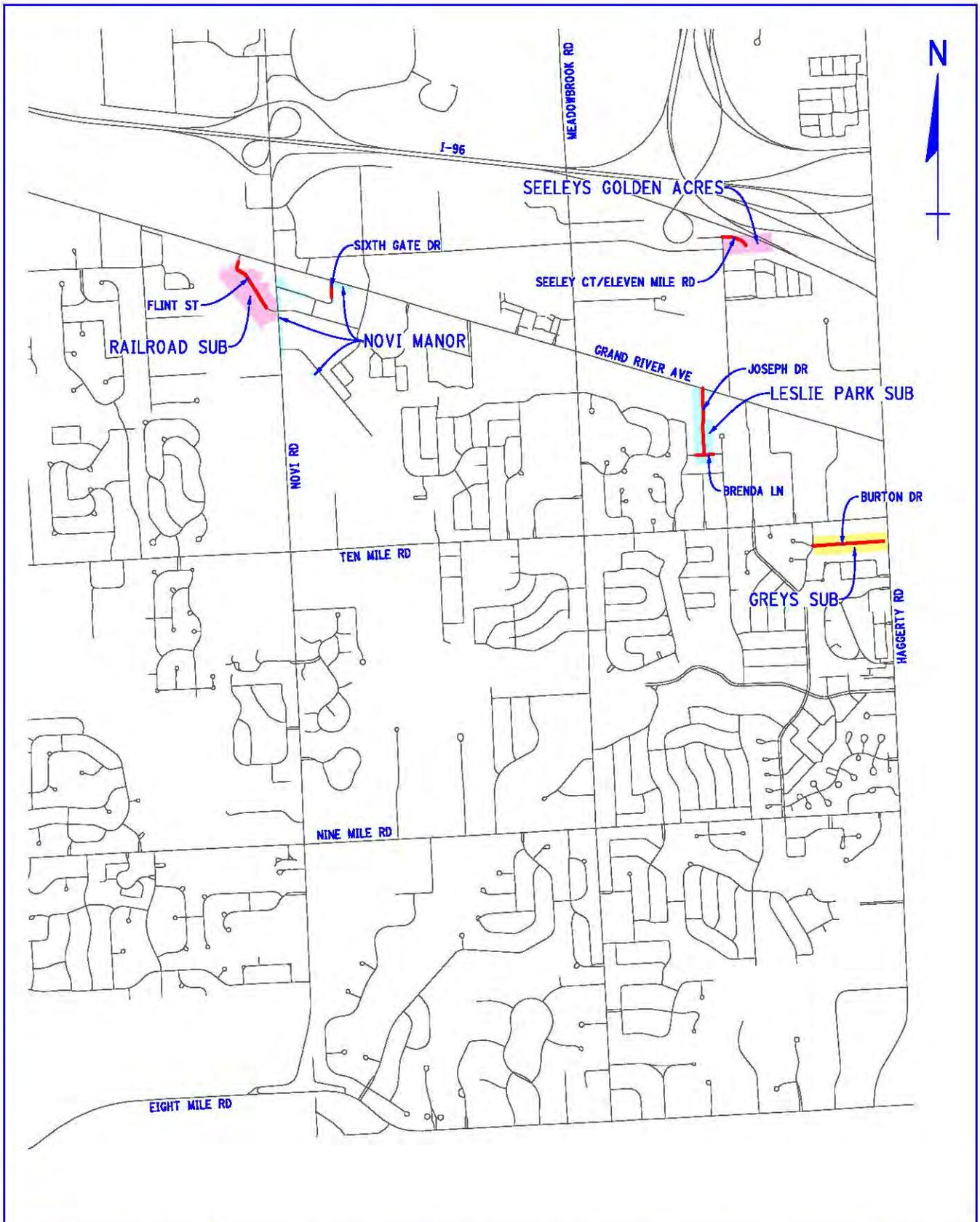
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CITY OF NOVI - 2013 CHIP SEAL STREET EVALUATION

SOUTHWEST LOCATION MAP

FIGURE

1



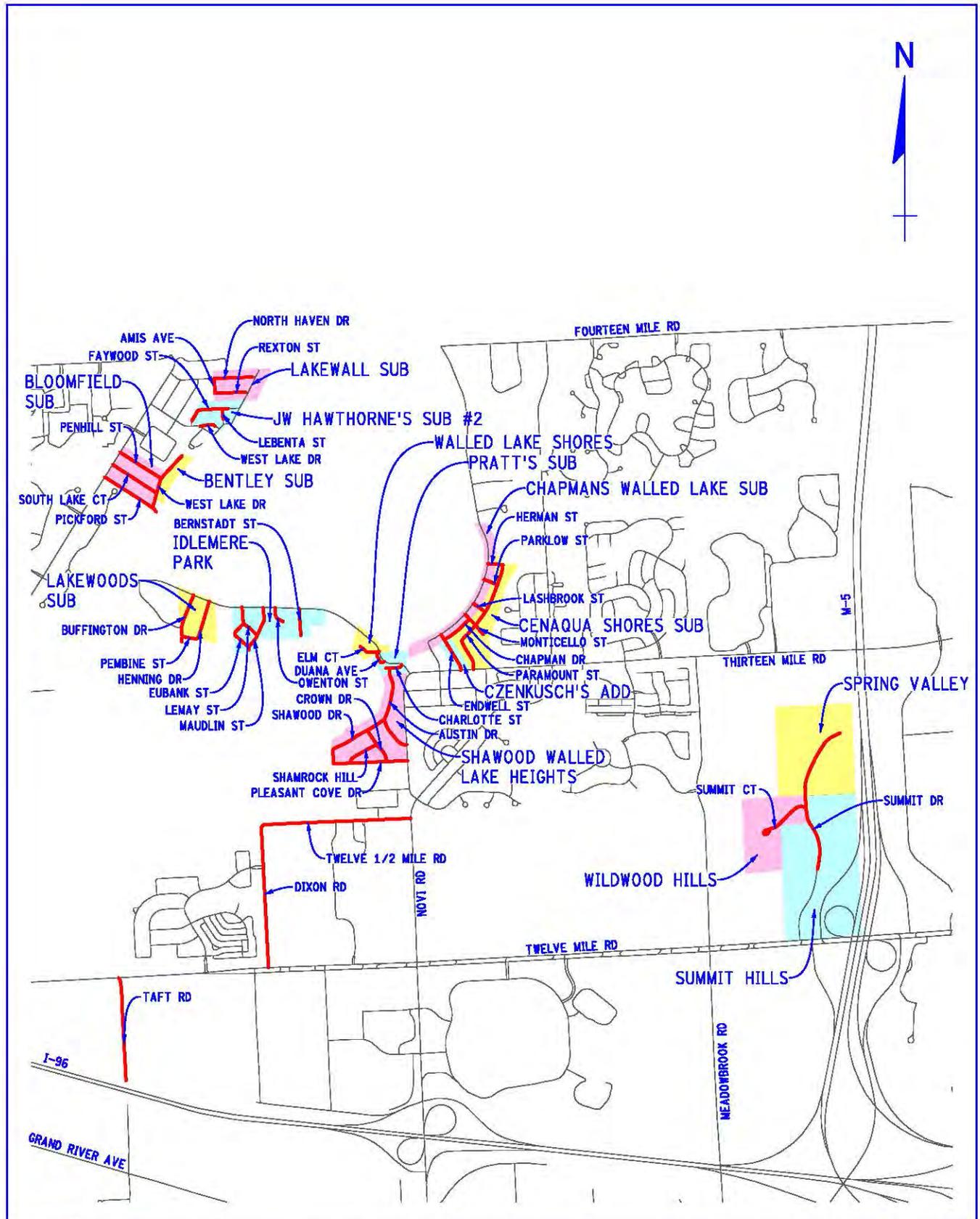
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CITY OF NOVI - 2013 CHIP SEAL STREET EVALUATION

SOUTHEAST LOCATION MAP

FIGURE

2



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CITY OF NOVI - 2013 CHIP SEAL STREET EVALUATION

NORTHEAST LOCATION MAP

FIGURE

3

Section 2 Bloomfield Subdivision

This section includes roadways in Bloomfield Subdivision and Bentley Subdivision. These roadways are typically 20-foot wide with no curb and gutter and grass shoulders. Original construction of the roadways was completed by chipsealing over gravel roads. They do not have street trees or sidewalks. The right-of-way for these roads varies from 28.6 feet to 66 feet.

There are four roads in these subdivisions, and all were reviewed: Pickford Street, Penhill Street, South Lake Court, and West Lake Drive. These roads were previously chip sealed in 2005-2006.

The roads in Bloomfield Subdivision and Bentley Subdivision are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

2.1 Pickford Street

Pickford Street was studied from West Park Drive to West Lake Drive. Pickford Street is about 950 feet long and 20 feet wide. It has a right-of-way of 40 feet.

Pickford Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$13,000.



2.2 Penhill Street

Penhill Street was studied from West Park Drive to West Lake Drive. Penhill Street is about 875 feet long and 20 feet wide. It has a right-of-way of 40 feet.

Penhill Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$12,000.



2.3 South Lake Court

South Lake Court was studied from West Park Drive to its end, just east of West Lake Drive. South Lake Court is about 1130 feet long and 22 feet wide. It has a right-of-way of 66 feet.

South Lake Court was previously chip sealed in 2005-2006. It is in fair condition with some potholes and several spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$26,200.



2.4 West Lake Drive

West Lake Drive was studied from South Lake Court to its end. West Lake Drive is about 1130 feet long and 20 feet wide. Its right-of-way varies from 28.6 to 30.1 feet.

West Lake Drive was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement. At the time of the field review, the segment north of Penhill Street was ice and snow covered, but appeared to be similar to the rest of West Lake Drive.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$15,400.



Section 3 Cenaqua Shores Subdivision

This section includes roadways in Cenaqua Shores Subdivision, Chapmans Walled Lake Subdivision, and Czenkusch's Addition. These roadways are typically 20-foot wide with no curb and gutter and grass shoulders. Original construction of the roadways was completed by chipsealing over gravel roads. They do not have street trees or sidewalks. The right-of-way for these roads varies from 28 feet to 52 feet.

There are eight roads in these subdivisions, and seven were reviewed: Chapman Drive, Endwell Street, Herman Street, Lashbrook Street, Monticello Street, Paramount Avenue, Parklow Street. East Lake Drive was not included.

These roads were previously chip sealed in 2004-2006.

The roads in Cenaqua Shores Subdivision, Chapmans Walled Lake Subdivision, and Czenkusch's Addition are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed. We recommend additional repairs at a low point on Paramount Avenue.

3.1 Chapman Drive

Chapman Drive was studied from Endwell Street to Monticello Street. Chapman Drive is about 590 feet long. It has a right-of-way of 30 feet.

Chapman Drive was previously chip sealed in 2004-2005. It is in fair condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$11,000.



3.2 Endwell Street

Endwell Street was studied from Thirteen Mile Road to East Lake Drive. Endwell Street is about 754 feet long. It has a right-of-way of 30 feet.

Endwell Street was previously chip sealed in 2004-2005. It is in fair condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$11,600.



3.3 Herman Street

Herman Street was studied from East Lake Drive to Paramount Avenue. Herman Street is about 280 feet long. Its right-of-way varies from 30 feet to 52 feet.

Herman Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,300.



3.4 Lashbrook Street

Lashbrook Street was studied from East Lake Drive to Paramount Avenue. Lashbrook Street is about 270 feet long. Its right-of-way varies from 30 feet to 52 feet.

Lashbrook Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,200.



3.5 Monticello Street

Monticello Street was studied from East Lake Drive to its end. Monticello Street is about 504 feet long. Its right-of-way varies from 28 feet to 52 feet.

Monticello Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$7,900.



3.6 Paramount Avenue

Paramount Avenue was studied from Thirteen Mile Road to Herman Street. Paramount Avenue is about 2155 feet long. It has a right-of-way of 50 feet.

Paramount Avenue was previously chip sealed in 2005-2006. Most of it is in good condition with a few potholes and spot locations with poor pavement. It has some drainage problems at the curve. There are existing catch basins just north of the curve, but there is a low point just south of it that has no outlet. There was significant ponding on the road, and the pavement in this area is in poor condition. The segment between Thirteen Mile Road and the curve is also in relatively poor condition.

We recommend:

- Chip seal with full depth pavement and crack repairs as needed.
- Mill the existing chipseal-pavement & place HMA overlay overlay for the segment south of the curve (about 275 feet)
- Full reconstruction of the curve area with the addition of two new catch basins at the existing low point and storm sewer to connect them to the existing catch basins (about 200 feet). Edge drains should also be placed in this area.

The estimated cost for the recommended improvements is \$80,200.



3.7 Parklow Street

Parklow Street was studied from East Lake Drive to Paramount Avenue. Parklow Street is about 260 feet long. Its right-of-way varies from 30 feet to 49 feet.

Parklow Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,000.



Section 4 Delmont Drive and Dinser Drive

This section includes Delmont Drive and Dinser Drive. They are not within platted subdivisions.

These roads were previously chip sealed in 2004-2005.

The roads are in fair to good condition. There are some potholes and spot locations with poor pavement.

4.1 Delmont Drive

Delmont Drive was studied from 180 feet east of Wixom Road to Dinser Drive. This segment of Delmont Drive is about 1120 feet long. The roadway is 22-foot wide with no curb and gutter, grass shoulders, and ditches on both sides. It does not have street trees. There is sidewalk along most of the southern side of the street. Its right-of-way varies from 66 feet to 103 feet.

Delmont Drive was previously chip sealed in 2004-2005. It is in generally good condition with a few potholes and spot locations with poor pavement. There is evidence of both recent and older patching.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$16,700.



4.2 Dinser Drive

Dinser Drive was studied from Ten Mile Road to Delmont Drive. Dinser Drive is about 2640 feet long. The roadway is 22-foot wide with no curb and gutter, grass shoulders, and ditches on both sides. It does not have street trees. There is sidewalk along most of the eastern side of the street. Its right-of-way varies from 66 feet to 76 feet.

Dinser Drive was previously chip sealed in 2004-2005. It is in fair to good condition, but has many potholes and locations with poor pavement. There is evidence of both recent and older patches along the roadway. It appears to have a stable subgrade, and is therefore in need of surface improvements, not complete reconstruction.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$53,700.



Section 5 Dixon Road and Twelve ½ Mile Road

This section includes Dixon Road and Twelve ½ Mile Road. They are not within platted subdivisions.

These roads were previously chip sealed in 2006-2007. Both roads are approximately 20-foot wide gravel with no curb and gutter and grass shoulders. They are currently in fair condition, to good condition. Conditions may vary with the weather. Some or all of Twelve ½ Mile Road is a natural beauty road.

There are new developments in various stages of construction with access to these roads. In addition, the south edge of Lakeshore Park is adjacent to Dixon Road and Twelve ½ Mile Road.

Since the new developments will likely result in a substantial increase in traffic on both roads, the City should consider complete reconstruction for both of them as asphalt roads with curb and gutter and storm sewer once the developments are completed. The use of curb and gutter and storm sewer will minimize the impact of construction on the adjacent landscape.

A double chip seal could provide a short-term improvement for both roads and reduce maintenance requirements until complete reconstruction is done. This would involve re-grading the existing aggregate and then applying two chip seal layers, resulting in a thin asphalt pavement. A double chip seal would likely deteriorate within a couple years, but would provide a better driving surface during that time.

5.1 Dixon Road

Dixon Road was studied from Twelve Mile Road to Twelve ½ Mile Road. Dixon Road is about 2500 feet long. The roadway is approximately 20-foot wide gravel with no curb and gutter. It does not have street trees or sidewalk. Its right-of-way varies from 66 feet to 76 feet.

Dixon Road was previously chip sealed in 2006-2007, however, the surface is now gravel and there is no evidence of the previous chip seal. The roadway was frozen solid and appeared to be quite smooth during our initial review. On January 29, 2013 heavy rains and warm weather partially thawed the road and numerous ruts and potholes were evident on that day. On May 29, 2013 the roadway had been recently re-graded and was in relatively good condition.

Since the new developments will likely result in a substantial increase in traffic on Dixon Road, we recommend a complete reconstruction as a 24-foot wide asphalt road with curb and gutter and storm sewer. The southern portion of Dixon Road currently has ditches, but the northern portion does not, and trees grow very close to it. The use of curb and gutter and storm sewer will minimize the impact of construction on the adjacent landscape. The estimated cost for the reconstruction of Dixon Road is \$746,700.

A double chip seal could provide a short-term improvement for Dixon Road and is recommended. It would involve re-grading the existing aggregate and then applying two chip seal layers, resulting in a thin asphalt pavement. A double chip seal would likely deteriorate in a couple years, but would provide a better driving surface during that time. The estimated cost for a double chip seal of Dixon Road is \$42,600.



5.2 Twelve ½ Mile Road

Twelve ½ Mile Road was studied from Dixon Road to Novi Road. Twelve ½ Mile Road is about 2750 feet long. The roadway is approximately 20-foot wide gravel with no curb and gutter. It does not have street trees. There is sidewalk along some of the southern side of the street. Its right-of-way varies from 66 to 76 feet.

Twelve ½ Mile Road was previously chip sealed in 2006-2007; however the chip seal has deteriorated and it is now a gravel roadway. The roadway was frozen solid and appeared to be quite smooth during our initial review. On January 29, 2013 heavy rains and warm weather partially thawed the road and numerous ruts and potholes were evident on that day. On May 29, 2013, the roadway had been recently re-graded and was in relatively good condition. .

Some or all of Twelve ½ Mile Road is a natural beauty road. There are developments planned or under construction along the south side of Twelve ½ Mile Road. There is existing sidewalk adjacent to these developments.

Since the new developments will result in a substantial increase in traffic on Twelve ½ Mile Road, we recommend a complete reconstruction as a 24-foot wide asphalt road with curb and gutter and storm sewer. The use of curb and gutter and storm sewer will minimize the impact of construction on the adjacent landscape. The estimated cost for the recommended improvements is \$812,900.

A double chip seal could provide a short-term improvement for Twelve ½ Mile Road. It would involve re-grading the existing aggregate and then applying two chip seal layers, resulting in a thin asphalt pavement. A double chip seal would likely deteriorate in a couple years, but would provide a better driving surface during that time. The estimated cost for a double chip seal of Twelve ½ Mile Road is \$46,900.



Section 6 Greys Subdivision

Greys Subdivision has just one road: Burton Drive.

6.1 Burton Drive

Burton Drive was studied from Nilan Drive to its end, just west of Haggerty Road. Burton Drive is about 1275 feet long. The roadway is 20-foot wide asphalt pavement with no curb and gutter and grass shoulders. Original construction appears to have consisted of chipsealing over gravel. It does not have street trees or sidewalk. It has a right-of-way of 60 feet.

Previous chip seal information on Burton Drive was not available. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$17,500.



Section 7 Idlemere Park

The roadways in Idlemere Park are typically 20-foot wide with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads is 30 feet. Original construction appears to have consisted of chip sealing over gravel.

There are five roads in this subdivision, and all were reviewed: Bernstadt Street, Eubank Street, Maudlin Street, Lemay Street, and Owenton Street.

These roads were previously chip sealed in 2005-2006.

The roads in Idlemere Park are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed. We recommend additional repairs at a low point on Bernstadt Street.

7.1 Bernstadt Street

Bernstadt Street was studied from its end to South Lake Drive. Bernstadt Street is about 490 feet long. It has a right-of-way of 30 feet.

Bernstadt Street was previously chip sealed in 2005-2006. Most of it is in good condition with a few potholes and spot locations with poor pavement. About 120 feet south of South Lake Drive, there is a small low point with no outlet and very poor pavement.

We recommend:

- Chip seal the entire length of the roadway, with full depth pavement and crack repairs as needed
- Full reconstruction of approximately the northern 170 feet with asphalt and aggregate base to eliminate the low point prior to placing the chipseal. Drainage improvements and the addition of edge drains also should be completed in this area.

The estimated cost for the recommended improvements is \$43,200.



7.2 Eubank Street

Eubank Street was studied from Maudlin Street to South Lake Drive. Eubank Street is about 875 feet long. It has a right-of-way of 30 feet.

Eubank Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$13,100.



7.3 Maudlin Street

Maudlin Street was studied from Eubank Street to South Lake Drive. Maudlin Street is about 785 feet long. It has a right-of-way of 30 feet.

Maudlin Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$11,700.



7.4 Lemay Street

Lemay Street was studied from Eubank Street to Maudlin Street. Lemay Street is about 330 feet long. It has a right-of-way of 30 feet.

Lemay Street was previously chip sealed in 2005-2006. It is generally in good condition, but has some potholes and several spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$6,600.



7.5 Owenton Street

Owenton Street was studied from South Lake Drive to its end. Owenton Street is about 320 feet long. It has a right-of-way of 30 feet.

Owenton Street was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$6,000.



Section 8 Garfield Road

Garfield Road is not within a development.

Garfield Road was studied from the end of a previous project north to Nine Mile Road. This segment of Garfield Road is about 1630 feet long. The roadway is 20-foot wide asphalt pavement with no curb and gutter, grass shoulders, and ditches on both sides for most of its length. It does not have street trees. Its right-of-way is 66 feet. Original construction appears to have been HMA pavement for a portion of the roadway and chip seal over gravel for the remainder.

Garfield Road was previously chip sealed in 2007-2008. The pavement surface is in fair condition with a number of potholes and spot locations with poor pavement. There is evidence of both recent and older patching along the roadway.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$28,100.



Section 9 JW Hawthorne's Sub #2

The roadways in JW Hawthorne's Sub #2 vary from 12 feet to 18 feet wide, with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads varies from 15 feet to 43 feet. Original construction appears to have been done by chip sealing over gravel.

There are three roads in these subdivisions, and portions of each were reviewed: Faywood Street, Lebenta Street, and West Lake Drive.

These roads were previously chip sealed in 2004-2006.

The roads in JW Hawthorne's Sub #2 are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for Lebenta Street and West Lake Drive, with full depth pavement and crack repairs as needed. We recommend a mill & overlay for Faywood Street, with full depth pavement and crack repairs as needed.

9.1 Faywood Street

Faywood Street was studied from north of Ludlow Street to west of West Lake Drive. This segment of Faywood Street is about 760 feet long and 18 feet wide. It has a right-of-way of 40 feet.

Faywood Street was previously chip sealed in 2005-2006. It is in fair to poor condition with a number of potholes and spot locations with poor pavement.

We recommend an HMA overlay, with full depth pavement and crack repairs as needed. Areas in poor shape would be removed entirely and replaced with new asphalt. Aggregate base would be removed and replaced in spot locations as required. A fabric interlayer is placed on the existing surface after the repairs are made and then a 2 inch overlay installed. Cold milling is not required, as there is no curb and gutter on this section of roadway. The estimated cost for these recommended long term improvements, as shown in Table 2, is \$30,800.



9.2 Lebenta Street

Lebenta Street was studied from West Lake Drive to Faywood Street. Lebenta Street is about 280 feet long and 14 feet wide. Its right-of-way varies from 32 feet to 43 feet.

Lebenta Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$3,500.



9.3 West Lake Drive

West Lake Drive was studied from north of Ludlow Street to west of a three leg intersection with another West Lake Drive. This segment of West Lake Drive is about 250 feet long and 12 feet wide. Its right-of-way varies from 15 feet to 26 feet.

Information on previous chip seals of West Lake Drive was not available. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$3,100.



Section 10 Lakewall Subdivision

The roadways in Lakewall Subdivision vary from 16 feet to 18 feet wide. They have asphalt pavement with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads is 40 feet. Original construction appears to have been done by chip sealing over gravel.

There are four roads in this subdivision, and three were reviewed: Amis Avenue, North Haven Drive, and Rexton Street. West Lake Drive was not reviewed.

These roads were previously chip sealed in 2004-2006.

The roads in Lakewall Subdivision are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

10.1 Amis Avenue

Amis Avenue was studied from Rexton Street to North Haven Drive. Amis Avenue is about 265 feet long and 16 feet wide. It has a right-of-way of 40 feet.

Amis Avenue was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$3,700.



10.2 North Haven Drive

North Haven Drive was studied from Amis Avenue to just west of West Lake Drive. This segment of North Haven Drive is about 690 feet long and 18 feet wide. It has a right-of-way of 40 feet.

North Haven Drive was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$10,500.



10.3 Rexton Street

Rexton Street was studied from Amis Avenue to just west of West Lake Drive. Rexton Street is about 545 feet long and 16 feet wide. It has a right-of-way of 40 feet.

Rexton Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$7,000.



Section 11 Lakewoods Subdivision

The roadways in Lakewoods Subdivision are typically 20-foot wide with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads varies from 27 feet to 50 feet. Original construction appears to have been done by chip sealing over gravel.

There are three roads in these subdivisions, and all were reviewed: Buffington Drive, Henning Drive, and Pembine Street.

These roads were previously chip sealed in 2004-2007.

The roads in Lakewoods Subdivision are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

11.1 Buffington Drive

Buffington Drive was studied from Pembine Street to South Lake Drive. Buffington Drive is about 775 feet long. It has a right-of-way of 50 feet.

Buffington Drive was previously chip sealed in 2005-2006. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$13,000.



11.2 Henning Drive

Henning Drive was studied from Pembine Street to South Lake Drive. Henning Drive is about 690 feet long. It has a right-of-way of 50 feet.

Henning Drive was previously chip sealed in 2006-2007. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$13,700.



11.3 Pembine Street

Pembine Street was studied from Buffington Drive to Henning Drive. Pembine Street is about 290 feet long. It has a right-of-way of 27 feet.

Pembine Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,800.



Section 12 Leslie Park Subdivision

The roadways in Leslie Park Subdivision vary from 20 feet to 22 feet wide. They have asphalt pavement with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads is 60 feet. Original construction appears to have been done by chip sealing over gravel.

There are two roads in these subdivisions, and both were reviewed: Brenda Lane and Joseph Drive.

These roads were previously chip sealed in 2004-2005.

The roads in Lakewoods Subdivision are in good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

12.1 Brenda Lane

Brenda Lane was studied from 150 feet west of Joseph Drive to 160 feet east of Joseph Drive. This segment of Brenda Lane is about 310 feet long and 20 feet wide. It has a right-of-way of 60 feet.

Brenda Lane was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,200.



12.2 Joseph Drive

Joseph Drive was studied from Brenda Lane to Grand River Avenue. Joseph Drive is about 1200 feet long and 22 feet wide. It has a right-of-way of 60 feet.

Joseph Drive was previously chip sealed in 2004-2005. It is in very good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$15,000.



Section 13 Novi Manor

Novi Manor is a group of three separate properties.

One road was reviewed in this development: Sixth Gate Drive.

13.1 Sixth Gate Drive

Sixth Gate Drive was studied from Paul Bunyan Drive to Grand River Avenue. Sixth Gate Drive is about 305 feet long. It is 18-foot wide asphalt pavement with no curb and gutter and grass shoulders. It does not have street trees or sidewalks. It has a right-of-way of 60 feet.

Previous chip seal information on Sixth Gate Drive was not available. It is in very poor condition with drainage problems evident. There are catch basins at the intersection with Grand River Avenue, but the road does not drain to them. The pavement at this location has failed completely.

Therefore, we recommend a complete reconstruction of the roadway as a long term improvement. A 24-foot wide asphalt roadway with aggregate base, edge drains, curb and gutter and storm sewer was assumed for the estimate. The estimated cost for the recommended improvements is \$79,300.



Section 14 Railroad Subdivision

Railroad Subdivision contains just one road: Flint Street.

14.1 Flint Street

Flint Street was studied from 140 feet south of Grand River Avenue to 220 feet west of Novi Road. This segment of Flint Street is about 1025 feet long. It is about 20 feet wide with no curb and gutter and grass shoulders. It does not have street trees or sidewalks. Its right-of-way varies from 45 feet to 90 feet. The northern 140 feet and southern 220 feet of Flint Street have been reconstructed and are not included in this project.

Flint Street was previously chip sealed in 2005-2006. Original construction appears to have done by chip sealing over gravel for at least portions of the roadway.

The northern 605 feet of this segment of Flint Street is asphalt, and is in good condition with a few potholes and spot locations with poor pavement. The southern 420 feet is gravel, and is also in good condition.

The studied segment of Flint Street provides access to a concrete plant, which is now closed. At this time, Flint Street has minimal traffic. In addition, a study is currently under way to relocate Flint Street as part of a re-development plan for this area.

In the event that the roadway is not reconstructed and relocated, we recommend chip sealing the asphalt segment of the road, with full depth pavement and crack repairs as needed. Areas in poor shape would be removed entirely and replaced with new asphalt prior to the chip sealing.

We recommend a double chip seal on the gravel segment and a single chip seal on the HMA/chip seal segment. A double chip seal can be used to develop a low-cost paved road on top of the existing aggregate base.

The estimated cost for the recommended improvements is \$18,200.



Section 15 Seeleys Golden Acres

Seeleys Golden Acres has just one road: Eleven Mile Road (also known as Seeleys Court).

15.1 Eleven Mile Road

Eleven Mile Road was studied from Seeley Road east to its end. This segment of Eleven Mile Road is about 490 feet long. It is about 20 feet wide with no curb and gutter and grass shoulders. It does not have street trees or sidewalk. Its right-of-way varies, with a minimum of 90 feet.

Previous chip seal information on Eleven Mile Road was not available. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$7,900.



Section 16 Shawood Walled Lake Heights

This section includes roadways in Shawood Walled Lake Heights, Pratt's Subdivision, and Walled Lake Shores. These roadways vary from 12 feet to 20 feet wide. They have asphalt/chip seal pavement with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads varies from 17 feet to 60 feet.

There are eight roads in these subdivisions, and all were reviewed: Austin Drive, Crown Drive, Pleasant Cove Drive, Shamrock Hill, Shawood Drive, Duana Avenue, Charlotte Street, and Elm Court.

These roads were previously chip sealed in 2004-2006.

The roads in Shawood Walled Lake Heights, Pratt's Subdivision, and Walled Lake Shores are in fair to good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

16.1 Austin Drive

Austin Drive was studied from Old Novi Road to Charlotte Street. Austin Drive is about 1600 feet long and 20 feet wide. Its right-of-way varies from 39 feet to 63 feet.

Austin Drive was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$23,900.



16.2 Charlotte Street

Charlotte Street was studied from its end to South Lake Drive. Charlotte Street is about 310 feet long and 18 feet wide. It has a right-of-way of 25 feet.

Charlotte Street was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,200.



16.3 Crown Drive

Crown Drive was studied from Pleasant Cove Drive to Shawood Drive. Crown Drive is about 670 feet long and 20 feet wide. It has a right-of-way of 60 feet.

Crown Drive was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement. For example, the intersection with Shamrock Hill is in poor condition.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$12,200.



16.4 Duana Avenue

Duana Avenue was studied from South Lake Drive to Elm Court. Duana Avenue is about 280 feet long and 16 feet wide. Its right-of-way varies from 17 feet to 40 feet.

Duana Avenue was previously chip sealed in 2005-2006. It is in fair condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$5,300.



16.5 Elm Court

Elm Court was studied from its end to South Lake Drive. Elm Court is about 270 feet long and 12 feet wide. It has a right-of-way of 25 feet.

Elm Court was previously chip sealed in 2005-2006. It is in poor condition with a number of potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$4,700.



16.6 Pleasant Cove Drive

Pleasant Cove Drive was studied from Shawood Drive to Old Novi Road. Pleasant Cove Drive is about 1335 feet long and 20 feet wide. It has a right-of-way of 30 feet.

Pleasant Cove Drive was previously chip sealed in 2005-2006. It is in fair condition with a number of potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$30,800.



16.7 Shamrock Hill

Shamrock Hill was studied from Pleasant Cove Drive to Crown Drive. Shamrock Hill is about 605 feet long and 20 feet wide. It has a right-of-way of 60 feet.

Shamrock Hill was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$9,100.



16.8 Shawood Drive

Shawood Drive was studied from Pleasant Cove Drive to Austin Drive. Shawood Drive is about 1600 feet long and 18 feet wide. Its right-of-way varies from 30 feet to 60 feet.

Shawood Drive was previously chip sealed in 2004-2005. It is in good condition with a few potholes and spot locations with poor pavement. It has one location with poor drainage just east of the bridge. The low point in the pavement is several feet away from the outlet, which is causing ponding in the road.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

We also recommend an HMA overlay at the low point to raise the pavement 2-3 inches so that it drains to the outlet.

The estimated cost for the recommended improvements is \$26,600.



Section 17 Summit Hills

The roadways in Summit Hills, Spring Valley, and Wildwood Hills are 20-foot wide asphalt pavement with no curb and gutter and grass shoulders. They do not have street trees or sidewalks. The right-of-way for these roads is 60 feet. Original construction appears to have been done by chip sealing over gravel.

There are two roads in these subdivisions, and both were reviewed: Summit Drive and Summit Court.

These roads were previously chip sealed in 2006-2007.

Summit Drive and Summit Court are in fair to good condition. There are some potholes and spot locations with poor pavement.

We recommend chip sealing for each of these roads, with full depth pavement and crack repairs as needed.

17.1 Summit Drive

Summit Drive was studied from about 1350 feet north of Twelve Mile Road to its end. This segment of Summit Drive is about 2750 feet long. It has a right-of-way of 60 feet.

Summit Drive was previously chip sealed in 2006-2007. It is in good condition with a few potholes and spot locations with poor pavement.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$42,500.



17.2 Summit Court

Summit Court was studied from its end to Summit Drive. Summit Court is about 1145 feet long. It has a right-of-way of 60 feet.

Summit Court was previously chip sealed in 2006-2007. It is in fair to poor condition with a few potholes and numerous locations with poor pavement. Water ponding on the road may be the cause for the failed areas, as many areas do not have ditches or grading to direct runoff away from the roadway. .

Given the relatively poor condition of the roadway, we recommend a 2 inch overlay with a fabric interlayer over the existing roadway. Full depth pavement and crack repairs should be done prior to the overlay. Failed areas should be removed and replaced with full depth HMA and aggregate base repair completed as needed. Ditching and/or other drainage improvements should be incorporated into the design of the improvements.

The estimated cost for the recommended improvements is \$60,000.



Section 18 Taft Road

Taft Road is not within a platted subdivision.

Taft Road was studied from its end just north of I-96 to Twelve Mile Road. This segment of Taft Road is about 1860 feet long. The roadway is 20-foot wide asphalt pavement/chip seal roadway with no curb and gutter and grass shoulders. It does not have street trees or sidewalk. Its right-of-way is 66 feet. The southern 220 feet is gravel, and is in fair condition.

Taft Road was previously chip sealed in 2006-2007.

The pavement surface is in fair to poor condition with a number of potholes and spot locations with poor pavement. There is evidence of both recent and older patching along the roadway. The southern 200 feet of Taft Road is gravel, and is in good condition.

We recommend chip sealing, with full depth pavement and crack repairs and crack sealing. Failed areas would be removed and replaced with full depth HMA and aggregate base repair completed as needed.

The estimated cost for the recommended improvements is \$31,100.

