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Caln Township Capital Improvements Plan

MAY 2019





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EXECUTIVE SUMMARY

This Capital Improvements Plan (CIP) was developed for Caln Township, Chester County, Pennsylvania as a pro-active planning tool providing the framework to plan, budget, and prioritize infrastructure projects throughout the Township. The CIP supports the objectives, policies, and action items of the Township. The goal of this CIP was to identify short- and long-term projects that will benefit the community. This planning instrument will identify capital projects in an effort to coordinate the financing and timing of expenditures in the Township, prioritizes capital improvements over a twenty-year period. This CIP was partially funded through the Chester County Vision Partnership Program (VPP) and was developed in coordination with a Task Force comprised of the Chester County Planning Commission, and Caln Township elected officials, staff, and residents.

To identify prioritized recommendations for capital improvement projects for Caln Township, the CIP required: 1.) a comprehensive assessment of relevant and existing Township and County planning documents, 2.) valuable input from the community and key Township stakeholders, and 3.) technical information gathered from a detailed assessment of community infrastructure (e.g., roads, stormwater infrastructure, culverts and bridges, sidewalks and trails, streetscaping, and parks and recreational facilities). Information gathered from these sources supported the identification of many potential capital improvement projects that were then ranked based on specific criteria developed for this CIP. The results of this ranking led to a recommended prioritized list of projects based on public safety, public input, cost and complexity, existing condition, funding possibilities, and community and economic benefit.

A 20-year budget was established for the implementation of this Capital Improvements Plan (CIP) based on a review of the Township's actual and projected annual capital expenditures from 2016 to 2019. The estimated capital budget is summarized in Table 1.

Table 1- Capital Project Budget Summary

0-5 Year Capital Project Total Probable Cost Estimate	Estimated 0-5-Year Capital Budget	5-20 Year Capital Project Total Probable Cost Estimate	Estimated 5-20 Year Capital Budget
\$1,335,000	\$1,797,440	\$5,303,200 - 6,053,200	\$5,392,320

From the inventory of over 100 projects that were ranked as described in Section 13 of this report, the top projects were selected until the approximate 20-year budget amount was reached based on preliminary probable cost estimates for each project. These projects are listed in Table 2 and further described in the Capital Project Detail Sheets in Appendix F. Potential funding agencies were identified, but not specific grant opportunities as these are dynamic and may not be available through the life of this CIP. The projects highlighted in green below should be implemented in the short-term (0-5 years).

This estimate of probable cost provided is preliminary in nature for planning purposes. Costs were calculated by roughly estimating quantities for the repairs noted in the inspection reports and/or project detail sheets. No length or area measurements were taken in the field and all measurements were estimated using google earth or approximated using structure dimensions. The costs associated with these quantities were estimated from unit prices received for similar work and reflect average 2019 prices for these estimates. The cost opinion does not reflect federal wages rates, if they should be added in the future due to grant requirements project costs may increase. Costs for the park improvement projects were estimated using a typical grant award through DCNR programs as the scopes are not yet defined.



Table 2- Capital Project Recommendations

Project ID No.	Name	Type	Timeline	Preliminary Probable Cost Estimate	Potential Funding Agencies
1	Barley Sheaf Road Bridge Rehabilitation	Bridge/Culvert	0-5 years	\$215,000	PennDOT, PA DCED, DVRPC
2	Edge Lane Pipe Replacement	Bridge/Culvert	0-5 years	\$320,000	-
3	North Barley Sheaf Road Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$180,000	-
4	Caln Municipal Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
5	Lloyd Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
6	Caln Park West Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
7	G.O. Carlson Boulevard Curb Extensions	Traffic Improvements	5-20 years	\$480,000	Chester County DCD, DVRPC, PA DCED, PennDOT
8	Bondsville Road Curb Extensions	Traffic Improvements	5-20 years	\$260,000	Chester County DCD, DVRPC, PA DCED, PennDOT
9	Foundry Street Traffic Signage Improvements	Traffic Improvements	5-20 years	\$13,700	-
10	Loomis Avenue Drainage Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$300,000 - \$750,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
11	Moore Road Bridge Rehabilitation	Bridge/Culvert	0-5 years	\$85,000	PennDOT, PA DCED, DVRPC
12	G.O. Carlson Boulevard Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$110,000	PennDOT, PA DCED, DVRPC
13	G.O. Carlson Boulevard Culvert Replacement	Bridge/Culvert	5-20 years	\$540,000	-
14	Ruth A. Dawkins Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
15	Kings Highway Open Space Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
16	Barley Sheaf Road Curb Extensions	Traffic Improvements	5-20 years	\$425,000	Chester County DCD, DVRPC, PA DCED, PennDOT
17	North Caln Road Curb Extensions	Traffic Improvements	5-20 years	\$360,000	Chester County DCD, DVRPC, PA DCED, PennDOT



Table 2- Capital Project Recommendations

Project ID No.	Name	Type	Timeline	Preliminary Probable Cost Estimate	Potential Funding Agencies
18	South Bailey Road and Hazelwood Avenue Traffic Improvements	Traffic Improvements	5-20 years	\$95,000	DVRPC, PA DCED, PennDOT
19	The Links at Thorndale Greene Traffic Improvements	Traffic Improvements	5-20 years	\$4,500	DVRPC, PA DCED, PennDOT
20	Osborne Road Stormwater Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$27,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
21	Barclay Street Pipe Rehabilitation and Drainage Improvements	Bridge/Culvert/Flooding/Stormwater Infrastructure	0-5 years	\$440,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
22	Lynn Boulevard Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$70,000	-
23	Toth Avenue Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$260,000	-
24	Humpton Road Stormwater Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$69,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
25	North Barley Sheaf Road Curb Improvements	Road Improvements	5-20 years	\$399,000	Chester County DCD, DVRPC, PA DCED, PennDOT
26	Adams Street Culvert Rehabilitation	Bridge/Culvert	5-20 years	\$130,000	-
27	Ingleside Drive Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$80,000	-
28	Unnamed Tributary to West Branch Brandywine Stream Restoration	Flooding/Stormwater Infrastructure	0-5 years	\$275,000	DEP, NFWF, PA DCED

The top-ranking large-scale projects are listed below and further described in the Large-Scale Project Detail Sheets in Appendix F. These projects scored high in the ranking assessment and should be acknowledged and spearheaded but may not fit into the Township's annual capital reserve expenditures and were therefore excluded.

Preliminary probable cost estimates were not provided for these projects as the scopes are anticipated to be complex and highly variable. Costs would be better determined after feasibility level studies are completed. However, the costs of these projects are anticipated to be large enough that outside funding and partners will be required; thus, these projects are not expected to be implemented as part of this Capital Improvements Plan.



Table 3. Large-Scale Project Recommendations Requiring Outside Funding Sources

Project ID No.	Name	Type	Potential Funding Agencies
29	11th Avenue Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
30	South Bailey Road Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
31	South Lloyd Avenue Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
32	Lincoln Highway Streetscaping Additions	Streetscaping	Chester County DCD, DVRPC, PA DCED, PennDOT
33	E. Fisherville Road Bridge Replacement	Bridge/Culvert	PennDOT, PA DCED, DVRPC
34	G.O. Carlson Boulevard Trail Extension	Trails	DCNR
35	G.L. Eggleston Boulevard Trail Extension	Trails	DCNR

*Preliminary probable cost estimates were not provided for these projects as the scopes are anticipated to be complex and highly variable. The costs of these projects are anticipated to be large enough that outside funding and partners will be required; thus, these projects are not expected to be implemented as part of this Capital Improvements Plan.



Caln Township Infrastructure Report Card

Caln Township Infrastructure

Report Card

Roads	
C	The condition of roads within the Township is rated a 6 (poor) to 7 (fair) out of 10. The Township should consider seal cracks, surface treatments, pavement overlay or pavement reconstruction to help protect these roads and prevent further deterioration.
Stormwater Infrastructure	
B	73% of the stormwater infrastructure, which include both structures and conveyances, were in Good condition. It's recommended that the Township develop a cleaning schedule, with the intent to clean out as many pipes and inlets of sediment and debris as possible each year.
Culverts and Bridges	
B	A total of 12 structures were found to need priority repairs due to various degrees of deterioration observed during the inspection work. Repair recommendations, including which repairs should occur first, and cost estimates for budgeting purposes have been included in this report.
Sidewalks and Trails	
D	56% of the Township-owned sidewalks and trails were in Poor condition. It is recommended that the existing trail along G.O. Carlson Boulevard be repaired or upgraded. General maintenance should occur to all sidewalk sections owned by the Township.
Parks and Recreation	
A	The majority of the elements within each of the parks were scored as Good or Excellent. Routine inspections, general maintenance and proper seasonal activities of the parks and the elements within them will ensure exceptional quality within the facilities.
Streetscaping	
B	6 out of 8 streetscaping locations evaluated within the Township were rated Excellent/Good. Recommendations include general maintenance to ensure streetscapes are functioning properly such as: weeding, vegetation trimming, trash and debris removal, infrastructure repairs.

GRADING EXPLANATION

For infrastructure categories that had a numeric ranking, the scores were divvied-up to fit the report card grading scale.

A- Excellent	C- Fair	F- Failed
B- Good	D- Poor	

Scores are based off of the existing conditions assessment performed in 2018 by CEDARVILLE Engineering Group, LLC.



1. INTRODUCTION

This Capital Improvements Plan (CIP) was developed for Caln Township, Chester County, Pennsylvania as an important and pro-active planning tool for providing the framework to plan, budget, and prioritize infrastructure projects throughout the Township, while supporting the objectives, policies, and action items of the Township. The goal of this CIP was to identify short- and long-term projects that will benefit the community. This planning instrument will identify capital projects in an effort to coordinate the financing and timing of expenditures in the Township. The CIP identifies and prioritizes capital improvements over a twenty-year period. This CIP was partially funded through the Chester County Vision Partnership Program (VPP) and was developed in coordination with a Task Force comprised of the Chester County Planning Commission, and Caln Township elected officials, staff, and residents.

To identify prioritized recommendations for capital improvement projects for Caln Township, the CIP was based on 1.) a comprehensive assessment of relevant and existing Township and County planning documents, 2.) valuable input from the community and key Township stakeholders, and 3.) technical information gathered from an assessment of community infrastructure (e.g., roads, stormwater infrastructure, culverts and bridges, sidewalks and trails, streetscaping, and parks and recreational facilities). Information gathered from these sources supported the identification of many potential capital improvement projects that were then ranked based on specific criteria developed for this CIP. The results of this ranking led to a recommended prioritized list of projects based on public safety, public input, cost and complexity, existing condition, funding possibilities, and community and economic benefit.

2. BACKGROUND

Caln Township is an 8.91 square-mile community located in the heart of Chester County. The local government of this First Class Township is comprised of a five-member Board of Commissioners who serve four-year terms. There are also seven additional boards and commissions that assist in governing the municipality: planning commission, zoning board, historical commission, parks and recreation board, civil service commission, municipal authority, stormwater committee. Caln Township is home to over 14,000 residents and numerous businesses. With direct access to community facilities such as hospitals, major highways, and public transit, Caln Township has an all-inclusive feel. The Township has six parks and open spaces that contain trails and sidewalks, which promote walkability. Caln Township and its residents take pride in their community by hosting and participating in numerous community-wide events each year.

3. NEED

The general welfare of a community is affected by the way in which it grows. Capital demands for improvements and maintenance of existing infrastructure must be balanced with the need to advance and extend infrastructure. These activities need to be planned and implemented in a manner that maximizes the use of limited resources and avoids infrastructure failures.

This CIP resulted from the need for Caln Township to have a comprehensive approach for determining which projects should be prioritized for capital expenditure. Many communities have historically taken a reactive approach to maintaining and improving aging roads and stormwater infrastructure, repairing and replacing once there are near structural failures. The goal of Caln Township is to make the shift towards a proactive approach, through the development of this CIP for community infrastructure.



Specifically, the public and County/Township stakeholders identified there were a number of factors driving the need to develop this Plan:

- ✓ Deteriorated existing conditions identified by Township staff.
-  Insufficient infrastructure to manage Township assets.
-  Public input through Board meetings and community comments.
-  Regulatory compliance requirements placed on the Township.
-  Increased infrastructure concern from more frequent, and intense rainfall events.
-  Importance and necessity of having a municipal capital improvements planning document.

The inception of this plan was based off of the listed needs from Caln Township. Project recommendations will align with the identified needs and consider the availability of future resources.

4. OBJECTIVES

To achieve this plan, the following five objectives were identified to guide the development of the Capital Improvements Plan:

- i. Review **existing documents** from applicable studies.
- ii. Obtain and assess **public participation** data, which includes Task Force sessions, public meetings, and a resident survey.
- iii. Perform a **conditions assessment** of the municipal roads, stormwater infrastructure, culverts and bridges, sidewalks, trails, streetscaping, and parks and recreational facilities and provide recommendations for repair, replacement, maintenance, or improvement.
- iv. Develop a short and long-term **project priority list**.
- v. Develop **probable cost estimates** for the capital projects identified.



5. DOCUMENT REVIEW

A document review was conducted to facilitate the development of a Capital Improvements Plan that considers the project recommendations made by other Township planning documents. As such, CEG included previous applicable studies prepared for the Township in the document review as listed in the Table 1 below. Infrastructure improvement projects recommended in these documents were incorporated and considered in the capital improvements planning process. Planning concepts identified throughout these documents facilitated decision-making.

Table 1 – Existing Document Review Summary

Document	Prepared By	Importance to Caln Township
Caln Township Comprehensive Plan (2017)	Urban Research & Development Corporation Community Consultants Bethlehem, Pennsylvania	This plan that is specific to Caln Township was developed to promote economic development and compatible land uses, improve sustainability, update community facilities and services, improve transportation safety, reduce congestion and expand transportation choices.
Route 30 Multimodal Transportation Study (2016)	McMahon Associates, Inc.	Updates and improvements to Caln Township's suburban commercial segment of Lincoln Highway (Route 30) between Veterans Drive and Barley Sheaf Road. This would include the completion of sidewalks connections along with streetscape, traffic calming measures, access management, and bus stop enhancements to improve safety and operations.
Chester Valley Trail Extension to Downingtown Feasibility Study/Master Plan (2017)	Chester County Planning Commission	Support the existing and planning non-motorized trail systems within Caln Township as a method of providing alternative transportation opportunities for pedestrians, bicyclist and horseback riders. The plan recommends linkages to public areas and regional trails along stream valley, scenic vistas, the Coatesville Area School District and other desirable areas.
Caln Township Pollutant Reduction Plan for West Branch Brandywine Creek (2018)	CEDARVILLE Engineering Group, LLC	This plan identifies how the Township proposes to meet water quality requirements set forth by the Pennsylvania Department of Environmental Protection (DEP) through the Township's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit.
Caln Township Culvert and Bridge Assessment (2019)	CEDARVILLE Engineering Group, LLC	As a supplement to the Caln Township Capital Improvements Plan, this report includes a full assessment of Caln Township's culverts and bridges. Repair recommendations, including which repairs should occur first, and cost estimates for budgeting purposes are included in this report.



6. PUBLIC PARTICIPATION

Public input is fundamental to the success of a Capital Improvements Plan because it displays a true representation of the stakeholders within the Township, allowing Township officials to prioritize future improvements and developments. To that end, CEG and the Township conducted multiple types of public participation activities to obtain critical feedback from the community regarding areas where improvement is desired, including roadways, Township accessibility, park amenities, etc. Public involvement and participation activities were conducted through Task Force Work Sessions, an online resident survey, public meetings, collaboration with Township staff, and presentations to the Township Planning Commission and the Board of Commissioners.

“I have been a resident in Caln for over 30 years and I am proud to live here. You guys do an awesome job of caring for the grounds and maintaining its beauty.”

~Anonymous Caln Township Survey Respondent

The public participation activities completed as part of this plan yielded vital information that contributed to the development of a comprehensive Capital Improvements Plan. There were several components that are described in greater detail in the following sections:

- **Task Force** Work Sessions gave the consistent feedback on progress that was important for keeping the process on track.
- A multi-faceted public **Online Survey** connected the CIP to a high volume of residents, giving a representative view of the Township as a whole.
- **Township Staff Meetings** gave the momentum to steer the Capital Improvements Plan consistently in the right direction.
- Presentations to the **Township Planning Commission** and the **Board of Commissioners** kept the Township officials and constituents in unison with all the moving parts of the Capital Improvements Plan.

6.1 Task Force

A Task Force was convened to direct the activities associated with the development of the Capital Improvements Plan. The Township assembled a volunteer Task Force which included: Kristen Denne (Township Manager), Mark Gallant (Chester County Planning Commission), Mike Fragale (Public Works Director), George Chambers (Township Commissioner), Lorraine Tindaro (Township Commissioner), John Adam Thomas (Planning Commission), and April Barkasi and Beth Uhler, CEDARVILLE Engineering Group, LLC (CEG) representatives. The Task Force held three (3) work sessions on the following dates: 7/30/2018, 10/2/2018, 4/30/2019.

- The first Task Force work session (7/30/2018) included the reviewing the specifics of the Chester County Planning Commission VPP Grant presented by Mark Gallant, the Grant Monitor from the Chester County Planning Commission (CCPC), the scope of the Capital Improvements Plan, the schedule of events for the plan, brainstorming the online resident survey, and reviewing existing documents to incorporate into the plan.
- The second Task Force work session (10/2/2018) was held at the midpoint of the schedule of the Capital Improvements Plan. The work session included a review of the progress of the infrastructure conditions assessment, the progress of the online public survey results, the potential projects list, and the ongoing schedule of activities for the Capital Improvements Plan. The Task Force gave critical feedback and discussion for the plan moving forward.
- The third Task Force work session (4/30/2019) included a presentation of the draft Capital Improvements Plan and offered the opportunity for comments and feedback that was incorporated into the CIP.



6.2 Online Survey



The online public survey was developed by CEG and reviewed by the Task Force to obtain resident input on areas of Township infrastructure that are important to the community to consider for improvement. The survey was distributed by the Township via email, the Township website, social media (the Township Facebook page), and postcards distributed during election day to maximize the number of respondents. The ten-question online public survey was live from September 2018 to January 2019 for residents to submit input. Survey questions were focused on the public's assessment of Township assets and included a variety of formats such as ranking, level of satisfaction, yes/no, rating, and open-ended. Refer to Appendix A for a list of the survey questions.

The Township received a total of five-hundred and twenty (520) responses within the five-month survey period. With roughly 14,255 number of residents within the Township, 2,389 of them being active members of the Township's Facebook page, this was a significant turnout and gave an ideal representation of the Township's residential feedback. The Task Force believed that the community's opinions as a whole were adequately represented with this level of response to the survey.

Overall, the respondents to the online survey gave notable feedback to this capital improvements project. There is an overall trend in the results from the survey that show the residents are aware of flooding issues within the Township and would rate the condition of the infrastructure as "Average".

Respondents were asked to rank specific assets in order of importance. The assets being ranked are the following: parks/trails, streetscaping, roads, stormwater infrastructure, sidewalks. The results show that most of the respondents rank roads and stormwater infrastructure as being the most important asset, while sidewalks are the least important asset. Refer to Figure 1 for a graph illustrating these results in more detail.

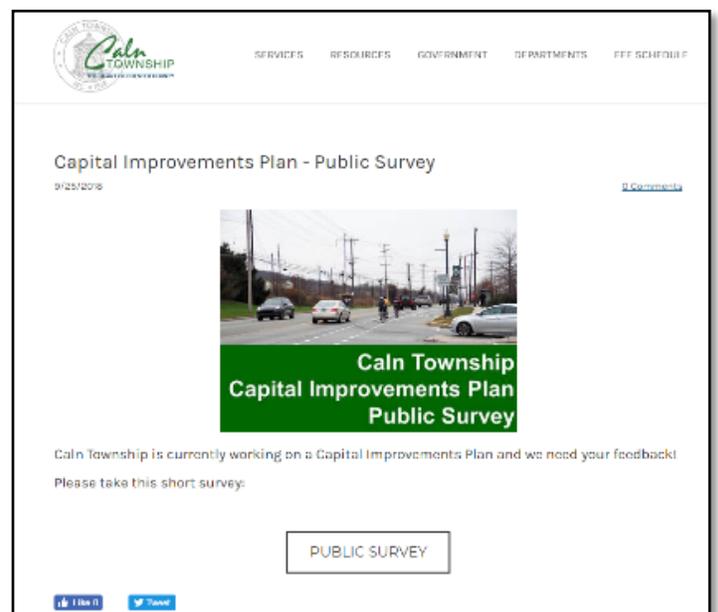
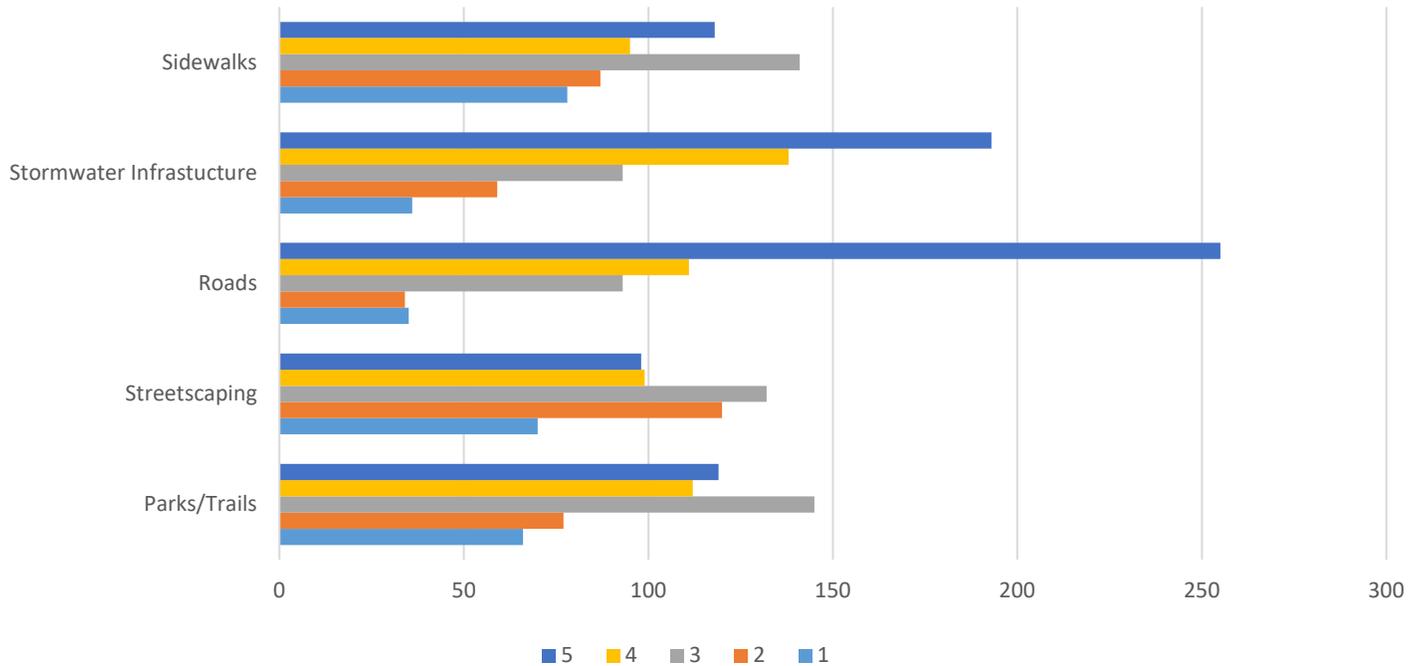




Figure 1 - Township Assets Ranked in Order of Importance

(#1 being the least important to #5 being the most important)



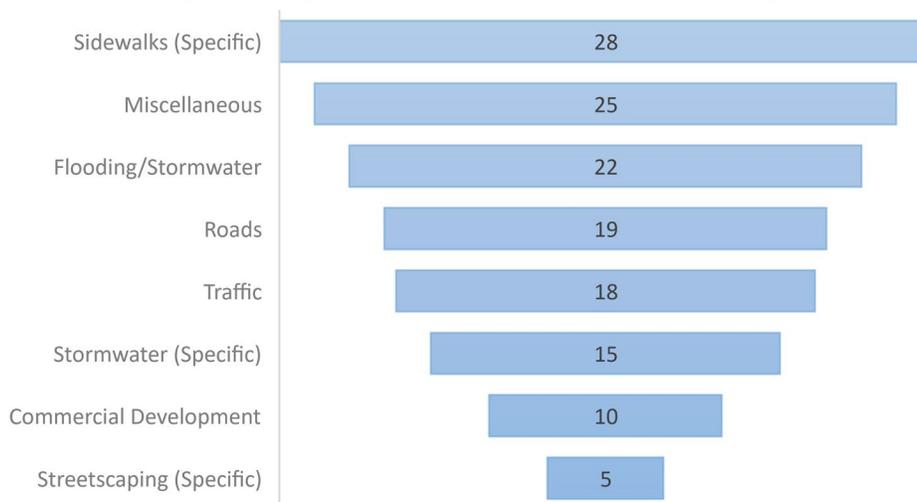
Survey respondents were asked to identify specific areas where flooding was observed as a result of inadequate stormwater infrastructure in an open-ended question. The SEPTA Underpasses were the most frequently identified locations where flooding was observed. The second most identified location for flooding is on G. O. Carlson Blvd. These top two areas represent approximately 60% of the respondent's specific locations of flooding within the Township.





Survey respondents were given the option to provide additional write-in comments for the Township’s Capital Improvements Plan. Of the 520 total responses, 188 respondents offered additional feedback. The results from this open-ended question were reviewed and organized into the top seven specific areas of concern along with a miscellaneous category: roads, flooding/stormwater, traffic, commercial development, sidewalks, streetscaping, stormwater. Aside from the miscellaneous category, the results show that the sidewalks are the most identified area of concerns within the Township. The result of this open-ended question does not reflect the results from the ranking Township assets in order of importance where “roads” was identified as being the most important. This could be a result from the question type; ranking vs. open-ended. It is possible that respondents have specific locations to mention in the optional, open-ended questions, making the results skewed from the ranking question. The second most mentioned area of concern is the “flooding/stormwater” category. These top two issues represent 33% of the areas of concern. Refer to Figure 2 for more details involving the other areas of concern.

Figure 2- Top Areas of Concern within the Township



6.3 Staff Meetings

Frequent Township staff meetings throughout the capital improvements planning process enabled the project to move forward smoothly and transparently. CEG staff members met with Township staff including Kristen Denne, Township Manager and Mike Fragale, Public Works Director on numerous occasions to discuss the progress of the project and obtain guidance.

Specific staff meetings occurred throughout the life of the Capital Improvements Plan process. CEG met with Township Manager, Kristen Denne, on the following dates: 3/27/18, 5/22/18, 6/14/18, 8/9/18, 9/21/18, 11/27/18, and 12/12/18. Items discussed included, but were not limited to, the Capital Improvements Plan schedule, field details, task force updates, project recommendations, along with any other logistics regarding the project. CEG also met with the Public Works Director, Mike Fragale, on the following dates: 10/23/18, 11/29/18, and 12/12/18, along with multiple informal meetings throughout the process. Items discussed included, but were not limited to, field work logistics, traffic safety concerns, institutional knowledge, asset ownership, and project recommendations.



6.4 Township Planning Commission

This Capital Improvements Plan will be presented to the Township Planning Commission on 5/14/2019 for feedback and the comments will be addressed.

6.5 Board of Commissioners

This Capital Improvements Plan will be presented to the Board of Commissioners on 6/13/2019 for feedback and the comments will be addressed.



7. ROADS

As indicated in the Introduction, the condition of Township infrastructure was evaluated to identify potential projects to consider. The condition of the Township's roads was evaluated to identify potential road improvement projects. The scope of the assessment included Township-owned roads and excluded state and private roads. During this evaluation, a condition rating was provided for each roadway section and any defects in the pavement structure were noted. It is important to note that these ratings and defect observations are representative of the pavement conditions observed at the time of the field assessment of each road and may not reflect current conditions. Based on this evaluation, project recommendations are provided for various project sizes from general maintenance to complete reconstruction of a road. The following sections describe the methodology and findings for the road condition assessment.

7.1 Background Information

New roads built as part of a land development or subdivision are built in layers. The design of each road varies based on the traffic volume the road will carry but will commonly use a combination of some or all of the layers listed below. This study did not individually investigate each layer as each road was only assessed visually from the surface layer for defects.

Sub-grade

The bottom layer is subgrade, usually the existing underlying soil that has been graded and compacted to accept the stone and pavement of the proposed road. It is important that the soil is properly compacted and structurally capable of supporting the roadbed. Some soils, such as those that are not well drained and/or high in organic material, exhibit properties that are not suitable for supporting a road. In cases where soils are not suitable, the soils can be modified with additives and/or provided extra support with geotextile fabric before road construction continues. If the subgrade is not suitable, the result will be pavement failure, including rutting and potholes.

Sub-base

Subbase is commonly composed of aggregate (stone). In current designs, it is generally a type 2A aggregate placed at approximately 6 inches thick and rolled for compaction.

Base

The base layer in roads built today is a bituminous pavement composed of larger stones (25 or 37.5 mm) blended with asphalt binder. It is commonly placed 4 or more inches thick.

Another common base course consists of interlocking stone, also referred to as Crushed Aggregate Base Course. Fine stones were placed in a layer, then large stones, then fine stones swept in overtop to lock the base. This construction method was commonly used in roads built in the 1960's or 1970's, but it is a labor-intensive process and, therefore, rarely used today.

Binder

The next layer is also an asphalt pavement and includes slightly smaller stones than the base layer. This layer is placed 2 to 3 inches thick.



Wearing

The top layer on a new street is called the wearing course. This layer consists of even smaller stones with sand (9.5mm to 12.5mm) coated in asphalt.

Joint Seal

All pavement joints, curb lines, and places where pavement abuts inlets and utility structures should be sealed with a rubberized emulsion to seal the joint. The seal is intended to prevent water from entering the pavement, and along curb lines has the added benefit of preventing accumulation of silt and growth of weeds.

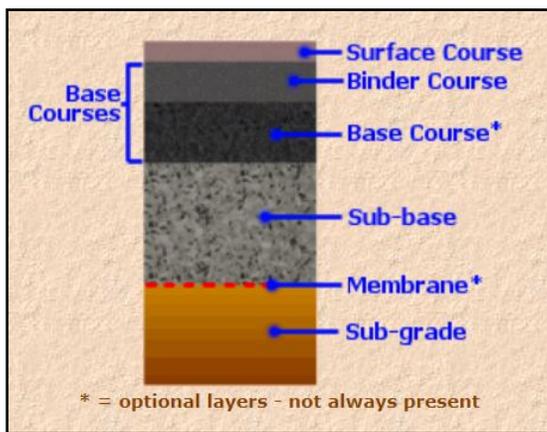


Figure 3- Pavement Section

(Source: <http://www.pavingexpert.com/tarmac03.htm>)

Figure 3 shows a breakdown of where these layers fall in the pavement section. As mentioned in the sub-grade layer above, this figure also shows a membrane being installed between the sub-base and sub-grade layers. This layer typically consists of a geotextile fabric that and is only typically placed when additional support is needed for the pavement section due to a weak sub-grade material.

The required pavement section, per Section 137-40 of the Caln Township Subdivision and Land Development Ordinance, is 6-inches of PennDOT 2A Modified stone subbase, 4.5-inches of 25mm Base Course, and 1.5-inches of 9.5mm Wearing Course. This is the minimum required pavement section for new road construction in the Township. Should improvements or construction be performed on a high-volume road, the design engineer should perform an engineering analysis to ensure that the new pavement section will have an adequate service life.

7.2 Pavement Deterioration

Over time pavements age and deteriorate. This deterioration occurs due to several factors, with the most common being fatigue related cracking caused by the pavement surface becoming oxidized and brittle, which can be characterized by the pavement turning from black to gray or white. As the pavement surface becomes brittle, the repeated loading from traffic traveling over the pavement causes cracks to form, which allow water into the pavement section causing more damage and deterioration. This process continues, with the deterioration becoming more severe over time if no corrective action is taken to repair the pavement.

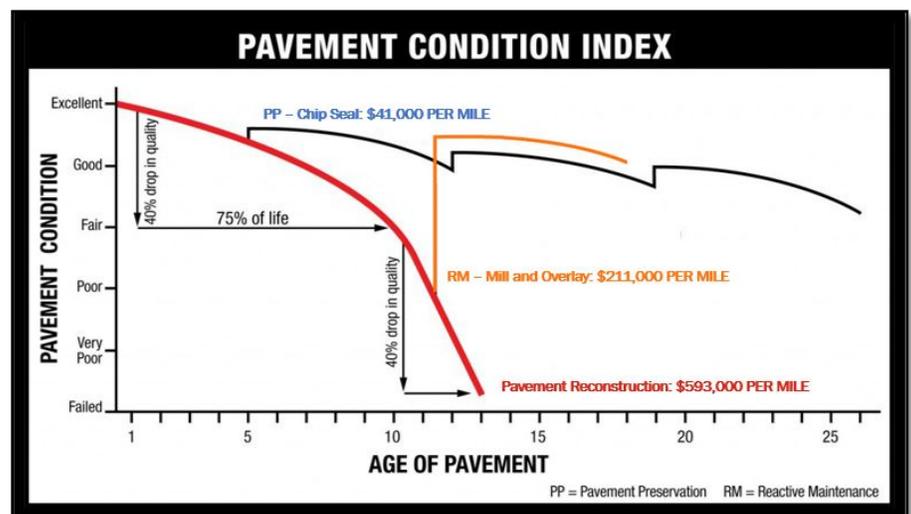


Figure 4- Pavement Condition Index

(Source: Modified from U.S. Army Corp. of Engineers)



Figure 4 represents this relationship, showing that the pavement section deteriorates over times. As the pavement condition continues to deteriorate over time, the overall cost for repairs also increases. The ideal maintenance plan should follow the “Pavement Preservation” path, with chip seal, another form of seal coating applied to the pavement surface early on in the deterioration curve, to help protect and extend the life of the pavement section. Further information related to seal coating, overlays, and roadway reconstruction are presented in the Recommendations section.

7.3 Caln Township Roads

Over the past several years, CEG has worked with the Township on the development and inspection of roadway improvement projects within the Township. Throughout the course of this work, it has been observed that many of the Townships older road structures consist of a crushed aggregate base course with 2 to 3 inches of a binder course, topped with 1 to 2 inches of a wearing course. While many of these roads have experienced some degree of pavement failure, often the subgrade and base are found to be in good condition with only repair to the asphalt pavement section being necessary. As a note, no roads in the Township were observed to have a wearing surface consisting of gravel or concrete.

7.4 Existing Conditions Assessment

CEG identified Township-owned roads by referencing the PennDOT Type 5 Map, last revised on February 16, 2018. Once identified, a field evaluation was performed for each road to document the pavement surface type, assign a condition rating, identify any pavement distresses, and collect notes regarding any other issues that could adversely affect the pavement structure. This assessment provided only a visual evaluation of the overall pavement condition. No core samples or non-destructive testing was performed as part of this work.

The condition rating assigned to each road was in accordance with the Pavement Deterioration Curve presented in Section 2.1. This condition assessment provided a subjective condition rating of the roadway based upon the visual appearance of the surface and smoothness of ride at the time of the survey. The visual appearance of the surface accounted for any observed pavement defects, which could lead to a pavement section failure, or pavement failures which may not affect the rideability of the pavement. This rating scale ranged from 1 to 10, with 1 indicating a completely failed pavement section and 10 a roadway in near perfect condition. Where significant differences in pavement conditions were observed, the roadways were broken into multiple segments at the nearest cross street.

The conditions assessment scores are as follows:

- Roadways with a condition rating of 10 have been repaved very recently.
- Roadways with a condition rating of 9 were still in overall good condition, however some cracking or general wearing of the surface was observed.
- Roadways with a condition rating of 7 or 8 showed significant wearing or oxidation of the pavement surface and more widespread cracking.
- Roadways with a condition rating of 5 or 6, the surface was significantly worn, oxidized, and widespread cracking was observed.
- Roadways with a condition rating of 4 or lower indicate a pavement section that has completely failed.



7.5 Pavement Distresses

The pavement distresses recorded as part of this evaluation were intended to provide quick assessment into some of the observed distresses on that roadway section. These distresses may not represent the entire pavement section evaluated as they may only be present in several locations along the length of this section. When used in combination with the condition rating of the section evaluated, a better understanding of the severity of the condition of each section was obtained. As an example, a roadway with a low condition rating will have significant distresses visible along the entire roadway segment and a roadway with a higher condition rating will only have localized distresses.

Pavement distresses were identified using the Federal Highway Administration (FHWA) *Distress Identification Manual for the Long-Term Pavement Performance Program* (Report Number FHWA-RD-03-031 dated June 2003). Since there are only asphalt concrete pavement surfaces within the Township, only the distress types from Section 1 of the FHWA report were considered. The distresses that were evaluated are presented in Table 2 with a general description of each distress and an example picture.

Table 2 - Pavement Distress Types

Distress	Description	
Fatigue Cracking	Grouping of close cracks that look similar to chicken wire or an alligator's skin.	
Longitudinal Cracking	Cracks predominantly parallel to the pavement centerline.	
Transverse Cracking	Cracks predominantly perpendicular to the pavement centerline.	
Block Cracking	Cracking that divides the pavement into rectangular blocks across a significant portion of the pavement width.	



Table 2 - Pavement Distress Types

Distress	Description	
<p>Potholes</p>	<p>A hole in the pavement surface.</p>	
<p>Rutting</p>	<p>A depression in the pavement surface along the length of a travel lane.</p>	
<p>Shoving</p>	<p>A localized longitudinal displacement of pavement material.</p>	
<p>Raveling</p>	<p>Loss of asphalt binder and stones from the pavement surface.</p>	
<p>Shoulder Drop-Off</p>	<p>Elevation difference between the travel lane and the unpaved shoulder.</p>	

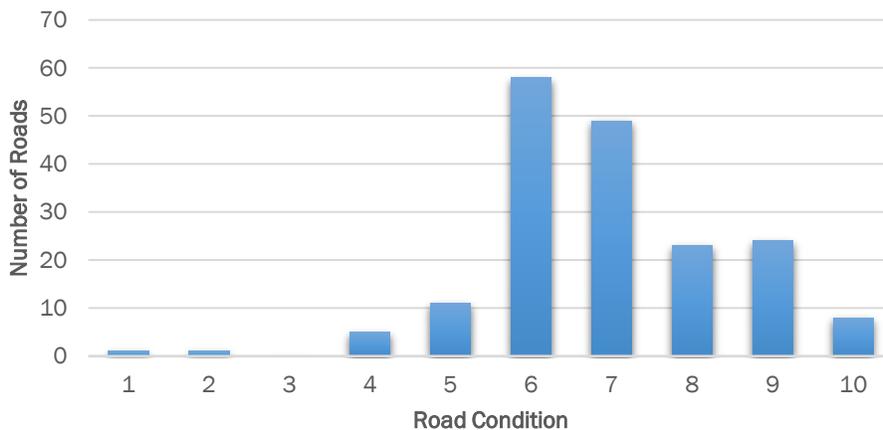


7.6 Road Assessment Results

As shown in Figure 5, overall the condition of roads within the Township is poor to fair, with the majority of roadways having condition rating of 6 or 7. These results indicate that the condition of the Township's roads is not bad, however many of the roads require more extensive repairs than a simple seal coating. While many of the roads will require more extensive repairs, 58% of the roads are only in need of general maintenance activities such as sealing cracks or application of seal coats. While many of the roads are likely in need of more extensive repairs, such as mill and overlay, the 58 of the 69 roads in the poor category are ranked on the high end of this category, with a rating of 6. This still allows some time for the necessary repairs to these roads to be completed prior to the condition deteriorating to a point warranting even costlier repairs.

Seven roads, Ambrose Avenue, E. Fisherville Road, Fifteenth Avenue, Kingsway Drive, Oak Street, Seventeenth Avenue, and Sixteenth Avenue were found to have a condition rating of 4 or lower. This rating indicates that the conditions of these roads has deteriorated to a point where more extensive repairs are necessary. These repairs include a partial or complete replacement of the existing pavement structure are necessary in order to bring the pavement condition back to an excellent or good condition. A comprehensive listing of each road segment, the condition rating, distresses observed, and any issues noted with the roadway segment are provided in Appendix B. A map displaying the pavement condition of Township roads is provided in Appendix C.

Figure 5 - Caln Township Road Condition





7.7 Treatment Options and Costs

Treatment options for Township roads are identified and described below. Approximate 2019 costs are provided where applicable.

Seal Cracks

The Township does own, maintain and operate a tar buggy for sealing cracks in the pavement similar to that shown in Figure 6. Township crews actively use the tar buggy to seal cracks, with crack sealing being performed for three periods each year during the spring, summer and fall. In addition to sealing these cracks, the Township uses the tar buggy to seal the joints between existing pavement and new patches placed in the pavement section.



Figure 6 - Example of a Tar Buggy

(Source: http://airvacequipment.com/Crafcro_Equipment_Rental.htm)

It is recommended that the Township continue to utilize this machine and the current usage schedule, with all cracks between $\frac{1}{4}$ inch and 1 inch being sealed with a PennDOT approved rubberized joint and crack sealant. Cracks wider than 1 inch must be filled with a 4.75 mm wearing course mixture. If no further repairs are made to the pavement surface within 3-5 years, the sealant will need to be reapplied in order to continue to protect the pavement section.

Surface Treatment

Surface treatments are an ideal maintenance item for seal large areas of pavement surface. Ideally, the treatment is applied once a condition of 8 is reached in order to help protect the existing pavement surface. Surface treatments do not any structural capacity to the roadway and therefore should not be used on roads with significant cracking, or where fatigue cracking is present. These treatments can also be used to restore skid resistance to surfaces that have been worn down over time but are in otherwise good condition. The three main surface treatment types are Chip Seal, Slurry Seal, and Micro-surfacing. Chip seal is often the cheapest surface treatment and involves the application of an asphalt emulsion to a road surface, followed by a stone aggregate.



Figure 7 – Chip Seal Application

(Source: <https://www.pavementinteractive.org/reference-desk/maintenance-and-rehabilitation/maintenance/bituminous-surface-treatments/>)



Once the asphalt emulsion cures the aggregate is locked in place providing a new wearing surface. Slurry seals involve combining the asphalt emulsion and a fine aggregate (sand) that is then evenly spread on the surface of the roadway. Micro-surfacing is similar to a slurry seal, however in place of the asphalt emulsion, a polymer modified asphalt binder is used to increase the durability of the treatment. Table 3 presents the cost per mile and typical life span of these three surface treatments.

Table 3 – Surface Treatment Costs and Life Span

Surface Treatment	Cost Per Mile ¹	Life Span
Chip Seal	\$40,000.00	3-5 years
Slurry Seal	\$70,000.00	5-7 years
Micro-Surfacing	\$155,000.00	7-10 years

¹ Assumed 24 ft. lane width and 2019 pricing.

Pavement Overlay

For conditions where significant cracks, block and fatigue cracks, are present in the roadway surface, a new wearing surface must be placed over the roadway surface. This new wearing course layer adds to the structural integrity of the pavement while also sealing the roadway surface from water. A new wearing course can be placed either after either milling the existing wearing surface, typically around 1.5 inches, to remove the cracked surface layer or after placing a paving fabric over the existing surface layer. Where applicable, base repairs should be made to the pavement section prior to a new wearing course being applied.

The advantage to using a paving fabric over a more traditional mill and overlay is an extended life span. By placing a paving fabric over an existing road, the existing pavement section is then protected from water infiltration and the new wearing course is protected reflective cracking throughout the life of the fabric. The use of a paving fabric also allows the existing pavement section to remain in place, while adding an additional layer on top. This is ideal for roadways that may be in relatively good condition, however the overall structure of the pavement may be thinner than desired by current standards. Several roads within the Township, such as W. Summit Ave. have already been paved with the use of paving fabrics and their continued use is recommended where an addition to the pavement section may be necessary. A cost per mile and lifespan comparison for these two overlay options are presented in Table 4.

Table 4 – Pavement Overlay Costs

Pavement Overlays	Cost per Mile ¹	Life Span
Mill and Overlay	\$211,000.00	15
Paving Fabric and Overlay	\$183,000.00	30 ²

¹ Assumed 24 ft. lane width and 2019 pricing.

² Per Propex, manufacturer of PETROMAT.



Pavement Reconstruction

Once a pavement condition reaches a rating of 4 or lower, the existing pavement section is past the point of repair and a whole new pavement section must be constructed. This has traditionally been done by removing the existing pavement section, including subbase, and then installing a new subbase, base/binder course and wearing course on top. When compared to the maintenance and repair methods listed above, the costs to perform this work are significantly higher, with the overall cost per mile for this work indicated in Table 5.

Table 5 – Pavement Reconstruction Costs

Pavement Reconstruction	Cost per Mile ¹
Remove and Replace Pavement ^{2,3}	\$593,000.00
Cold-In-Place Recycling ²	\$494,000.00
Full Depth Reclamation ^{2,4}	\$534,000.00

¹ Assumed 24 ft. lane width and 2019 pricing.

² Replaced pavement section consisting of 1.5" of 9.5mm Wearing Course and 3" of 19mm Binder Course.

³ Includes subbase replacement.

⁴ Cement additive used for cost analysis.



Figure 8 – Cold-In-Place Recycling

In lieu of milling out the existing pavement section, additional there are methods for in-place recycling of the pavement. Two of the more common in-place recycling methods are Cold-in-Place Recycling (CIR) and Full-Depth Replacement. For Cold-in-Place Recycling (CIR), the existing pavement section milled up, simultaneously combined with an asphalt emulsion to bind the mixture together, and then replaced in the roadway to be finish graded and compacted to form a new base course for the pavement. Prior to the construction processes being performed, a mixture design must be performed to determine the application rate for the asphalt emulsion. The equipment for this process, similar to that shown in Figure 8, is typically linked together to form a “train,” often making this process less ideal for more developed areas and areas with tight turns. Additionally, due to the usage of asphalt emulsion to bind the mixture together only light traffic should be permitted on the

roadway for at least one week to allow the mixture to cure. Once the new base course has cured, a new binder and wearing course can be installed as determined by the design engineer.



Full Depth Reclamation (FDR) is a similar process, however where CIR is limited to recycling of the pavement section, FDR includes recycling of the sub-base and even the sub-grade, when conditions are favorable. For the FDR process, the section of material to be recycled is milled up and an additive incorporated into the mixture. The additive used will vary based on the conditions encountered and will require a mixture design prior to construction, however the additives approved for use by PennDOT include asphalt, cement, magnesium chloride and calcium chloride. Select PennDOT aggregate mixtures may be used as an additive on lower volume roads. Both CIR and FDR will increase the height of roadways, which will require material to be removed and properly disposed of where increases in height are not desired, such as along curbed roadways. Figure 9 illustrates the equipment and processes utilized for FDR, with the additive being spread out onto surface in order to incorporate it into the new base.



Figure 9 – Full Depth Reclamation

(Source: <https://www.rocksolidstabilization.com/service/full-depth->

7.8 Road Condition Recommendations

While the condition of the roads is fair to poor, many of the roads are approaching the point where more significant repairs will be required. Table 6 shows a correlation between the condition rating of each road and a recommended repair strategy for that rating. While these recommendations strive to be all inclusive for all each road, each road should be evaluated prior to the construction to ensure that the treatment is appropriate for the roadway surface.

Table 6 – Road Condition and Repair Strategies

Condition Rating	Condition and Recommended Repair
10	Excellent Condition. No repair necessary.
9	Good Condition. Seal Cracks.
7-8	Fair Condition. Surface Treatment.
5-6	Poor Condition. Wearing Course Overlay
1-4	Failed Condition. Base Rehabilitation.



The following specific recommendations are provided based on the findings of the road conditions assessment.

ROAD CONDITIONS RECOMMENDATIONS:

- ✓ Roadways with a rating of 10 require no maintenance or upkeep for several years. These roads should still be monitored for cracking and any cracks that appear should be sealed.
- ✓ Crack sealing is recommended for roadways that were rated a 9. Any cracks appearing should be sealed as recommended below.
- ✓ Chip sealing is recommended for pavements that are categorized as a 7 or 8 is recommended in order to help protect these roads and prevent further deterioration.
- ✓ Roadways that are categorized as a 5 or 6 will require a mill and overlay, as described in the section below.
- ✓ Ambrose Avenue, E. Fisherville Road, Fifteenth Avenue, Kingsway Drive, Oak Street, Seventeenth Avenue, and Sixteenth Avenue are in complete or partial need of total reconstruction due to their present condition. Repair/reconstruction of these roads would prevent further deterioration and even costlier repairs.



8. STORMWATER INFRASTRUCTURE

An inventory and conditions assessment of the Township's 1,238 stormwater structures (i.e., inlets, manholes, endwalls, headwalls, risers) and 1,109 stormwater conveyances (i.e., pipes, swales) were completed for this CIP to facilitate the Township efforts to efficiently manage and plan maintenance activities per regulatory requirements. The NPDES MS4 program, which is federally mandated by the Environmental Protection Agency (EPA) and enforced by the Pennsylvania Department of Environmental Protection (PA DEP), requires certain municipalities, such as Caln Township, to have a complete inventory of all Township stormwater infrastructure and documented maintenance activities.

Maintaining an inventory of a municipality's stormwater infrastructure allows for more efficient asset management, streamlined maintenance, and improved regulatory compliance. As part of the Capital Improvements Plan, Caln Township's entire stormwater system was inventoried and evaluated for condition. Caln Township is better prepared to maintain their stormwater infrastructure in the future as a result of this stormwater infrastructure inventory and assessment effort.

8.1 Existing Conditions Assessment

Using the Township's readily available GIS-based stormwater infrastructure dataset, a two-person team performed a field evaluation of all the Township-owned stormwater infrastructure to assess their general characteristics and overall condition. All stormwater infrastructure located within the approximate right-of-way of Township-owned roads as per the PennDOT Type 5 Map for Caln Township (last revised February 16, 2018) was considered Township-owned for the purposes of this assessment. Characteristics collected about the stormwater structures included the type, size of the structure on the surface, depth to bottom, grate type, and material. Asset information collected about the stormwater conveyances included the type, diameter, and material.

The overall structural condition was also assessed, and a qualitative score was assigned based on a surface (ground level) and sub-surface (underground) visual inspection of the structure. It is important to note, that the assessment represent the assessed condition of each item at the time of evaluation and may be representative of current conditions. Structural deficiencies that were noted on the surface included settlement around the structure, cracking on the surface around the structure, and overall ability for the structure to function properly. Structural deficiencies that were noted on the sub-surface included deficiencies on the base, exposed rebar, reparging, dislodging, eroding metal, standing water, fallen brick spacers and overall functionality.

Photograph documentation was recorded for each structure unless inaccessible due to sediment/debris clogging or restricted access. Where necessary, maintenance suggestions were noted for follow-up. Once inspected, the structures were assigned one of the following condition ratings: Failed, Poor, Good, Excellent (refer to Table 7). The data was collected in the field using tablets and was geo-spatially evaluated using desktop GIS for further recommendations by analyzing the stormwater features on a map.



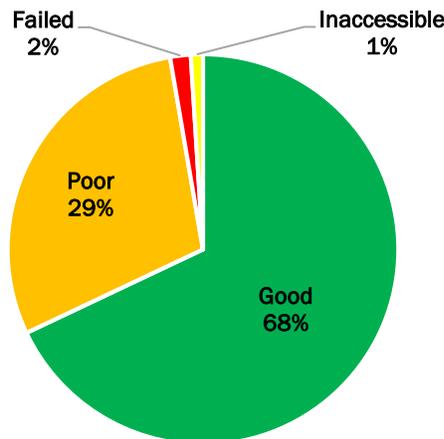
Table 7 - Existing Conditions Rating Criteria

Rating	Description
Failed	Not functioning, needs immediate attention, is at the end of the life-cycle or not existing
Poor	Shows signs of significant deterioration, poor structural integrity and limited life-span is remaining
Good	Functioning appropriately and does not show signs of deterioration and significant life-span is remaining
Excellent	New or recently installed and near full life-span is remaining

8.2 Stormwater Infrastructure Results

A total of 1,109 conveyances were documented within Caln Township. There were 709 Corrugated Metal Pipes (CMPs), 283 Reinforced Concrete Pipes (RCP), 30 High Density Poly-Ethylene (HDPE) Pipes, and 17 swales. A total of 102 pipes were inaccessible due to concerns regarding private property or manhole covers and inlet grates that were sealed shut during paving.

Figure 10- Township Stormwater Conveyance Conditions



Approximately 68% of the conveyances were rated in good condition as depicted in Figure 10. This result was not unexpected given that these conveyances are located within relatively new developments. These pipes were likely installed within the last 10-15 years, are closer to the start of their useful life and do not require repair. The remaining 403 CMPs are older and likely approaching the end of the design life as indicated by their poor condition rating. The



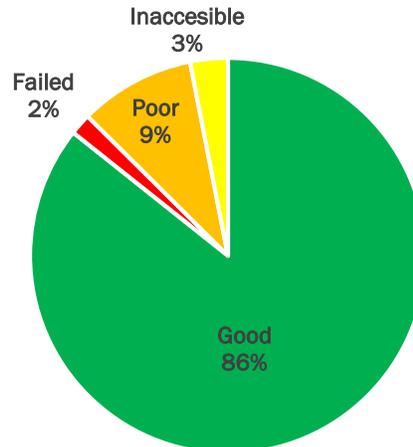
Township should consider replacing or lining these conveyances in accordance with the recommendations below in order to extend their useful life.

A total of 283 RCP pipe segments were rated as poor or failed. These poor and failed condition ratings were assigned primarily due to observed disconnections between pipe sections. Any observed defects involving the disconnection of RCP pipes should be dug up and resealed in order to prevent water flow from leaving the pipe and possibly undermining the roadway and pipe sections. All of the accessible HDPE pipes were observed to be in good condition with no defects observed.

Approximately 86% of the structure were rated in good condition as depicted in Figure 11. A total of 1,146 inlets and stormwater manholes were documented within the Township. These structures consisted of both newer pre-cast concrete structures and older brick structures. 36 structures were inaccessible due to manhole covers or inlet grates being sealed shut. The 21 structures rated as failed were primarily old brick inlets where collapsing brick was observed. These inlets should be completely replaced with new precast structures in order to ensure the stability of the soil and pavement around the structure remains intact and no subsidence occurs.

Structures observed to be in poor condition were a combination of both brick and concrete inlets with minimal loose bricks or mortar observed and water infiltrating through the bricks and concrete. These structures should have the loose brick and mortar repaired and any gaps where water is infiltrating sealed. Where applicable, lining of the inlets, should be implemented to potentially extend the life of the structures as recommended in the sections below. The results from this assessment will be incorporated into the final project recommendation ranking criteria.

Figure 11- Township Stormwater Structure Conditions





8.3 Stormwater Infrastructure Recommendations

General recommendations for maintenance and improvements to stormwater infrastructure are provided below. Specific project recommendations generated as a result of this assessment were evaluated, ranked, and incorporated into project recommendations as described in Sections 13 and 14 of this CIP.

Lining of Pipes

Due to the quantity of corrugated metal pipes (CMPs) in the Township, it is recommended that the Township line pipes to help extend their life cycles and spread out the costs associated with total replacement. Pipes that show signs of rust and were in poor condition, but otherwise appear to be structurally sound, are ideal candidates for lining. For smaller pipes, up to and including 36-inches in diameter, it is recommended that the pipes be lined using a Cured-In-Place Pipe (CIPP). This method slides a new liner through the existing pipe and inflates a bladder to expand the new lining to conform to the existing pipe. The liner is then hardened through the desired curing method in order to make the new lining permanent. The sizing restriction for this method is based on typically manufactured sizes of the linings and contractor capabilities.

For pipes larger than 36-inches in diameter, or pipes with significant deterioration and section loss, it is recommended that the pipes be lined with a Centrifugally Cast Concrete Pipe (CCCP). This method casts a new concrete lining of 2 to 3 inches within the pipe helping to not only protect the remaining pipe but also to add additional structural stability to the pipe. A cost analysis was performed, where it was determined that pipe sizes of 36-inches or greater are economically more feasible for the pipe to be lined with the CCCP method due to the costs of producing a CIPP liner. This determination should be further evaluated as projects are selected to ensure this cost assumption is still reasonable.

Manhole and Stormwater Inlets

Existing stormwater inlets and manholes should be regularly monitored to ensure water is not infiltrating into the inlet or manhole from in between any joints. Any gaps where infiltration is observed should be resealed in order to prevent this infiltration as this seepage can cause settlement to occur around the inlet. Any full brick inlets should be parged or replaced in order to seal the inlet or manhole from infiltration. While parging can be done with a typical cementitious mixture, other lining designed for rehabilitating sanitary sewer manholes could be used to further extend the life of the brick inlet or manhole before replacement. These products can also be used to help restore some structural integrity to the structures, however, careful consideration should be given to using these products to help with the structural integrity of the pipe.

Inlet Grates

The existing grates for stormwater inlets consist of a both bicycle safe, consisting of an inlet top with a grid pattern as



Figure 12 – Bicycle Safe Grate

shown in Figure 12, and slotted grates as shown in Figure 13 and 14. The slotted inlet grates shown in Figure 13 varied between the diagonal slotting shown and slotting that runs perpendicular to the path of travel, shown in Figure



Figure 13 – Diagonal Slotted Grate



14. Due to the potential for bicycle tires to become trapped in slotted inlet style, causing an accident with potential injury for the rider, it is recommended that all slotted inlets within the right-of-way be converted to be bicycle safe.

While the bicycle safe grate is the preferred method, at a minimum the diagonal slotted grates should be replaced with slots running perpendicular to the lane of travel. This will minimize the potential hazard for bicyclists allowing them to travel over the structure with minimal risk.



Figure 14 – Perpendicular Slotted Gate

General Maintenance

During the field work effort, it was observed that many of the pipes contained varying levels of anti-skid stone, silt, and debris buildup along the bottom of the pipes. This buildup negatively affects the flow of water through the pipe by restricting the flow capacity of the pipe and also accelerates the deterioration of pipes, with corrugated metal pipes being the biggest concern. Over time, the buildup traps moisture along the bottom of the pipe aiding in the advancement of corrosion. These corrugated metal pipes are galvanized to protect the bare metal, however, over time this coating is designed sacrifice itself in

order to protect the pipe metal. This sacrifice occurs through both scour from stones and sediment traveling through the pipe and the chemical balance of the water traveling through the pipe.

It is recommended that the Township develop a regular cleaning schedule, with the intent to clean out as many pipes as possible each year. Any pipes that continue to show signs of significant build up after cleaning should be evaluated to determine the primary source of the debris buildup, with corrective actions taken to prevent further buildup. An additional recommendation is to remove any sediment or debris that has built up in the inlet while cleaning out the pipes. Should the galvanization become visibly worn down, it is recommended that the Township reline the pipe in order to protect the bare metal and structural integrity of the pipe. It is further recommended that the outfalls for all pipe systems regularly be checked and maintained to ensure that waterflow out of the system is unimpeded and that the system is functioning properly.

STORMWATER INFRASTRUCTURE RECOMMENDATIONS:

- ✓ **Line corrugated metal pipes (CMPs).**
- ✓ **Convert all inlet grates within Township road right-of-ways to bicycle-safe grates.**
- ✓ **Parge fully brick inlets.**
- ✓ **Develop a regular pipe and structure cleaning schedule.**



9. CULVERTS AND BRIDGES

This report provides the data and findings from the detailed evaluation of bridges and culverts under Township-owned roads, with spans less than 20 feet in length. 59 total structures were inventoried and assessed as part of this evaluation. Structures with spans over 20 feet in length were not assessed, as these structures must be evaluated by a Certified Bridge Inspector (CBI) per the National Bridge Inspection Standards (NBIS), with evaluation reports submitted for record in the National Bridge Inventory (NBI).



9.1 Existing Conditions Assessment

CEG identified the number of stream crossings under Township-owned roads through a Geographic Information Systems (GIS) analysis and field identification of structures. Road ownership was determined through referencing the Type 5 Map published by the Pennsylvania Department of Transportation (PennDOT) and last revised February 16, 2018 and coordination with the Township. Through this process, 59 total Township-owned structures, including culverts and bridges, were identified. The locations of these structures are shown on the Culverts and Bridges Map in Appendix D. In addition, 14 pipe crossings conveying ephemeral streams under Township roads were also evaluated. The locations of these pipe crossings are shown on the Pipe Crossings Map in Appendix E.

Once all structures locations were identified, CEG conducted a field inspection of all structures. During the inspection, each stream crossing was placed in one of four structure type categories: 3-sided box culvert, 4-sided box culvert, bridge or pipe culvert. These structures were then evaluated on various criteria in order to provide an overall structure condition. The evaluation categories for 3-sided box culverts, 4-sided box culverts and bridges were the same as these structures are comprised of the same structural elements. These categories and brief descriptions of what was evaluated are shown in Table 8. Pipe culvert conditions were evaluated using the categories shown in Table 9. In addition to the categories listed in these tables, the material composition and the opening size was recorded for each structure.

Table 8 – Bridge and Box Culvert Evaluation Categories

Evaluation Category	Description
Traffic Safety	Provides an overall rating for traffic protection measures to protect the motoring public. These items include but are not limited to guide rail, structure safety signage, and pedestrian safety (where applicable).
Structure Approach	Condition of the roadway and pavement leading up to the stream crossing.
Structure Wearing Surface	Condition of the pavement section above the stream crossing.
Structure Deck	Observed condition of the concrete deck for the structure.
Super-Structure	Observed condition of the structural elements above grade.



Table 8 – Bridge and Box Culvert Evaluation Categories

Evaluation Category	Description
Sub-Structure	Observed condition of the structural elements below grade.
Stream Channel	An approximate condition of the existing stream channel, including the upstream and downstream alignment with the pipe and any scouring occurring around the ends of the culvert.

Table 9 – Pipe Culvert Evaluation Categories

Evaluation Category	Description
Traffic Safety	Provides an overall rating for traffic protection measures to protect the motoring public. These items include but are not limited to guide rail, structure safety signage, and pedestrian safety (where applicable).
Structure Approach	Condition of the roadway and pavement leading up to the stream crossing.
Structure Wearing Surface	Condition of the pavement section above the stream crossing.
Stream Channel	An approximate condition of the existing stream channel, including the upstream and downstream alignment with the pipe and any scouring occurring around the ends of the culvert.
Pipe Condition	Observed structural condition of existing pipe, including any observed defects.

The categories presented in Table 8 and Table 9 were then evaluated using the coding system from the *Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges* published by the Federal Highway Administration (FHWA) (Report Number FHWA-PD-96-001 Dated December 1995) in order to provide consistency with FHWA and PennDOT inspection methodology. These rating codes and their corresponding description can be found in Table . A breakdown of the structure elements evaluated and a brief description what was looked at for each element are presented in the sub-sections below.

Table 10 – FHWA Coding Guide Condition Ratings and Descriptions

Rating Code	Description
N	Not Applicable
9	Excellent Condition
8	Very Good Condition - No problems noted.
7	Good Condition - Some minor problems noted.
6	Satisfactory Condition - Structural elements show some minor deterioration.



Table 10 – FHWA Coding Guide Condition Ratings and Descriptions

Rating Code	Description
5	Fair Condition - All primary structural elements are sound but may have minor section loss, cracking, spalling, or scouring.
4	Poor condition - Loss of section, deterioration, spalling, or scour may have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
3	Serious Condition – Loss of section, deterioration, spalling, or scour may have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Critical Condition – Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present, or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	“Imminent” Failure Condition – Major deterioration or section loss present in critical structural components of obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put it back in light service.
0	Failed Condition – Out of service; beyond corrective action.

Limitations encountered in the field are described below. Structures 1, 8, 11, 14, 18 and 34 were only accessible from one side to due concerns regarding site access due to private property on one side of the structure. Structure 3 was unable to be evaluated due to the pipe ends not being visible from Township Right-of-Way and inlets that were sealed shut. One location Structure 22 was only accessible from one side due to thick brush and steep terrain. Additionally, it should be noted that this evaluation is only intended to provide an observed assessment of the structural condition of each structure at the time of evaluation. These structures were not evaluated for travel lane widths or traffic carrying capacity.

9.2 Culvert and Bridge Assessment Results

The results of the inspections are summarized in the tables below. Detailed reports for each structure can be found in the complete *Caln Township Culvert and Bridge Assessment Report* (prepared by CEG, 2019) showing these ratings, more detailed comments indicating the issues that were observed at each structure, and pictures of the structure and the problems noted.

An overall structure rating was assigned to each structure based on the lowest condition rating received in the analyzed category for that structure. As any significant effects with issues related to the stream channels and traffic safety categories for the structure were captured in other categories, these two categories were excluded from the analysis. Table 11 and Table 12 have been highlighted to indicate the priority repairs in red and general maintenance items yellow.

The condition ratings for pipe culverts are presented in Table 11. Overall, the pipe condition was the controlling factor for the overall structure rating. This is primarily due to the significant presence of corrugated metal pipes at the



crossings. Over time the protective coatings on these pipes wear away exposing the bare metal to oxygen and water leading to corrosion of the pipe. For the other locations, defects were observed in the roadway pavement or potential issues were observed with the traffic safety measures observed at the crossing as noted in the report for each structure.

Table 11 – Pipe Culvert Condition Ratings

Structure ID	Pipe Diameter	Traffic Safety	Structure Approach	Structure Wearing Surface	Pipe Condition	Overall Condition Rating
1	30"	6	9	7	7	7
2	36"	8	7	7	4	4
4	36"x70"	5	8	8	2	2
5	62"x87"	6	8	7	5	5
6	40"x66"	8	8	7	3	3
9	50"x80"	6	8	8	6	6
12	4.3'x16'	5	6	5	6	5
13	48"	6	7	7	8	7
14	42"x62"	8	8	8	4	4
16	18"	9	9	7	7	7
18	36"	8	8	8	4	4
22	48"	6	5	5	5	5
23	30"	4	8	8	8	8
24	24"	8	9	9	3	3
26	54"	9	8	8	8	8
28	36"	6	6	6	7	6
29	36"	6	7	7	6	6
30	18"	7	7	6	8	6
31	24"	6	8	7	7	7
32	42"	8	7	7	5	5
34	50"x60"	8	8	8	1	1
35	48"	5	3	3	5	3
36	18"	6	7	7	7	7
37	30"	7	7	7	7	7
44	5'x16'	7	7	7	7	7

Condition ratings for the bridges, 3-sided box culverts, and 4-sided box culverts are presented in Table . The controlling factor in the overall condition rating for most of these structures were the superstructure elements. One structure was observed to be closed and in an advanced state of deterioration. Two other structures are in need of further evaluation and repairs to prevent further deterioration. Traffic safety issues were also observed at several of the structures, with repairs necessary to these elements as noted in the report for each structure.



Table 12 - Bridge and Box Culvert Condition Ratings

Structure ID	Structure Height (ft)	Structure Span Length (ft)	Traffic Safety	Structure Approach	Structure Wearing Surface	Structure Deck	Super Structure	Sub Structure	Overall Condition Rating
8	5.5	11	4	8	7	5	5	7	5
11	4	8	8	8	7	N	7	7	7
15	4	11.2	4	6	6	7	3	6	3
17	8	15	6	8	7	N	6	7	6
20	9	17	0	0	0	0	0	N	0
21	5	7.5	8	8	8	N	7	9	7
25	3.5	6	5	7	7	N	8	7	7
27	5	6	7	9	9	N	8	8	8
40	4.42	13.75	7	7	7	7	8	8	7
42	4.5	11	8	4	4	8	3	5	3
46	2.5	4.5	8	8	8	N	8	8	8

There were 12 structures (Structures 2, 4, 5, 6, 14, 15, 18, 20, 24, 34, 35 and 42) that were assigned a condition rating of 4 or below. These structures all require some form of repair in order to ensure that the structure continues to function as it was originally designed and protect the structure from further deterioration. Repair recommendations for these structures and cost estimates for budgeting purposes were evaluated, ranked in comparison to other project types, and incorporated into the overall CIP project recommendations in Section 14.

Any structure with a condition of 5 or above should continue to be monitored for any potential structural damage, with general maintenance occurring regularly to ensure that the condition does not deteriorate further.

The structures over 20 feet in span length are shown in Table , along with their recorded span length. As mentioned in Section 9, the structures that were found to be over 20 feet in span length must be inspected by a Certified Bridge Inspector in accordance with the National Bridge Inspection Standards (NBIS). As several of the structures are already known to be inspected by PennDOT as part of an Inspection Agreement with the Township, it is advised that the Township coordinate with PennDOT to ensure all structures are inspected per the NBIS. In the event that the Township does not wish to coordinate this with PennDOT as part of their Inspection Agreement, the Township must hire their own Certified Bridge Inspector to perform the inspections, with records of these inspections provided to PennDOT and the National Bridge Inventory.

Table 13 - Structures Over 20 feet in Span Length

Structure Number	Structure Span Length (ft)
10	24
33	24.3
38	40
41	22.5
43	35.5
45	39
47	29.5



9.3 Culverts and Bridges Recommendations

General recommendations for maintenance and improvements to culverts and bridges are provided below. Specific project recommendations generated as a result of this assessment were evaluated, ranked, and incorporated into project recommendations as described in Sections 13 and 14 of this CIP.

CULVERT AND BRIDGE RECOMMENDATIONS:

- ✓ **Line corrugated metal pipes (CMPs) culverts and pipe crossings.**
- ✓ **Address maintenance items highlighted above and referenced in the *Caln Township Culvert and Bridge Assessment Report*.**
- ✓ **Continuously monitor traffic safety to ensure that no hazard is present to cause harm to motoring public.**
- ✓ **Apply joint sealer to pavement cracks on structure wearing surface.**
- ✓ **Ensure pipe and pipe openings are kept clear of obstructions or debris.**



10. SIDEWALKS AND TRAILS

Because sidewalks and trails are a vital aspect to every community's healthy multi-modal transportation system, a conditions assessment was initiated for Caln Township to identify potential opportunities for capital improvement projects. An assessment such as this was critical because connectivity from local trails and sidewalks to county or statewide networks allows a community to boost interaction and economic development within the Township.

The high value the Township's citizens place in trails and sidewalks, as identified in the public survey results discussed in Section 6, reinforces their importance when developing a comprehensive capital improvements plan such as this one. In fact, pedestrian paths were ranked the most important park amenity in the survey and 37 percent of respondents replied that they were satisfied with the walkability within the township.

Sidewalks and trails are unique from the other infrastructure evaluated in this CIP in that there are federal requirements associated with the Americans with Disabilities Act (ADA). One major aspect evaluated as part of this study was compliance with the ADA as all of the Township's sidewalks and trails are required to comply with different parts of this regulation. The following sections describe the methodology and findings of the conditions assessment.

10.1 Existing Conditions Assessment

A two-person team performed a field evaluation of all the Township-owned trails and sidewalks and assessed their overall condition. Only trails and sidewalks owned by the Township, those on or surrounding municipally owned property, were evaluated as part of this study. Thus, it was determined that Caln Township owns 1.47 miles of the 54.10 miles of sidewalks and trails within the community. Accordingly, approximately 1.22 miles of trails and 0.25 miles of sidewalks were included in the scope of this conditions assessment.

The various distresses evaluated included, but were not limited to, fatigue cracking, block cracking, longitudinal cracking, and transverse cracking. Photograph documentation was recorded for each Township-owned sidewalk and trail. The overall condition was noted, and a qualitative score was assigned. Scores were based on a visual inspection and were assigned one of the following condition ratings: Failed, Poor, Good, Excellent (refer to Table 14). Condition criteria were based on physical observations such as cracking, discoloration, alignment, and functionality. The data was collected using tablets in the field and was geo-spatially evaluated for further recommendations by analyzing the sidewalks and trails features on a map in conjunction with existing and potential trail connections with multiple entities.

Table 14 - Existing Conditions Rating Criteria

Rating	Description
Failed	Not functioning, needs immediate attention, is at the end of the life-cycle or not existing
Poor	Shows signs of significant deterioration, poor structural integrity and limited life-span is remaining
Good	Functioning appropriately and does not show signs of deterioration and significant life-span is remaining
Excellent	New or recently installed and near full life-span is remaining



10.2 Sidewalks and Trails Results

While ramps and depressed curbs were observed at sidewalk and trail crossings with roads, these ramps and depressed curbs are not in compliance with current ADA requirements as no detectable warning surfaces are present on the sidewalks and trails prior to the roads. The lack of compliance could place the Township into a difficult liability situation in the event that an accident would occur.

The trail following G.O. Carlson Boulevard is currently poor condition, with significant cracking and settlement occurring. While minimal height differences were observed between any cracks, the settlement still poses a concern for individuals with disabilities. The remaining trails within the Township Parks are in good condition, with only minimal surface wear and minor defects observed.

Table 15 - Trails & Sidewalks Existing Conditions

Type	Description	Condition Rating	Length (miles)
Trail	G. O. Carlson Boulevard	Poor	0.82
Trail	Caln Township Municipal Park	Good	0.40
Sidewalk	Caln Township Municipal Park	Good	0.19
Sidewalk	Caln Township Municipal Complex	Good	0.06
TOTAL:			1.47

10.3 Sidewalks and Trails Recommendations

General recommendations for maintenance and improvements to sidewalks and trails are provided below. Specific project recommendations generated as a result of this assessment were evaluated, ranked, and incorporated into project recommendations as described in Sections 13 and 14 of this CIP.

G.O. Carlson Boulevard Trail

It is recommended that the existing asphalt trail along G.O. Carlson Boulevard be repaired or upgraded. While the existing width of 5 feet is within compliance for a standard sidewalk, the Township may wish to consider widening this trail in order to convert it to a multi-use trail.

American Disabilities Act (ADA) Compliance

The Township must convert all existing roadway crossings in order to be fully compliant with current ADA standards. This includes upgrades for pedestrian safety within the roadway and ramps from the trail/sidewalks to the roadway surface, including detectable warning surfaces to alert pedestrians about the roadway crossing.

Chester Valley Trail Extension Study

The Chester Valley Trail Extension Study (CVTE) was completed in 2017 and includes potential trail extensions within Caln Township. These projects should be considered and referenced when proposing new trails in the Township.



General Maintenance

General maintenance should occur to all sidewalk sections owned by the Township. This work may include replacement or repair of sidewalk sections in the event that the height difference between sections becomes greater than ¼ inch. ADA ramps, including detectable warning strips, and crosswalk markings should be installed where the existing sidewalk crosses the driveway to the municipal building in order to protect pedestrian traffic at the driveway.

Sidewalk and Trail Connectivity

Consider additional sidewalk and trail sections to promote further walkability within the Township. While many sidewalks were observed in newer developments, many of these sidewalks did not have any connections to sidewalks or trails outside of these developments. Several potential trail projects are recommended as part of the Township's Comprehensive Plan. The Township should continue to partner with other organizations to develop these trails as part of larger trail systems, while also considering local resident access to these potential trails.

SIDEWALK AND TRAIL RECOMMENDATIONS:

- ✓ **Repair or upgrade trail along G.O. Carlson Boulevard.**
- ✓ **Assess all roadway crossings for ADA compliance.**
- ✓ **Continue to perform general maintenance on all sidewalks and trails.**



11. PARKS AND RECREATIONAL FACILITIES

Caln Township owns and manages operation and maintenance of four parks with recreational facilities and two open spaces. **Caln Municipal Park** is located on 20 acres in the central part of the Township and is used by Caln Athletic Association throughout the year. **Lloyd**

“Lloyd Park is great! Family friendly and safe recreation areas are important to me, as is access to nature/trails/open space.”

Park is a 30-acre park located off of Lloyd Avenue and is most unique from the other township parks due to a large section dedicated for a dog park.

Ruth A. Dawkins Memorial Park is a small neighborhood park located in the Brandywine Homes section of the

Township. **Caln Park West** is located on Route 340 and includes 20 acres primarily used by a local soccer league. Amenities available throughout the parks include pavilions, rest rooms, volleyball nets, play areas, hockey rink, tennis courts, dog park, picnic areas, walking trails, gazebo, basketball courts, and soccer fields.



The Parks and Recreation Board was formed to promote, advocate, and maintain recreation activities within Caln Township. The Board is comprised of volunteers, who are appointed by the Board of Commissioners.

11.1 Existing Conditions Assessment

A two-person team performed a field evaluation of each of the Township park elements and assessed their overall condition. Examples of common park elements evaluated include seating, trash cans, benches, water fountains, rest rooms, pavilions, picnic tables, and lighting. The overall structural condition was noted, and a qualitative score was assigned. Scores were based on a visual inspection of the element and were assigned one of the following condition ratings: Failed, Poor, Good, Excellent (refer to Table 16). The scores were assigned based on physical observations,

such as broken fixtures, chipping paint, graffiti, evidence of weathering, and functionality. Photo documentation was recorded for each structure. The data was collected using tablets in the field and the results were geospatially evaluated for further recommendations by analyzing the park features on a map.





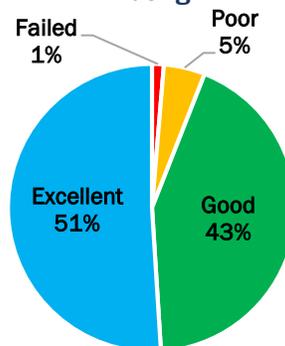
Table 16 - Existing Conditions Rating Criteria

Rating	Description
Failed	Not functioning, needs immediate attention, is at the end of the life-cycle or not existing
Poor	Shows signs of significant deterioration, poor structural integrity and limited life-span is remaining
Good	Functioning appropriately and does not show signs of deterioration and significant life-span is remaining
Excellent	New or recently installed and near full life-span is remaining

11.2 Parks and Recreational Facilities Results

Overall, the majority of the elements within each of the parks were scored as Good or Excellent as depicted in Figure 15. There were some specific elements that need maintenance/repair and were assigned a score of Failed or Poor. These ratings will be reflected in the final project recommendation ranking criteria and will also align with the 2017 Caln Township Comprehensive Plan’s Parks and Recreation recommendations to further improve existing recreational needs in Caln Municipal Park, Lloyd Park, Ruth A. Dawkins Memorial Park, and Caln Park West.

Figure 15- Overall Existing Park Elements Condition Rating



11.3 Parks and Recreational Facilities Recommendations

Based on the findings of the assessment, the overall recommendation for Caln Township’s municipal parks and recreational facilities is to continue to perform general operations and maintenance activities to keep park amenities in good working order, safe, and to limit deferred maintenance that can prove more costly. Continuing to perform routine inspections, general maintenance and seasonal maintenance activities of the parks and the elements within them (i.e. benches, play equipment, trash cans) will ensure long-term within the facilities. These operation and maintenance recommendations are vital to the longevity of these facilities throughout the seasons.

Specific project recommendations generated as a result of this assessment were evaluated, ranked, and incorporated into project recommendations as described in Sections 13 and 14 of this CIP.



12. STREETS CAPING

Streetscaping in a community is used as a natural pathway of design along roads that helps spur walkability, traffic-calming, pedestrian safety, and overall aesthetics. As a method of landscape beautification, streetscaping provides a welcoming feel for residents and visitors to the community. As part of the existing conditions assessment, existing features of streetscaping was identified and rated.

12.1 Existing Conditions Assessment

A two-person team performed a field evaluation of streetscaping located on Township roads by assessing their overall condition. Photograph documentation was recorded for each located streetscape and recommendations were recorded where applicable. The overall condition was noted, and a qualitative score was assigned. Scores were based on a visual inspection and were assigned one of the following condition ratings: Failed, Poor, Good, Excellent (Refer to Table 17). Condition criteria was based on physical observations such as curb deterioration, quality and quantity of vegetation, and sight visibility. Most of the streetscaping within the Township was located within subdivisions. The data was collected using tablets in the field and was geo-spatially evaluated post-assessment for additional recommendations. Numerous streetscaping projects were recommended in the existing documents that were reviewed for this plan. Those streetscape locations will be considered as part of the project recommendations within this Capital Improvements Plan.

Table 17 - Existing Conditions Rating Criteria

Rating	Description
Failed	Not functioning, needs immediate attention, is at the end of the life-cycle or not existing
Poor	Shows signs of significant deterioration, poor structural integrity and limited life-span is remaining
Good	Functioning appropriately and does not show signs of deterioration and significant life-span is remaining
Excellent	New or recently installed and near full life-span is remaining

12.2 Streetscaping Assessment Results

Results from the streetscaping evaluated are presented in the table below. Overall, 6 out of 8 existing streetscaping evaluated within the Township were rated Excellent/Good. The streetscaping located on Thornridge Drive at the entrance to the Thornridge community was rated the lowest; Poor. The streetscape lacked the presence of vegetation and does not serve as an ideal streetscape by improving aesthetics, and traffic-calming. The streetscapes rated as Excellent have sufficient vegetative diversity, provide traffic-calming measures with its presence, and is aesthetically pleasing.



Table 18 - Streetscaping Existing Conditions

Road Location	Rating	Photo
Hidden Creek Drive	Excellent	
Wedgewood Road	Excellent	
Wedgewood Road	Good	



Table 18 - Streetscaping Existing Conditions

Road Location	Rating	Photo
Thornridge Drive	Fair	
Thornridge Drive	Fair	
Clothier Street	Excellent	



Table 18 - Streetscaping Existing Conditions

Road Location	Rating	Photo
G.L. Eggleston Boulevard	Good	
Kings Grant Boulevard	Good	

12.3 Streetscaping Recommendations

It is recommended that the existing streetscapes that were rated Fair be upgraded with a vegetation diversity. When implementing streetscaping in new locations, major Township roadways should be considered. Placing streetscaping along highly-traveled, business roads will promote traffic-calming where it is most needed and boosts economic activity by encouraging people to shop in the area. Further recommendations include general maintenance of these streetscapes to ensure that they are functioning properly such as: weeding, vegetation trimming, trash and debris removal, infrastructure repairs.

Specific project recommendations generated as a result of this assessment were evaluated, ranked, and incorporated into project recommendations as described in Sections 13 and 14 of this CIP.



13. CAPITAL IMPROVEMENTS PROJECT RANKING CRITERIA

Based on the information gathered from the existing conditions assessments, documents review, and public participation activities, over 100 projects were assembled and categorized by type: Parks and Recreation, Municipal Facilities, Flooding/Stormwater Infrastructure, Road Improvements, Traffic Improvements, Multi-Modal Transportation, Sidewalks, Streetscaping, Trails, Bridges/Culverts. With the use of GIS-mapping applications, the projects were entered into a geodatabase and were analyzed spatially for a planning level assessment.

The projects were further separated into capital projects and large-scale projects. The capital project list included projects that can likely be funded through the Township’s Capital fund, although outside funding could still be sought out where applicable and appropriate. The large-scale list included projects that are a size and scope that may likely require outside funding. For the purposes of this assessment, any project with a conceptual cost greater than \$750,000 was considered large-scale. It should be noted that paving projects were not considered a capital improvement project.

Once all possible capital improvement projects were identified, the next step was to assign a rating to each project based on criteria developed by CEG subject-matter experts in order to provide a priority ranking. Each project was ranked based on scores for the following factors: Public Safety, Asset Condition, Public Support, Cost/Complexity, Grant Funding Availability, Community Wide Benefit, Economic Benefit. All of the projects were evaluated using each of the seven factors on a scale ranging from 1 (lowest priority for funding as a capital improvement project) to 5 (highest priority for funding as a capital improvement project). This approach provided a consistent, structured, unbiased approach for ranking each individual project.

The ranking criteria definitions applied to each project are provided below.

Public Safety

Refers to the direct impact a project would have on improving the safety of residents within the Township and the immediacy of safety provided.

High (5)	Medium (3)	Low/None (1)
The project would be completed within a short timeframe and vastly improve the safety of all residents within the Township.	The project would be completed within a longer timeframe and somewhat improve the safety of residents within the Township.	The project has no influence on the overall safety of residents within the Township.

Asset Condition

Refers to the current condition of Township owned and maintained assets, which include stormwater infrastructure, culverts, bridges, roads, sidewalks, trails, and parks.

High (5)	Medium (3)	Low/None (1)
Severe Deterioration of Asset (i.e. large-scale repairs/replacements)	Moderate Deterioration of Asset (i.e. repairs)	No Deterioration of Assets (i.e. preventative projects)



Public Support

Refers to feedback provided by Township residents that were given the opportunity to respond to both specific and general questions regarding the Township's assets through the public survey for the CIP.

High (5)	Medium (3)	Low/None (1)
The project was a consistently mentioned topic or theme within the public survey.	The project was mentioned more than once in the public survey.	The project was not mentioned in the public survey.

Cost / Complexity

Refers not only to the face value cost of completing a project, but also the timeframe and complexity associated with the total cost such as regulatory hurdles and/or coordination with other entities necessary for project completion.

High (5)	Medium (3)	Low/None (1)
The anticipated project cost is lower (<\$100,000). The project is not overly complex, could be completed within 5 years, has few regulatory hurdles, and requires little to no multi-agency coordination in order to initiate and complete.	The anticipated project cost is medium (\$100,000 to \$1,000,000). The project may be complex due to a combination of, extended timeframe, regulatory hurdles and multi-agency coordination required to initiate and complete.	The anticipated project cost is high (>\$1,000,000). The project's complexity will hinder the likelihood of initiation and completion.

Grant Funding Availability

Refers to the availability of grant funding that would alleviate the financial burden on the to complete the project.

High (5)	Medium (3)	Low/None (1)
The project qualifies for grant funding that can be used to pay for the majority or all of the project cost.	The project may qualify for grant funding for less than half of the project cost.	The project likely does not qualify for grant funding of any kind.

Community Wide Benefit

Refers to the scope of citizen population that would benefit from the completion of the project.

High (5)	Medium (3)	Low/None (1)
The project would serve to benefit all or a majority of residents within the Township and surrounding area.	The project would benefit a subset of residents within the Township (i.e. neighborhood(s)).	The project would benefit only one or a handful of residents within the Township (i.e. individuals).



Economic Benefit

Refers to the direct economic impact a project would have on the Township, by either stimulating the economic activities of the current population or drawing in economic activity from an outside population or entity(ies).

High (5)	Medium (3)	Low/None (1)
The project has a high probability of providing direct economic benefit to	The project would indirectly result in economic benefit to the Township.	The project would provide little to no economic benefit to the Township.



14. CAPITAL IMPROVEMENTS BUDGET AND PROJECT RECOMMENDATIONS

A 20-year budget was established for the implementation of this Capital Improvements Plan (CIP) based on a review of the Township’s actual and projected annual capital expenditures from 2016 to 2019. Per this review, the average annual capital budget from 2016 to 2019 was \$359,488. The capital funds budget amounts for each year are listed in Table 19. Assuming that a minimum of \$359,488 will be available for 20 years, the total 20-year CIP budget was set at \$7,189,760.

Table 19- Caln Township Capital Funds Reserve Budget (2016-2019)

Year	Amount
2016 (actual)*	\$265,611
2017 (actual)*	\$343,584
2018 (projected)	\$223,140
2019 (projected)	\$605,615
Total Annual Average	\$359,488
Total Estimated 0-5 Year Capital Budget	\$1,797,440
Total Estimated 5-20 Year Capital Budget	\$5,392,320
Total Estimated 0-20 Year Capital Budget	\$7,189,760

* The Osborne Bridge-Local Share expense was removed from these annual budgets, as it was considered a one-time expenditure.

14.1 Capital Project Recommendations

From the inventory of over 100 projects that were ranked as described in Section 13, the top projects were selected until the approximate 20-year budget amount was reached based on preliminary probable cost estimates for each project. These projects are listed in Table 20 and further described in the Capital Project Detail Sheets in Appendix F. Potential funding agencies were identified, but not specific grant opportunities as these are dynamic and may not be available through the life of this CIP. The projects highlighted in green below should be implemented in the short-term (0-5 years).

This estimate of probable cost provided is preliminary in nature for planning purposes. Costs were calculated by roughly estimating quantities for the repairs noted in the inspection reports and/or project detail sheets. No length or area measurements were taken in the field and all measurements were estimated using google earth or approximated using structure dimensions. The costs associated with these quantities were estimated from unit prices received for similar work and reflect average 2019 prices for these estimates. The cost opinion does not reflect federal wages rates, if they should be added in the future due to grant requirements project costs may increase. Costs for the park improvement projects were estimated using a typical grant award through DCNR programs as the scopes are not yet defined.



Table 20- Capital Project Recommendations

Project ID No.	Name	Type	Timeline	Preliminary Probable Cost Estimate	Potential Funding Agencies
1	Barley Sheaf Road Bridge Rehabilitation	Bridge/Culvert	0-5 years	\$215,000	PennDOT, PA DCED, DVRPC
2	Edge Lane Pipe Replacement	Bridge/Culvert	0-5 years	\$320,000	-
3	North Barley Sheaf Road Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$180,000	-
4	Caln Municipal Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
5	Lloyd Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
6	Caln Park West Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
7	G.O. Carlson Boulevard Curb Extensions	Traffic Improvements	5-20 years	\$480,000	Chester County DCD, DVRPC, PA DCED, PennDOT
8	Bondsville Road Curb Extensions	Traffic Improvements	5-20 years	\$260,000	Chester County DCD, DVRPC, PA DCED, PennDOT
9	Foundry Street Traffic Signage Improvements	Traffic Improvements	5-20 years	\$13,700	-
10	Loomis Avenue Drainage Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$300,000 - \$750,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
11	Moore Road Bridge Rehabilitation	Bridge/Culvert	0-5 years	\$85,000	PennDOT, PA DCED, DVRPC
12	G.O. Carlson Boulevard Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$110,000	PennDOT, PA DCED, DVRPC
13	G.O. Carlson Boulevard Culvert Replacement	Bridge/Culvert	5-20 years	\$540,000	-
14	Ruth A. Dawkins Park Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
15	Kings Highway Open Space Improvements	Parks & Recreation	5-20 years	\$300,000	DCNR
16	Barley Sheaf Road Curb Extensions	Traffic Improvements	5-20 years	\$425,000	Chester County DCD, DVRPC, PA DCED, PennDOT
17	North Caln Road Curb Extensions	Traffic Improvements	5-20 years	\$360,000	Chester County DCD, DVRPC, PA DCED, PennDOT



Table 20- Capital Project Recommendations

Project ID No.	Name	Type	Timeline	Preliminary Probable Cost Estimate	Potential Funding Agencies
18	South Bailey Road and Hazelwood Avenue Traffic Improvements	Traffic Improvements	5-20 years	\$95,000	DVRPC, PA DCED, PennDOT
19	The Links at Thorndale Greene Traffic Improvements	Traffic Improvements	5-20 years	\$4,500	DVRPC, PA DCED, PennDOT
20	Osborne Road Stormwater Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$27,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
21	Barclay Street Pipe Rehabilitation and Drainage Improvements	Bridge/Culvert/Flooding/Stormwater Infrastructure	0-5 years	\$440,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
22	Lynn Boulevard Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$70,000	-
23	Toth Avenue Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$260,000	-
24	Humpton Road Stormwater Improvements	Flooding/Stormwater Infrastructure	5-20 years	\$69,000	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
25	North Barley Sheaf Road Curb Improvements	Road Improvements	5-20 years	\$399,000	Chester County DCD, DVRPC, PA DCED, PennDOT
26	Adams Street Culvert Rehabilitation	Bridge/Culvert	5-20 years	\$130,000	-
27	Ingleside Drive Pipe Rehabilitation	Bridge/Culvert	5-20 years	\$80,000	-
28	Unnamed Tributary to West Branch Brandywine Stream Restoration	Flooding/Stormwater Infrastructure	0-5 years	\$275,000	DEP, NFWF, PA DCED

14.2 Capital Project Budget Summary

The estimated capital project budget summary is provided in Table 21. The estimated capital budget was derived from actual and projected capital expenditures listed in Table 19. In order to provide flexibility and account for inflation, approximately 75 percent of this budget was allocated to capital improvements projects for the short-term (0-5 years). The long-term (5-20 year) capital projects may slightly exceed the estimated capital budget. Outside funds will need to be secured to supplement the Township funds and implement these projects.



Table 21- Capital Project Budget Summary

0-5 Year Capital Project Total Probable Cost Estimate	Estimated 0-5-Year Capital Budget	5-20 Year Capital Project Total Probable Cost Estimate	Estimated 5-20 Year Capital Budget
\$1,335,000	\$1,797,440	\$5,303,200 – 6,053,200	\$5,392,320

14.3 Large-Scale Projects

The top-ranking large-scale projects are listed in Table 22 and further described in the Large-Scale Project Detail Sheets in Appendix F. These projects scored high in the ranking assessment and should be acknowledged and spearheaded but may not fit into the Township’s annual capital reserve expenditures and were therefore excluded.

Preliminary probable cost estimates were not provided for these projects as the scopes are anticipated to be complex and highly variable. Costs would be better determined after feasibility level studies are completed. However, the costs of these projects are anticipated to be large enough that outside funding and partners will be required; thus, these projects are not expected to be implemented as part of this Capital Improvements Plan.

Table 22- Large-Scale Project Recommendations Requiring Outside Funding Sources

Project ID No.	Name	Type	Potential Funding Agencies
29	11th Avenue Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
30	South Bailey Road Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
31	South Lloyd Avenue Underpass Stormwater Improvements	Flooding/Stormwater Infrastructure	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD
32	Lincoln Highway Streetscaping Additions	Streetscaping	Chester County DCD, DVRPC, PA DCED, PennDOT
33	E. Fisherville Road Bridge Replacement	Bridge/Culvert	PennDOT, PA DCED, DVRPC
34	G.O. Carlson Boulevard Trail Extension	Trails	DCNR
35	G.L. Eggleston Boulevard Trail Extension	Trails	DCNR

*Preliminary probable cost estimates were not provided for these projects as the scopes are anticipated to be complex and highly variable. The costs of these projects are anticipated to be large enough that outside funding and partners will be required; thus, these projects are not expected to be implemented as part of this Capital Improvements Plan.



14.4 Liquid Fuels

As stated in Section 13, paving projects were not assessed as capital improvement projects. For the purposes of this Capital Improvements Plan, it is assumed that the Township's annual Liquid Fuels Reserve will be dedicated to paving projects, although may be allocated toward culvert or bridge improvement projects if necessary. The information provided in the Roads section (Section 7) and in Appendices B and C of this report should be utilized to prioritize paving projects. The liquid fuels reserve budget amounts for each year are listed in Table 23.

Table 23- Caln Township Liquid Fuels Reserve Budget (2016-2019)

Year	Amount
2016 (actual)	\$254,239
2017 (actual)	\$364,720
2018 (projected)	\$624,351
2019 (projected)	\$444,520
Total Annual Average	\$421,958



APPENDIX A

Online Public Survey



Caln Township Capital Improvements Plan Public Survey

* Required



1. Rank each of the following Township assets in order of importance (#1 being the least important to #5 being the most important asset): *

	1	2	3	4	5
Parks/Trails	<input type="radio"/>				
Streetscaping (beautification of streets with trees, flowers, street lighting, benches etc.)	<input type="radio"/>				
Roads	<input type="radio"/>				
Stormwater infrastrucutre (inlets, pipes, etc.)	<input type="radio"/>				
Sidewalks	<input type="radio"/>				

2. How satisfied are you with the Township's parks and recreation facilities? *

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied



3. Rank each of the following park amenities in order of importance (#1 being the least important to #5 being the most important): *

	1	2	3	4	5
Pedestrian paths	<input type="radio"/>				
Bicycle paths	<input type="radio"/>				
Dog accessibility	<input type="radio"/>				
ADA accessibility (inclusion of features such as accessible parking spaces, routes and toilet facilities for the disabled)	<input type="radio"/>				
Pavilions	<input type="radio"/>				
Playgrounds	<input type="radio"/>				
Sporting facilities	<input type="radio"/>				
Landscaping	<input type="radio"/>				
Restrooms	<input type="radio"/>				



4. How satisfied are you with the Township's road conditions (consider potholes, cracks, debris, shoulders, etc.)? *

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied

5. How satisfied are you with the Township's walkability (presence of sidewalks, trails and connectivity)? *

- Very satisfied
- Somewhat satisfied
- Neither satisfied nor dissatisfied
- Somewhat dissatisfied
- Very dissatisfied



6. How easy is it for people who are disabled to get around in the Township? *

- Very easy
- Somewhat easy
- Difficult
- Very difficult
- Not applicable

7. Have you observed any flooding in the Township resulting from inadequate stormwater infrastructure (broken pipes, clogged inlets, etc.) *

- Yes
- No

8. If yes to question #7, where did you observe the flooding?

Your answer _____



9. Overall, how would you rate Caln Township's infrastructure conditions? (bridges, roads, stormwater inlets, parks, etc.): *

- Excellent
- Above average
- Average
- Below average

10. Do you have any comments or concerns regarding any of the above questions?

Your answer

SUBMIT

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Google Forms





APPENDIX B

Township Pavement Condition Listing

Road Name	Surface Type	Condition Score	Distress1	Distress2	Distress3	Distress4	Comment	Cross Street Reference
Acorn ST	Asphalt	10						
Adams ST	Asphalt	8						
Albermarle CT	Asphalt	9						
Allison LA	Asphalt	6	Transverse Cracking		Longitudinal Cracking			
Alydar RD	Asphalt	9						
Ambrose AV	Asphalt	2	Transverse Cracking	Potholes	Longitudinal Cracking			
Andrew CI	Asphalt	6	Transverse Cracking	Block Cracking	Longitudinal Cracking			
Andrew RD	Asphalt	6	Longitudinal Cracking	Transverse Cracking				
Atkins AV	Asphalt	6	Longitudinal Cracking	Transverse Cracking	Block Cracking			
Avebury Stone CI	Asphalt	9						
Ayerwood DR	Asphalt	9						
Baker LA	Asphalt	7	Transverse Cracking	Block Cracking	Longitudinal Cracking			
Balmoral RD	Asphalt	9						
Barclay ST	Asphalt	8						
Barley Sheaf RD	Asphalt	6	Longitudinal Cracking	Microsurface Peeling	Transverse Cracking	Block Cracking		
Beaver Run RD	Asphalt	5	Block Cracking	Transverse Cracking	Longitudinal Cracking		Failing microsurface treatment.	
Broad ST	Asphalt	5	Block Cracking	Transverse Cracking	Longitudinal Cracking			
Brook LA	Asphalt	7					Needs cul-de-sac and no parking signs	
Bungalow Glade	Asphalt	7						
Caln Meetinghouse RD	Asphalt	7	Rutting	Microsurface Peeling	Longitudinal Cracking			
Caranel CI	Asphalt	7	Transverse Cracking					
Carlson WY	Asphalt	6	Transverse Cracking	Longitudinal Cracking			Failing microsurface treatment.	
Clothier ST	Asphalt	7	Transverse Cracking		Block Cracking			
Corey LA	Asphalt	7					Drainage issues in cul-de-sac	
Country Edge CI	Asphalt	7	Longitudinal Cracking					
Courtney LA	Asphalt	8						
Crest DR	Asphalt	6	Longitudinal Cracking		Transverse Cracking			
Dana DR	Asphalt	7	Longitudinal Cracking					
Deer DR	Asphalt	6	Longitudinal Cracking	Transverse Cracking				
Deerfield DR	Asphalt	7	Longitudinal Cracking					
Dogwood LA	Asphalt	7	Longitudinal Cracking					
Doral CT	Asphalt	7						
Dupont ST	Asphalt	9						
E Fisherville RD	Asphalt	1					Not functioning due to bridge closure.	
E Harmony ST	Asphalt	6	Longitudinal Cracking		Transverse Cracking			
E Morgan DR	Asphalt	6	Transverse Cracking	Block Cracking	Longitudinal Cracking			
E Summit AV	Asphalt	5	Longitudinal Cracking	Potholes	Block Cracking			
Edge LA	Asphalt	9					Some curb deterioration	
Edgemont AV	Asphalt	7						
Ehlen AV	Asphalt	6						
Eighteenth AV	Asphalt	7	Longitudinal Cracking					
Eleventh AV	Asphalt	7					Drainage issues under bridge	
Eliot CI	Asphalt	6	Longitudinal Cracking		Transverse Cracking		Patching	
Eliot RD	Asphalt	6	Longitudinal Cracking		Transverse Cracking		Patching	

Road Name	Surface Type	Condition Score	Distress1	Distress2	Distress3	Distress4	Comment	Cross Street Reference
Elizabeth CT	Asphalt	6	Block Cracking	Longitudinal Cracking	Transverse Cracking		Standing water needs to be addressed in the cul-de-sac	
Elmwood LA	Asphalt	7	Longitudinal Cracking					
Embreeville RD	Asphalt	6						
Essex ST	Asphalt	9						
Fifteenth AV	Asphalt	4	Longitudinal Cracking	Block Cracking	Transverse Cracking			
First AV	Asphalt	10						
Fisherville RD	Asphalt	7	Longitudinal Cracking	Block Cracking	Shoulder Drop-off			
Fitzwilliam CT	Asphalt	9						
Foundry ST	Asphalt	7	Longitudinal Cracking				Ponding around curb	
Fourteenth AV	Asphalt	6	Transverse Cracking	Longitudinal Cracking				
Fox AV	Asphalt	6	Longitudinal Cracking	Transverse Cracking				
Fox Farm LA	Asphalt	7	Longitudinal Cracking	Transverse Cracking	Block Cracking			
Fulton AV	Asphalt	6	Longitudinal Cracking	Potholes			Cul-de-sac should be added	
Fynamore LA	Asphalt	9						
G L Eggleston BL	Asphalt	7						
G O Carlson BL	Asphalt	10						
G O Carlson BL	Asphalt	5	Microsurface Peeling	Transverse Cracking	Block Cracking			Segments between Bondsville Rd and Park Dr.
G O Carlson BL	Asphalt	7	Transverse Cracking	Block Cracking	Longitudinal Cracking	Block Cracking		Segments between Bailey Rd and Loomis Ave.
G O Carlson BL	Asphalt	8						Segements between Devon Ct and Lloyed Ave.
Gallaherville RD	Asphalt	7						
Garden View DR	Asphalt	7	Transverse Cracking	Longitudinal Cracking			Hole in role	
Glen View LA	Asphalt	6	Block Cracking	Transverse Cracking	Longitudinal Cracking			
Glenridge DR	Asphalt	6	Block Cracking	Transverse Cracking	Longitudinal Cracking			
Grandview RD	Asphalt	5	Rutting	Longitudinal Cracking	Block Cracking			
Granger LA	Asphalt	8						
Greenleaf CT	Asphalt	7	Longitudinal Cracking					
Greenwood CI	Asphalt	7	Block Cracking		Longitudinal Cracking			
Hartley AV	Asphalt	6	Transverse Cracking	Potholes	Block Cracking	Longitudinal Cracking		
Harvest DR	Asphalt	8						
Hazelwood AV	Asphalt	10						
Hazelwood AV	Asphalt	6	Rutting	Longitudinal Cracking				Segments between Marshallton Rd and Gallagherville Rd.
Heather CT	Asphalt	8					Possible drainage issues in cul-de-sac	
Hidden Creek DR	Asphalt	7	Longitudinal Cracking					
Hillcrest DR	Asphalt	6	Transverse Cracking	Longitudinal Cracking	Block Cracking			
Homestead LA	Asphalt	8						
Honeymead RD	Asphalt	9						
Horseshoe DR	Asphalt	8						
Humpton RD	Asphalt	9						
Hurley RD	Asphalt	8	Longitudinal Cracking					
Ingleside DR	Asphalt	8						
James Buchanan DR	Asphalt	6					Patching	
Jason LA	Asphalt	8						
Jennifer DR	Asphalt	6	Transverse Cracking		Longitudinal Cracking			
Jewell AV	Asphalt	7						

Road Name	Surface Type	Condition Score	Distress1	Distress2	Distress3	Distress4	Comment	Cross Street Reference
Johnson AV	Asphalt	7	Longitudinal Cracking		Transverse Cracking			
Jonathan DR	Concrete	6	Longitudinal Cracking		Transverse Cracking		Sediment accumulation near 206 and 207.	
Joseph CT	Asphalt	7	Transverse Cracking				Drainage issues at driveways	
Katherine LA	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
Kings Grant BL	Asphalt	9						
Kingsway DR	Asphalt	4	Block Cracking	Potholes	Longitudinal Cracking		Ends of curb in poor condition.	
Kingswood LA	Asphalt	7	Longitudinal Cracking		Transverse Cracking			
Larson DR	Asphalt	6	Longitudinal Cracking		Transverse Cracking			
Lisa DR	Asphalt	8						
Longview DR	Asphalt	7	Potholes	Block Cracking	Longitudinal Cracking			
Loomis AV	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
Louanna AV	Asphalt	5	Potholes	Longitudinal Cracking				
Lynn BL	Asphalt	9						
Magnolia CT	Asphalt	6	Transverse Cracking	Block Cracking	Longitudinal Cracking		Standing water. Drainage improvements needed in cul-de-sac	
Maple AV	Asphalt	6	Transverse Cracking		Longitudinal Cracking			
Marion DR	Asphalt	8	Longitudinal Cracking					
Marshall CI	Asphalt	8						
Marshall DR	Asphalt	7	Longitudinal Cracking		Transverse Cracking			
Meadow DR	Asphalt	7						
Miller AV	Asphalt	6	Potholes	Longitudinal Cracking	Block Cracking	Transverse Cracking	Centerline cracking	
Millwood LA	Asphalt	7	Longitudinal Cracking		Transverse Cracking		Curb deterioration	
Moore RD	Asphalt	6	Longitudinal Cracking	Shoulder Drop-off	Rutting			
Municipal DR	Asphalt	7	Longitudinal Cracking		Transverse Cracking			
N Bailey RD	Asphalt	6	Shoulder Drop-off		Longitudinal Cracking			Segment between Kings Hwy and Fisherville Rd.
N Bailey RD	Asphalt	8	Rutting	Uneven road surface	Edge cracking near bridge			Segment between Township boundary and Fisherville Rd, and segments between Kings Hwy and Lincoln Hwy.
N Barley Sheaf RD	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
N Humpton RD	Asphalt	5	Block Cracking				Delamination	
N Lloyd AV	Asphalt	7	Shoulder Drop-off				Shoulder cracking. Reseal repaired sections	
N Longview DR	Asphalt	8						
Norma DR	Asphalt	7	Longitudinal Cracking	Raveling			Poor curb condition, Minor transverse cracking.	
Norton AV	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
Norwood AV	Asphalt	5	Longitudinal Cracking	Block Cracking				
Oak LA	Asphalt	6	Longitudinal Cracking	Block Cracking				
Oak ST	Asphalt	4	Longitudinal Cracking	Transverse Cracking	Potholes			
Oakmont DR	Asphalt	7	Longitudinal Cracking					
Olive ST	Asphalt	7	Transverse Cracking	Longitudinal Cracking				
Osborne RD	Asphalt	9					Road scraping near 1003 Osborne	
Park DR	Asphalt	7	Transverse Cracking					
Parkside AV	Asphalt	6						
Parkside DR	Asphalt	6	Longitudinal Cracking		Transverse Cracking			
Paul Nelms DR	Asphalt	6	Longitudinal Cracking	Transverse Cracking				
Pierce LA	Asphalt	7						
Pippen LA	Asphalt	7					Construction impact	
Quarry ST	Asphalt	6	Transverse Cracking					

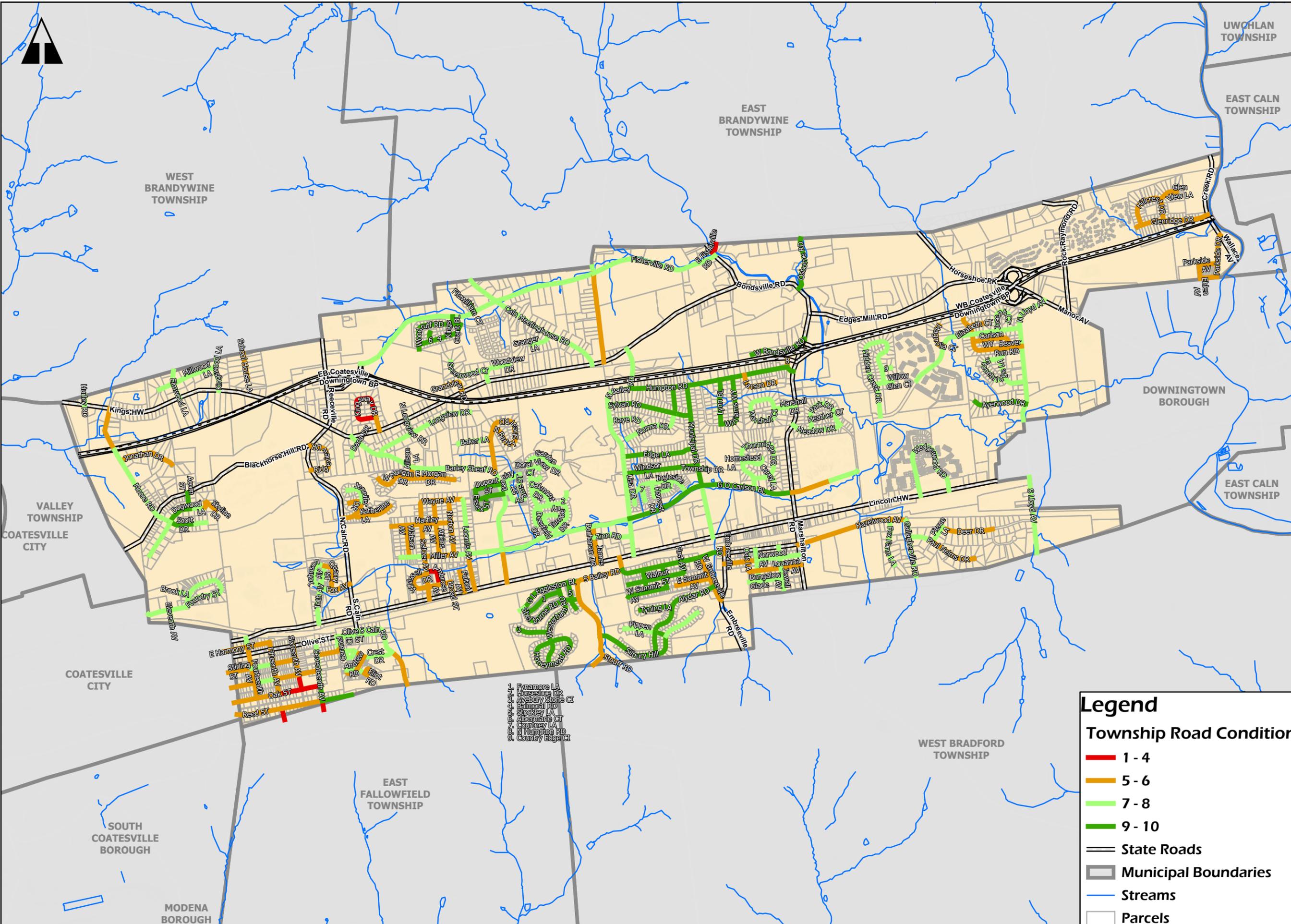
Road Name	Surface Type	Condition Score	Distress1	Distress2	Distress3	Distress4	Comment	Cross Street Reference
Raye RD	Asphalt	8	Longitudinal Cracking					
Reed ST	Asphalt	6	Longitudinal Cracking					Segments between Thirteenth Ave and Seventeenth Ave
Reed ST	Asphalt	10						Segment between Seventeenth Ave and end of road
Ridgeview DR	Asphalt	6	Longitudinal Cracking		Block Cracking			
S Bailey RD	Asphalt	6	Longitudinal Cracking					
S Caln RD	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
S Lloyd AV	Asphalt	7	Longitudinal Cracking					
School House LA	Asphalt	6	Block Cracking					
Scott DR	Asphalt	7	Longitudinal Cracking					Segment between Blackhorse Hill Rd and Dogwood Rd, and segment between cul-de-sac and midpoint to intersection.
Scott DR	Asphalt	10						Segment between Dogwood Dr and midpoint to cul-de-sac.
Second AV	Asphalt	10						
Seltzer AV	Asphalt	6	Transverse Cracking	Block Cracking	Longitudinal Cracking	Potholes		
Seventeenth AV	Asphalt	4	Potholes					Segment between Reed St and Township boundary.
Seventeenth AV	Asphalt	7	Potholes	Longitudinal Cracking				Segments between Reed St and Olive St.
Shelburne RD	Asphalt	9						
Sherry LA	Asphalt	6	Longitudinal Cracking		Transverse Cracking			
Silbury Hill	Asphalt	8	Raveling	Shoving				
Sixteenth AV	Asphalt	4	Potholes	Transverse Cracking	Longitudinal Cracking	Block Cracking	Spring at top of segment	
Skyline DR	Asphalt	6	Longitudinal Cracking		Potholes			
Stirling ST	Asphalt	6	Transverse Cracking	Block Cracking	Longitudinal Cracking			
Stockley LA	Asphalt	9						
Stonebridge LA	Asphalt	8	Transverse Cracking				Crack at intersection	
Stouff RD	Asphalt	6						
Sylvan RD	Asphalt	9					Poor curb line	
Third AV	Asphalt	10						
Thornridge DR	Asphalt	8						
Toth AV	Asphalt	7	Longitudinal Cracking					
Township DR	Asphalt	9						
Turnberry DR	Asphalt	7	Longitudinal Cracking	Transverse Cracking				
Tyning LA	Asphalt	9						
W Bondsville RD	Asphalt	10						
W Embreeville RD	Asphalt	6	Longitudinal Cracking		Block Cracking			
W Morgan DR	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking		Manhole at top of cul de sac is sinking	
W Summit AV	Asphalt	10						
Walnut ST	Asphalt	6	Transverse Cracking	Longitudinal Cracking			Spring at 1630	Segments between Seventeenth Ave and Thirteenth Ave.
Walnut ST	Asphalt	10						Segments crossing Third, Second, and First Ave.
Warren AV	Asphalt	5	Potholes	Block Cracking	Longitudinal Cracking			
Watson AV	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
Wayne AV	Asphalt	6	Longitudinal Cracking	Block Cracking	Transverse Cracking			
Wedgewood RD	Asphalt		Transverse Cracking					
Wedgewood RD	Asphalt	7	Longitudinal Cracking	Transverse Cracking			Drainage issues in the road	
Westerham RD	Asphalt	9					Uneven pavement along curb	
Whissell DR	Asphalt	6	Longitudinal Cracking					
Williams WY	Asphalt	9						

Road Name	Surface Type	Condition Score	Distress1	Distress2	Distress3	Distress4	Comment	Cross Street Reference
Willow Glen CI	Asphalt	8					Cracking at intersection joint	
Windsor LA	Asphalt	9						
Woodruff RD	Asphalt	9					Reseal pavement joint	
Woodview DR	Asphalt	7	Block Cracking				Concentrated drainage towards one end	
Zinn RD	Asphalt	8	Longitudinal Cracking		Transverse Cracking		Curb deterioration	



APPENDIX C

Pavement Condition Map



NOTES:
 1. Parcels and base road layer provided by the Chester County GIS (2018).
 2. Road data (i.e. observations, recommendations, road score, etc.) collected by CEG in 2018.
 3. Road scores were assigned based on a 1 to 10 rating scale reflecting general road condition and need of repair.

DISCLAIMER:
 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. Infrastructure ownership information is displayed for general planning purposes. It may not be accurate and is not legal or definitive.

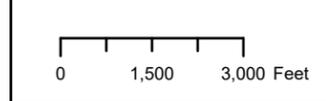
CALN TOWNSHIP ROAD PROGRAM ROAD CONDITION (2018)

CHESTER COUNTY, PENNSYLVANIA

Date: 02/28/2019



DRAWN BY: WH



1 Inch = 3,000 Feet

Legend

Township Road Condition

- █ 1 - 4
- █ 5 - 6
- █ 7 - 8
- █ 9 - 10
- State Roads
- Municipal Boundaries
- Streams
- Parcels



APPENDIX D

Culvert and Bridge Location Map



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Caln Township
 Capital Improvements Plan

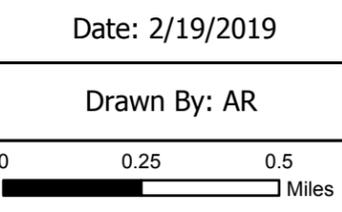
Culvert & Bridge Location Map

CALN TOWNSHIP
 CHESTER COUNTY, PENNSYLVANIA

- Legend**
- Bridges and Culverts
 - Streams
 - Township Boundary

Date: 2/19/2019

Drawn By: AR



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



APPENDIX E

Pipe Crossing Location Map



DISCLAIMER:
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Caln Township
 Capital Improvements Plan

Pipe Crossing Location Map

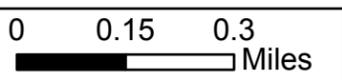
CALN TOWNSHIP
 CHESTER COUNTY, PENNSYLVANIA

Date: 2/19/2019

Drawn By: AR

Revisions:

- Legend**
- Pipe Crossings
 - Streams
 - Township Boundary



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



APPENDIX F

Project Detail Sheets



BARLEY SHEAF ROAD BRIDGE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$215,000
LOCATION: Barley Sheaf Rd	TIMEFRAME: 0-5 years
PROJECT ID NO.: 1	SOURCE: CEG Field Observation

Project Description:

This project is located on Barley Sheaf Road, south of the G.O. Carlson Boulevard intersection at the stream crossing. The bridge consists of an original structure of stone masonry

abutments, steel beams, and a concrete deck that was widened with concrete and steel beams in order to accommodate two lanes of traffic and a pedestrian sidewalk. The original stone masonry abutments and steel beams require significant repair. There is undermining, dislodged stones, and rusted beams observed with the structure. Recommendations include structural repairs and blasting and painting of the structural beams.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		PennDOT, PA DCED, DVRPC		<i>Budget Distribution</i>	
					AMOUNT
TOTAL PROJECT COST:				DESIGN/PERMITTING	\$32,250.00
YEAR:	<input checked="" type="checkbox"/> 0-5 Years	<input type="checkbox"/> 5-20 Years		CONSTRUCTION	\$131,150.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied	<input type="checkbox"/> Application Pending	<input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$12,900.00
				CONTINGENCY (30%)	\$38,700.00
				TOTAL	\$215,000.00

NOTES:



EDGE LANE PIPE REPLACEMENT

CATEGORY: Bridge/Culvert	COST: \$320,000
LOCATION: Edge Lane	TIMEFRAME: 0-5 years
PROJECT ID NO.: 2	SOURCE: CEG Field Observation

Project Description:

This project is located on Edge Lane, east of the N. Bailey Road intersection at the stream crossing. The pipe is an elliptical corrugated metal arch pipe approximately 36 inches in height by 70 inches in width, conveying an Unnamed Tributary to Valley Run. The structure shows significant scaling rust just above the waterline along the bottom of the entire length of the pipe. The pipe is misaligned and, at times, contains standing water. It is recommended that the pipe be completely replaced.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

TOTAL PROJECT COST:

YEAR: 0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if applicable): Not Yet Applied Application Pending Funding Received

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$48,000.00
CONSTRUCTION	\$227,200.00
CONSTRUCTION INSPECTION & ADMINISTRATION	\$19,200.00
CONTINGENCY (30%)	\$25,600.00
TOTAL	\$320,000.00

NOTES:



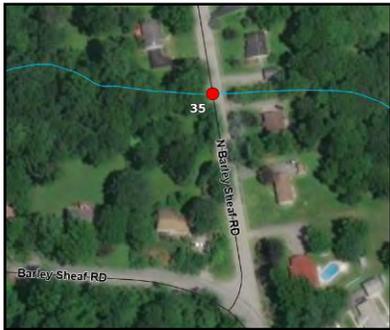
NORTH BARLEY SHEAF ROAD PIPE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$180,000
LOCATION: North Barley Sheaf Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 3	SOURCE: CEG Field Observation

Project Description:

This project is located on North Barley Sheaf Road, north of the Barley Sheaf Road intersection at the stream crossing. The pipe is a 48-inch reinforced concrete pipe (RCP) conveying an Unnamed Tributary to Valley Run. A section of pipe has become disconnected on the upstream side causing a significant gap between the pipe sections and significant

movement in the slope, inlet and curb above the pipe. Additionally, the inlet tops are set directly on top of the existing pipe, draining through holes cut in the top of the pipe sections. Cracking and depressions in the pavement surface above the pipe were observed and are likely cause primarily by inadequate backfill compaction at the time of installation. There is also significant scouring on the upstream end of the pipe, likely due to a combination of the pipe disconnection and the flow of water in the area during high water events. It is recommended that the pipe be reconnected to the stream sections and stabilize the bank. Further repair should be considered as well, which includes replacement of inlets and pavement repairs.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

TOTAL PROJECT COST:

YEAR: 0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if Not Yet Application Funding

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$27,000.00
CONSTRUCTION	\$127,800.00
CONSTRUCTION INSPECTION & ADMINISTRATION	\$10,800.00
CONTINGENCY (30%)	\$14,400.00
TOTAL	\$180,000.00

NOTES:



CALN MUNICIPAL PARK IMPROVEMENTS

CATEGORY: Parks and Recreation	COST: \$300,000
LOCATION: Caln Municipal Park	TIMEFRAME: 5-20 years
PROJECT ID NO.: 4	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

Caln Municipal Park is 20 acres in size and is located off of Municipal Drive. The park is used primarily for passive recreation. A park master plan should be created, updated, and/or reviewed before implementation occurs. Because the specific improvements proposed are currently unknown, the budget allocated to this project was generated from the maximum grant opportunity through DCNR available at the time of the completion of this report. Recommended improvements may include:



- Adding parkland
- Improving the park to meet a wide variety of recreational needs
- Updates to trash cans located throughout the park
- Routine maintenance of park benches and picnic tables

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	DCNR	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$45,000.00
		CONSTRUCTION	\$213,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years		CONSTRUCTION INSPECTION & ADMINISTRATION	\$18,000.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONTINGENCY (30%)	\$24,000.00
		TOTAL	\$300,000.00

NOTES:



LLOYD PARK IMPROVEMENTS

CATEGORY: Parks and Recreation	COST: \$300,000
LOCATION: Lloyd Park	TIMEFRAME: 5-20 years
PROJECT ID NO.: 5	SOURCE: 2017 Caln Township Comprehensive Plan/CEG Field Observation

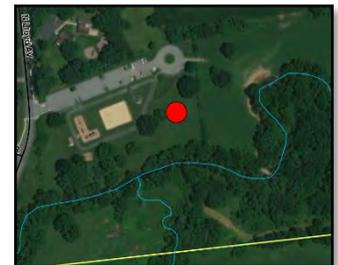
Project Description:

Lloyd Park is 30 acres in size and is located off of Lloyd Avenue at Mary Street. The park is currently primarily used for passive recreation. A park concept master plan should be developed to identify specific improvements to the park. Because the specific improvements proposed are currently unknown, the budget allocated to this project was generated from the maximum grant opportunity through DCNR available at the time of the completion of this report.



Recommended improvements may include:

- An Information kiosk
- Two horseshoe courts
- A picnic/performance area
- Restoration of Beaver Creek, which runs through the entire length of the park
- A dog beach along Beaver Creek
- A fitness trail with rest stops
- A pedestrian bridge over Beaver Creek
- A stormwater demonstration area
- Future connection to the Brandywine-Struble Regional Recreation Corridor
- Link Between pedestrian path and school yard
- Trail, link to existing parking and athletic fields
- Trail link to existing sidewalk system.
- Environmental education area



FINANCIAL SUMMARY

Budget Distribution

POTENTIAL FUNDING SOURCE(S):	DCNR		AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$45,000.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$213,000.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$18,000.00
		CONTINGENCY (30%)	\$24,000.00
		TOTAL	\$300,000.00

NOTES:



CALN PARK WEST IMPROVEMENTS

CATEGORY: Parks and Recreation	COST: \$300,000
LOCATION: Caln Park West	TIMEFRAME: 5-20 years
PROJECT ID NO.: 6	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

Caln Park West is 20 acres in size and is located off of Route 340 near the VA Medical Center. The park is used primarily for athletic recreation. A park master plan should be created, updated, and/or reviewed before implementation occurs. Because the specific improvements proposed are currently unknown, the budget allocated to this project was generated from the maximum grant opportunity through DCNR available at the time of the completion of this report. Recommended improvements may include:



- Improving the park to meet a wide variety of recreational needs
- Additional seating
- Permanent restroom facility
- Routine maintenance of trash and recycling cans



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	DCNR	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$45,000.00
		CONSTRUCTION	\$213,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years		CONSTRUCTION INSPECTION & ADMINISTRATION	\$18,000.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONTINGENCY (30%)	\$24,000.00
		TOTAL	\$300,000.00

NOTES:



G.O. CARLSON BOULEVARD CURB EXTENSIONS

CATEGORY: Traffic Improvement	COST: \$480,000
LOCATION: G.O. Carlson Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 7	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

This project is located along G.O. Carlson Boulevard. The goal is to extend curbing along G.O. Carlson Boulevard in locations where needed. As part of the 2017 Caln Township Comprehensive Plan, this is to be carried out as part of the “Complete Streets” concept.



This concept involves considering all of the different users of a public right-of-way, as opposed to placing the priority on motor vehicles. This curb improvement would take into consideration the needs of pedestrians, persons in wheelchairs, bicyclists and public transit users. The use of curb extensions can reduce the speeds of turning vehicles and the distance of a street that must be crossed by pedestrians. A feasibility study should be conducted



to identify specific locations and determine design alternatives to keep costs reasonable and also avoid right-of-way acquisitions if possible. As part of the feasibility study, stormwater, sidewalks, and streetscaping elements should be addressed.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	PA DCED, Chester County DCD, DVRPC, PennDOT	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$72,000.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$292,800.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$28,800.00
		CONTINGENCY (30%)	\$86,400.00
		TOTAL	\$480,000.00

NOTES:



BONDVILLE ROAD CURB EXTENSIONS

CATEGORY: Traffic Improvement	COST: \$260,000
LOCATION: Bondsville Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 8	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

This project is located along Bondsville Road. The goal is to extend curbing along Bondsville Road in locations where needed. As part of the 2017 Caln Township Comprehensive Plan, this is to be carried out as part of the “Complete Streets” concept. This concept involves considering all of the different users of a public right-of-way, as opposed to placing the priority on motor vehicles. This curb improvement would take into consideration the needs of pedestrians, persons in wheelchairs, bicyclists and public transit users. The use of curb extensions can reduce the speeds of turning vehicles and the distance of a street that must be crossed by pedestrians. A feasibility study should be conducted to identify specific locations and determine design alternatives to keep costs reasonable and also avoid right-of-way acquisitions if possible. As part of the feasibility study, stormwater, sidewalks, and streetscaping elements should be addressed.



As part of the 2017 Caln Township Comprehensive Plan, this is to be carried out as part of the “Complete Streets” concept. This concept involves considering all of the different users of a public right-of-way, as opposed to placing the priority on motor vehicles. This curb improvement would take into consideration the needs of pedestrians, persons in wheelchairs, bicyclists and public transit users. The use of curb extensions can reduce the speeds of turning vehicles and the distance of a street that must be crossed by pedestrians. A feasibility study should be conducted to identify specific locations and determine design alternatives to keep costs reasonable and also avoid right-of-way acquisitions if possible. As part of the feasibility study, stormwater, sidewalks, and streetscaping elements should be addressed.



As part of the feasibility study, stormwater, sidewalks, and streetscaping elements should be addressed.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	PA DCED, Chester County DCD, DVRPC, PennDOT	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$39,000.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$158,600.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$15,600.00
		CONTINGENCY (30%)	\$46,800.00
		TOTAL	\$260,000.00

NOTES:



FOUNDRY STREET TRAFFIC SIGNAGE IMPROVEMENTS

CATEGORY: Traffic Improvements	COST: \$13,700
LOCATION: Foundry Street	TIMEFRAME: 5-20 years
PROJECT ID NO.: 9	SOURCE: CEG Field Observation

Project Description:

This project is located at the entrance of Carver Court on Foundry Street. Currently, there is a one-way sign at the entrance to the community however the flow direction of traffic is not clear. Vehicles are parked on either side of the road, restricting the width of the travel lane. Recommendations include further evaluation of the traffic patterns in this area and improvements to the signage and pavement markings.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

TOTAL PROJECT COST:

YEAR: 0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if applicable): Not Yet Applied Application Pending Funding Received

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$7,500.00
CONSTRUCTION	\$3,000.00
CONSTRUCTION INSPECTION AND ADMINISTRATION	-
CONTINGENCY	\$3,200.00
TOTAL	\$13,700.00

NOTES:



LOOMIS AVENUE DRAINAGE IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: \$300,000 - \$750,000
LOCATION: Loomis Avenue	TIMEFRAME: 5-20 years
PROJECT ID NO.: 10	SOURCE: Public Survey, CEG Field Observation, Township Staff

Project Description:

This project is located within the drainage area of the following avenues: Loomis, Wayne, Hartley, Norton, Atkins, Seltzer, Watson, Miller. This area experiences flooding, specifically where Valley Run flows through a bridge under Loomis Avenue. The aging stormwater infrastructure in this area may also contribute to the flooding. The stormwater system poses a maintenance challenge as well, as the publicly owned infrastructure are closely intertwined with privately owned infrastructure.



It is recommended that a comprehensive stormwater management study be conducted for this area in order to determine the drainage patterns, including an analysis of the stream flow under the bridges in this area, in order to

develop a plan that will mitigate flooding. The size and scope of this project cannot be determined until this feasibility-level is complete. A potential cost range has been allocated for this project for budgeting purposes and will be honed based on the results of the study.

FINANCIAL SUMMARY

Budget Distribution

POTENTIAL FUNDING SOURCE(S):	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD		AMOUNT
TOTAL PROJECT COST:		<i>DESIGN/PERMITTING</i>	\$45,000.00-\$112,500.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	<i>CONSTRUCTION</i>	\$213,000.00-\$532,500.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	<i>CONSTRUCTION INSPECTION & ADMINISTRATION</i>	\$18,000.00-\$45,000.00
		<i>CONTINGENCY (30%)</i>	\$24,000.00-\$60,000.00
		TOTAL	\$300,000.00-\$750,000.00

NOTES:



MOORE ROAD BRIDGE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$85,000
LOCATION: Moore Rd	TIMEFRAME: 0-5 years
PROJECT ID NO.: 11	SOURCE: CEG Field Observation

Project Description:

This project is located on Moore Road, 0.15 miles south of the Kings Highway intersection at the stream crossing. The bridge is an original stone masonry and timber structure that was widened to accommodate a second lane of traffic. The wooden beams are not in contact with the existing concrete deck of the structure. It is recommended that the bridge be evaluated by a structural engineer in order to determine if the structure should have a weight limit posted. Additionally, it is recommended that the structural abutments be repaired.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		PennDOT, PA DCED, DVRPC		<i>Budget Distribution</i>	
					AMOUNT
TOTAL PROJECT COST:				DESIGN/PERMITTING	\$12,750.00
YEAR:	<input checked="" type="checkbox"/> 0-5 Years <input type="checkbox"/> 5-20 Years			CONSTRUCTION	\$51,850.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received			CONSTRUCTION INSPECTION & ADMINISTRATION	\$5,100.00
				CONTINGENCY (30%)	\$15,300.00
				TOTAL	\$85,000.00

NOTES:



G.O. CARLSON BOULEVARD PIPE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$110,000
LOCATION: G.O. Carlson Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 12	SOURCE: CEG Field Observation

Project Description:

This project is located on G.O. Carlson Boulevard, east of the Municipal Drive intersection at the stream crossing. The pipe is a 24-inch corrugated metal pipe conveying an Unnamed Tributary to Valley Run. The pipe shows significant signs of corrosion, with significant scale rust along the bottom third of the pipe. It is recommended that the pipe be lined in order to increase the structural integrity of the pipe and protect the remaining metal from further corrosion.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	PennDOT, PA DCED, DVRPC	Budget Distribution	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$16,500.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years		CONSTRUCTION	\$78,100.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONSTRUCTION INSPECTION & ADMINISTRATION	\$6,600.00
		CONTINGENCY (30%)	\$8,800.00
		TOTAL	\$110,000.00

NOTES:



G.O. CARLSON BOULEVARD CULVERT REPLACEMENT

CATEGORY: Bridge/Culvert	COST: \$540,000
LOCATION: G.O. Carlson Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 13	SOURCE: CEG Field Observation

Project Description:

This project is located on G.O. Carlson Boulevard, east of the N. Bailey Road intersection at the stream crossing. The structure consists of 4 corrugated metal arches, each approximately 40 inches in height by 66 inches in width, conveying an Unnamed Tributary to Valley Run. There is a significant amount of sediment within the structure in addition to a dip observed in the center of all the pipes, due to settlement. Additionally, the curbing above the pipe shows noticeable signs of settlement. It is recommended that the entire structure is replaced.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

TOTAL PROJECT COST:

YEAR: 0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if applicable): Not Yet Applied Application Pending Funding Received

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$81,000.00
CONSTRUCTION	\$383,400.00
CONSTRUCTION INSPECTION & ADMINISTRATION	\$32,400.00
CONTINGENCY (30%)	\$43,200.00
TOTAL	\$540,000.00

NOTES:



RUTH A. DAWKINS MEMORIAL PARK IMPROVEMENTS

CATEGORY: Parks and Recreation	COST: \$300,000
LOCATION: Ruth A. Dawkins Memorial Park	TIMEFRAME:
PROJECT ID NO.: 14	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

Ruth A. Dawkins park is a small neighborhood park in the Brandywine Homes section of the Township, which includes play equipment, two picnic pavilions, and a basketball court. A park master plan should be created, updated, and/or reviewed before implementation occurs.



Because the specific improvements proposed are currently unknown, the budget allocated to this project was generated from the maximum grant opportunity through DCNR available at the time of the completion of this report. Recommended improvements may include:

- Improving the park to meet a wide variety of recreational needs
- Water fountain repairs/updates
- Routine maintenance of park benches and picnic tables

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	DCNR	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$45,000.00
		CONSTRUCTION	\$213,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input type="checkbox"/> 5-20 Years		CONSTRUCTION INSPECTION & ADMINISTRATION	\$18,000.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONTINGENCY (30%)	\$24,000.00
		TOTAL	\$300,000.00

NOTES:



KINGS HIGHWAY OPEN SPACE IMPROVEMENTS

CATEGORY: Parks and Recreation	COST: \$300,000
LOCATION: Kings Highway Open Space	TIMEFRAME: 5-20 years
PROJECT ID NO.: 15	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

Kings Highway Open Space has an 11-acre area with a historical farmhouse, barn, and related structures surrounded by agricultural fields. There are also 2 40-acre parcels with open agricultural field and woodlands. A park master plan should be created, updated, and/or reviewed before implementation occurs. Because the specific improvements proposed are currently unknown, the budget allocated to this project was generated from the maximum grant opportunity through DCNR available at the time of the completion of this report. Recommended improvements may include:

- A destination playground
- Picnic areas
- A wedding garden
- A 9-hole disc golf course
- Informal open lawn areas
- An amphitheater
- 5 pavilions
- The barn
- Wetland boardwalks
- Entrance/access areas and parking
- A trail system
- Natural areas, including woodlands, a riparian corridor
- A grass/wildflower meadow
- Site amenities, including landscaping, site furnishings, park architecture



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		DCNR	<i>Budget Distribution</i>	
				AMOUNT
TOTAL PROJECT COST:			DESIGN/PERMITTING	\$45,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years			CONSTRUCTION	\$213,000.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received			CONSTRUCTION INSPECTION & ADMINISTRATION	\$18,000.00
			CONTINGENCY (30%)	\$24,000.00
			TOTAL	\$300,000.00

NOTES:



BARLEY SHEAF ROAD CURB EXTENSIONS

CATEGORY: Sidewalks	COST: \$425,000
LOCATION: Barley Sheaf Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 16	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

This project is located along Barley Sheaf Road. The goal is to extend curbing along Barley Sheaf Road in locations where needed. As part of the 2017 Caln Township Comprehensive Plan, this is to be carried out as part of the “Complete Streets”



This concept involves considering all of the different users of a public right-of-way, as opposed to placing the priority on motor vehicles. This curb improvement would take into consideration the needs of pedestrians, persons in wheelchairs, bicyclists and public transit users. The use of curb extensions can reduce the speeds of turning vehicles and the distance of a street that must be crossed by pedestrians. A feasibility study should be conducted to identify specific locations and determine design alternatives to keep costs reasonable and also avoid right-of-way acquisitions if possible. As part of the feasibility study,



stormwater, sidewalks, and streetscaping elements should be addressed.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	PA DCED, Chester County DCD, DVRPC, PennDOT	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$63,750.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$259,250.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$25,500.00
		CONTINGENCY (30%)	\$76,500.00
		TOTAL	\$425,000.00

NOTES:



NORTH CALN ROAD CURB EXTENSIONS

CATEGORY: Traffic Improvement	COST: \$360,000
LOCATION: North Caln Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 17	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

This project is located along North Caln Road. The goal is to extend curbing along North Caln Road in locations where needed. As part of the 2017 Caln Township Comprehensive Plan, this is to be carried out as part of the “Complete Streets” concept. This



concept involves considering all of the different users of a public right-of-way, as opposed to placing the priority on motor vehicles. This curb improvement would take into consideration the needs of pedestrians, persons in wheelchairs, bicyclists and public transit users. The use of curb extensions can reduce the speeds of turning vehicles and the distance of a street that must be crossed by pedestrians. A feasibility study should be conducted to identify specific locations and determine design alternatives to keep costs reasonable and also avoid right-of-way acquisitions if possible. As part of the feasibility study, stormwater, sidewalks, and streetscaping elements should be addressed.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	PA DCED, Chester County DCD, DVRPC, PennDOT	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$54,000.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$219,600.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$21,600.00
		CONTINGENCY (30%)	\$64,800.00
		TOTAL	\$360,000.00

NOTES:



SOUTH BAILEY ROAD & HAZELWOOD AVENUE TRAFFIC IMPROVEMENTS

CATEGORY: Traffic Improvements	COST: \$95,000
LOCATION: South Bailey Road & Hazelwood Avenue	TIMEFRAME: 5-20 years
PROJECT ID NO.: 18	SOURCE: 2017 Caln Comprehensive Plan

Project Description:

This project is located at the intersection of South Bailey Road and Hazelwood Avenue before the train underpass. Currently, there is a stop sign at the intersection for traffic coming west from South Bailey Road while the two other directions have the right-of-way. The approach of Hazelwood Avenue to the intersection is a very sharp continuous curve, making it difficult for all traffic to safely exchange at the intersection. Recommendations include evaluation of the traffic patterns in this area to improve the safety of this intersection.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		DVRPC, PA DCED, PennDOT		<i>Budget Distribution</i>	
					AMOUNT
TOTAL PROJECT COST:				DESIGN/PERMITTING	\$16,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years				CONSTRUCTION	\$56,000.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received				CONSTRUCTION INSPECTION AND ADMINISTRATION	\$6,000.00
				CONTINGENCY (30%)	\$17,000.00
				TOTAL	\$95,000.00

NOTES:

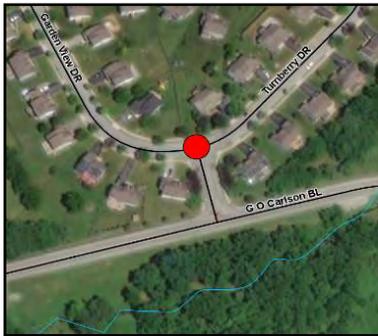


THE LINKS AT THORNDALE GREENE TRAFFIC IMPROVEMENTS

CATEGORY: Traffic Improvements	COST: \$4,500
LOCATION: The Links at Thorndale Greene	TIMEFRAME: 5-20 years
PROJECT ID NO.: 19	SOURCE: CEG Field Observation

Project Description:

This project is located at the intersection of Links Way, Garden View Drive and Turnberry Drive within The Links at Thorndale Greene community.



Currently, there is a stop sign at the intersection for traffic coming from G.O. Carlson Boulevard while the two other directions have the right-of-way. During high volume traffic times throughout the day, traffic from G.O. Carlson Boulevard backs up at the stop sign into the busy G.O. Carlson Boulevard. This poses a safety hazard for those stopped cars entering The Links at Thorndale Greene community. Recommendations include evaluating the traffic patterns for the intersection to correct this issue.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		DVRPC, PA DCED, PennDOT		<i>Budget Distribution</i>	
					AMOUNT
TOTAL PROJECT COST:				DESIGN/PERMITTING	\$2,500.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years			CONSTRUCTION	\$1,000.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received			CONSTRUCTION INSPECTION AND ADMINISTRATION	-
				CONTINGENCY (30%)	\$1,000.00
				TOTAL	\$4,500.00

NOTES:



OSBORNE ROAD STORMWATER IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: \$27,000
LOCATION: Osborne Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 20	SOURCE: CEG Field Observation

Project Description:

This project is located on Osborne Road north of the Bondsville Road intersection. On the western side of the Osborne Road, a stormwater pipe discharges beyond the edge of the roadway. There is significant erosion around this discharge site that compromise the stability of the roadside. It is recommended that repairs be made to correct the erosion and minimize the potential for erosion in the future.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD

Budget Distribution

TOTAL PROJECT COST:

DESIGN/PERMITTING | AMOUNT | \$5,000.00

YEAR:

0-5 Years 5-20 Years

CONSTRUCTION | \$15,000.00

GRANT APPLICATION STATUS (if applicable):

Not Yet Applied Application Pending Funding Received

CONSTRUCTION INSPECTION AND ADMINISTRATION | \$2,000.00

CONTINGENCY (30%) | \$5,000.00

TOTAL | **\$27,000.00**

NOTES:

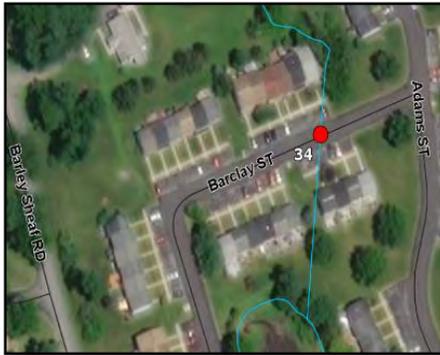


BARCLAY STREET PIPE REHABILITATION AND DRAINAGE IMPROVEMENTS

CATEGORY: Bridge/Culvert/Flooding/Stormwater Infrastructure	COST: \$440,000
LOCATION: Barclay Street	TIMEFRAME: 0-5 years
PROJECT ID NO.: 21	SOURCE: CEG Field Observation

Project Description:

This project is located on Barclay Street, within the Barley Sheaf Farms community, at the stream crossing upstream of the pond. The pipe is a corrugated metal arch pipe culvert that is approximately 50-inches in height by 60-inches in width conveying an Unnamed Tributary under Barclay Street. The pipe has scaling rust and debris inside. The pipe also appears to be installed incorrectly, with the first joint connection visible from the upstream end of the pipe. In addition to the pipe deficiencies, there is significant streambank erosion occurring on the upstream end. This area is highly prone to flooding. It is recommended that the pipe be lined in order to prevent further deterioration or future problems with the pipe. Additionally, to address the effects from the drainage, approximately 285 linear feet of stream restoration and realignment to the stream is recommended to address to the flooding issues.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD	Budget Distribution	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$66,000.00
YEAR:	<input checked="" type="checkbox"/> 0-5 Years <input type="checkbox"/> 5-20 Years	CONSTRUCTION	\$312,400.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$26,400.00
		CONTINGENCY (30%)	\$35,200.00
		TOTAL	440,000.00

NOTES:

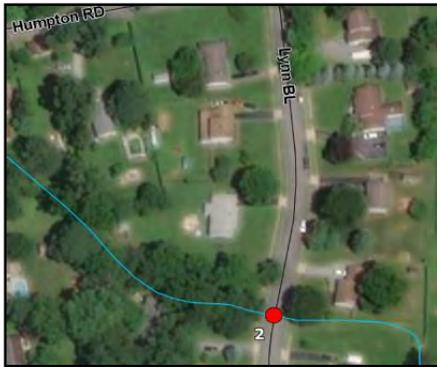


LYNN BOULEVARD PIPE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$70,000
LOCATION: Lynn Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 22	SOURCE: CEG Field Observation

Project Description:

This project is located on Lynn Boulevard, south of the Humpton Road intersection at the stream crossing. The pipe is a 36-inch corrugated metal pipe conveying an Unnamed Tributary to Beaver Creek. The pipe is showing significant signs of scale rust formation along the bottom of the pipe, which is present along the entire bottom of the pipe. Additionally, the upstream conditions indicate that the pipe may be inadequately sized. It is recommended that the size of the pipe be evaluated and lined to extend the life of the pipe.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	<i>Budget Distribution</i>	
		AMOUNT
TOTAL PROJECT COST:	DESIGN/PERMITTING	\$10,500.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$49,700.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$4,200.00
	CONTINGENCY (30%)	\$5,600.00
	TOTAL	\$70,000.00

NOTES:



TOTH AVENUE PIPE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$260,000
LOCATION: Toth Avenue	TIMEFRAME: 5-20 years
PROJECT ID NO.: 23	SOURCE: CEG Field Observation

Project Description:

This project is located on Toth Avenue, south of the Fox Avenue intersection at the stream crossing. The structure is a corrugated metal arch approximately 42-inches in height by 66-inches in width conveying Valley Run. The pipe has significant scaling rust that is visible along the bottom of the pipe. In order to protect the structural integrity of the pipe, it is recommended that the pipe be lined, preventing further corrosion.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

TOTAL PROJECT COST:

YEAR: 0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if applicable): Not Yet Applied Application Pending Funding Received

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$39,000.00
CONSTRUCTION	\$184,600.00
CONSTRUCTION INSPECTION & ADMINISTRATION	\$15,600.00
CONTINGENCY (30%)	\$20,800.00
TOTAL	\$260,000.00

NOTES:



HUMPTON ROAD STORMWATER IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: \$69,000
LOCATION: Humpton Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 24	SOURCE: CEG Field Observation

Project Description:

This project is located on Humpton Road between the Municipal Drive and Williams Way intersections on the northern side of the road. There is a rock/grass conveyance on private property that runs into the Township storm sewer system. The system conveys an ephemeral stream. During storm events, there is significant flooding, which has brought degradation to the stormwater system along Humpton Road and the private yards it runs through. It is recommended to restructure the system to withstand the flow from the ephemeral stream into the Township storm sewer system. These improvements would also help to reduce the icing potential along this portion of Humpton Road in the winter.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$8,500.00
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$43,000.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$4,500.00
		CONTINGENCY (30%)	\$13,000.00
		TOTAL	\$69,000.00

NOTES:



NORTH BARLEY SHEAF ROAD CURB IMPROVEMENTS

CATEGORY: Road Improvements	COST: \$399,000
LOCATION: North Barley Sheaf Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 25	SOURCE: CEG Field Observation

Project Description:

This project is located along North Barley Sheaf Road. The curbing along the road is eroding and deteriorating. This project should be completed in conjunction with additional road improvements to North Barley Sheaf Road in order to maximize construction resources.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):

PA DCED, Chester County DCD, DVRPC, PennDOT

TOTAL PROJECT COST:

YEAR:

0-5 Years 5-20 Years

GRANT APPLICATION STATUS (if applicable):

Not Yet Applied Application Pending Funding Received

Budget Distribution

	AMOUNT
DESIGN/PERMITTING	\$27,000.00
CONSTRUCTION	\$265,000.00
CONSTRUCTION INSPECTION AND ADMINISTRATION	\$27,000.00
CONTINGENCY (30%)	\$80,000.00
TOTAL	\$399,000.00

NOTES:

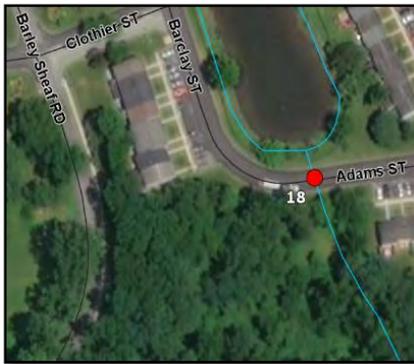


ADAMS STREET CULVERT REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$130,000
LOCATION: Adams Street	TIMEFRAME: 5-20 years
PROJECT ID NO.: 26	SOURCE: CEG Field Observation

Project Description:

This project is located on Adams Street, within the Barley Sheaf Farms community, south of the pond at the stream crossing. The structure consists of two 36-inch corrugated metal pipes conveying an Unnamed Tributary to Valley Run. The downstream end, where the pipe outlets to an endwall was significantly scoured. The overall stability of the endwall should be monitored to ensure that no undermining does occur and that the structure is not at risk of falling over into the stream. Significant scaling rust is present throughout the bottom of both pipes. It is recommended that the pipes be lined in order to prevent further corrosion in the pipe and to protect its structural integrity.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	<i>Budget Distribution</i>	
		AMOUNT
TOTAL PROJECT COST:	DESIGN/PERMITTING	\$19,500.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$92,300.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$7,800.00
	CONTINGENCY (30%)	\$10,400.00
	TOTAL	\$130,000.00

NOTES:



INGLESIDE DRIVE PIPE REHABILITATION

CATEGORY: Bridge/Culvert	COST: \$80,000
LOCATION: Ingleside Drive	TIMEFRAME: 5-20 years
PROJECT ID NO.: 27	SOURCE: CEG Field Observation

Project Description:

This project is located on Ingleside Drive, east of the North Bailey Road intersection at the stream crossing.



The corrugated metal arch structure is 62-inches in width by 87-inches in height conveying an Unnamed Tributary to Valley Run. There is significant scouring on the upstream side of the pipe with visible undermining occurring to a tree adjacent to the upstream headwall. Both upstream and downstream headwalls have cracks above the holes for the pipes. Significant corrosion is visible along the bottom of the pipe with pitting visible throughout the bottom of the pipe. It is recommended that the pipe gets lined to protect the structural integrity of the pipe. Repairs include lining the pipe and fixing the structure headwall cracks.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	<i>Budget Distribution</i>	
		AMOUNT
TOTAL PROJECT COST:	DESIGN/PERMITTING	\$12,000.00
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION	\$56,800.00
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	CONSTRUCTION INSPECTION & ADMINISTRATION	\$4,800.00
	CONTINGENCY (30%)	\$6,400.00
	TOTAL	\$80,000.00

NOTES:



UNNAMED TRIBUTARY TO WEST BRANCH BRANDYWINE STREAM RESTORATION

CATEGORY: Stormwater/Flooding Infrastructure	COST: \$275,000
LOCATION: Moore Road & Kings Highway	TIMEFRAME: 0-5 Years
PROJECT ID NO.: 28	SOURCE: CEG Field Observation

Project Description:

A minimum of 400 linear feet of stream restoration is being proposed along an unnamed (UNT) to West Branch Brandywine Creek on the property address 1208 Kings Highway near the intersection of Moore Road and Kings Highway. The reach of stream is eroded and actively incising. This project is proposed to address the Township's Municipal Separate Storm Sewer System (MS4) Pollutant Reduction Plan (PRP) sediment load requirements.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	DEP, NFWF, PA DCED	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	\$82,500.00
		CONSTRUCTION	\$192,500.00
		CONSTRUCTION INSPECTION & ADMINISTRATION	-
		CONTINGENCY (30%)	(included in costs above)
		TOTAL	\$275,000.00

YEAR:	<input checked="" type="checkbox"/> 0-5 Years	<input type="checkbox"/> 5-20 Years	
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied	<input type="checkbox"/> Application Pending	<input type="checkbox"/> Funding Received

NOTES:



11th AVENUE UNDERPASS STORMWATER IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: TBD
LOCATION: 11 th Avenue	TIMEFRAME: 5-20 years
PROJECT ID NO.: 29	SOURCE: CEG Field Observation/Public Survey

Project Description:

This project is for stormwater improvements to 11th Avenue underneath the Amtrak overpass. During significant rain events, the current system becomes overwhelmed by the volume of water directed at the system, causing the roadway to flood. This flooding makes travel difficult as residents must travel to a different underpass in order to safely get to the other side of the railroad tracks. Due to this safety hazard, it is recommended that the Township work to resolve these stormwater issues. A feasibility study should first be conducted in order to define a clear scope of work. At this time, a budget was not defined for this project due to scale and project complexity.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S): TOTAL PROJECT COST: YEAR:	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: right;"><i>Budget Distribution</i></th> <th style="text-align: right;">AMOUNT</th> </tr> </thead> <tbody> <tr> <td style="width: 70%;"><i>DESIGN/PERMITTING</i></td> <td style="width: 5%;"></td> <td style="text-align: right;">-</td> </tr> <tr> <td><i>CONSTRUCTION</i></td> <td></td> <td style="text-align: right;">-</td> </tr> <tr> <td><i>CONSTRUCTION INSPECTION & ADMINISTRATION</i></td> <td></td> <td style="text-align: right;">-</td> </tr> <tr> <td><i>CONTINGENCY (30%)</i></td> <td></td> <td style="text-align: right;">-</td> </tr> <tr> <td style="text-align: right;">TOTAL</td> <td></td> <td style="text-align: right;">-</td> </tr> </tbody> </table>	<i>Budget Distribution</i>		AMOUNT	<i>DESIGN/PERMITTING</i>		-	<i>CONSTRUCTION</i>		-	<i>CONSTRUCTION INSPECTION & ADMINISTRATION</i>		-	<i>CONTINGENCY (30%)</i>		-	TOTAL		-
<i>Budget Distribution</i>		AMOUNT																		
<i>DESIGN/PERMITTING</i>		-																		
<i>CONSTRUCTION</i>		-																		
<i>CONSTRUCTION INSPECTION & ADMINISTRATION</i>		-																		
<i>CONTINGENCY (30%)</i>		-																		
TOTAL		-																		

NOTES:



SOUTH BAILEY ROAD UNDERPASS STORMWATER IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: TBD
LOCATION: South Bailey Road	TIMEFRAME: 5-20 years
PROJECT ID NO.: 30	SOURCE: CEG Field Observation/Public Survey

Project Description:

This project is for stormwater improvements to South Bailey Road underneath the Amtrak overpass. During this evaluation, the



existing infrastructure was unable to be assessed as most of the inlets in the area were filled with debris. The inlets that were able to be evaluated, prior to the entrance of the underpass showed pipes that are likely undersized for the volume of water that is going through them. Further investigation should be done to confirm this, however. During significant rain events, the current system becomes overwhelmed by the volume of water directed at the system, causing the roadway to flood and have to be closed. This flooding makes travel difficult as residents must travel to a different underpass in order to safely get to the other side of the railroad tracks. Due to this safety hazard, it is recommended that



the Township work to resolve these stormwater issues. A feasibility study should first be conducted in order to define a clear scope of work. At this time, a budget was not defined for this project due to scale and project complexity.

FINANCIAL SUMMARY

		<i>Budget Distribution</i>	
POTENTIAL FUNDING SOURCE(S):	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD		AMOUNT
TOTAL PROJECT COST:		<i>DESIGN/PERMITTING</i>	-
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	<i>CONSTRUCTION</i>	-
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	<i>CONSTRUCTION INSPECTION & ADMINISTRATION</i>	-
		<i>CONTINGENCY (30%)</i>	-
		TOTAL	-

NOTES:



SOUTH LLOYD AVENUE UNDERPASS STORMWATER IMPROVEMENTS

CATEGORY: Flooding/Stormwater Infrastructure	COST: TBD
LOCATION: South Lloyd Avenue	TIMEFRAME: 5-20 years
PROJECT ID NO.: 31	SOURCE: CEG Field Observation/Public Survey

Project Description:

This project is for stormwater improvements to South Lloyd Avenue underneath the Amtrak overpass. During this evaluation, the existing infrastructure was unable to be assessed as most of the inlets in the area were filled with debris. The inlets that were able to be evaluated, prior to the entrance of the underpass showed pipes that are likely



undersized for the volume of water that is going through them. Further investigation should be done to confirm this, however. During significant rain events, the current system becomes overwhelmed by the volume of water directed at the system, causing the roadway to flood and have to be closed. This flooding makes travel difficult as residents must travel to a different underpass in order to safely get to the other side of the railroad tracks. Due to this safety hazard, improvements to stormwater infrastructure is proposed to address the flooding. A feasibility study should first be conducted in order to define a clear scope of work. At this time, a budget was not defined for this project due to scale and project complexity.



FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	FEMA/PEMA, PENNVEST, PA DCED, Chester County DCD	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	-
		CONSTRUCTION	-
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years		CONSTRUCTION INSPECTION & ADMINISTRATION	-
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONTINGENCY (30%)	-
		TOTAL	-

NOTES:



LINCOLN HIGHWAY STREETSCAPING ADDITIONS

CATEGORY: Streetscaping	COST: TBD
LOCATION: Lincoln Highway	TIMEFRAME: 5-20 years
PROJECT ID NO.: 32	SOURCE: 2017 Caln Township Comprehensive Plan

Project Description:

The appearance of Lincoln Highway corridor should be improved through redevelopment and the addition of street trees, other landscaping, decorative lighting, and highly visible crosswalks. The Lincoln Highway corridor should continue to be improved in appearance, pedestrians and transit accessibility, transit services and economic vitality. This includes establishing more of a “village” character in the Thorndale area. Other recommendations include:



- Orientation to encourage pedestrians, with an ability to walk or bicycle to stores, schools and parks. Sidewalks should be required along both sides of all streets as part of new construction. Overly wide intersections should be avoided to discourage speeding and to make it easier for pedestrians to cross the street.
- Street trees should be planted, with reasonable flexibility on their location. New street lights should be required to meet a design standard with a limited height that is similar to older styles of street lights.
- Plant buffering or architectural walls to separate existing parking lots from the street. These buffers should be designed to still allow sight lines into parking areas from the street, for security purposes.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	Chester County DCD, DVRPC, PA DCED, PennDOT	<i>Budget Distribution</i>
TOTAL PROJECT COST:		<i>AMOUNT</i>
YEAR:	<input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years	<i>DESIGN/PERMITTING</i> \$3,000,000.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received	<i>CONSTRUCTION</i> \$12,000,000.00
		<i>CONSTRUCTION INSPECTION AND ADMINISTRATION</i> \$1,200,000.00
		<i>CONTINGENCY (30%)</i> \$3,600,000.00
		<i>TOTAL</i> \$19,800,000.00

NOTES:

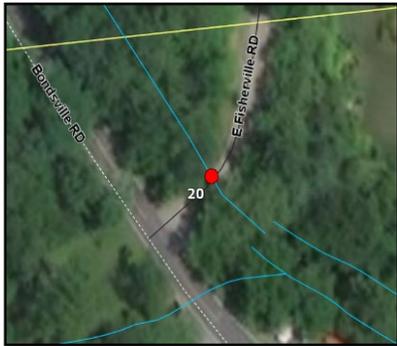


EAST FISHERVILLE ROAD BRIDGE REPLACEMENT

CATEGORY: Bridge/Culvert	COST: \$760,000
LOCATION: East Fisherville Road	TIMEFRAME: 0-5 years
PROJECT ID NO.: 33	SOURCE: CEG Field Observation

Project Description:

This project is located on East Fisherville Road, east of the Bondsville Road intersection at the stream crossing. The bridge conveys Beaver Creek and was constructed using stone masonry and concrete. The bridge is currently closed due to its condition. It is recommended that the structure gets demolished and replaced with a new structure. This is being recommended due to potential safety concerns with the permanent closure or removal of the structure.



This project has been identified as a large-scale project that will require outside funding.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):		PennDOT, PA DCED, DVRPC		<i>Budget Distribution</i>	
				AMOUNT	
TOTAL PROJECT COST:				DESIGN/PERMITTING	\$114,000.00
YEAR:	<input checked="" type="checkbox"/> 0-5 Years <input type="checkbox"/> 5-20 Years			CONSTRUCTION	\$539,600.00
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received			CONSTRUCTION INSPECTION & ADMINISTRATION	\$45,600.00
				CONTINGENCY (30%)	\$60,800.00
				TOTAL	\$760,000.00

NOTES:



G.O. CARLSON BOULEVARD TRAIL EXTENSION

CATEGORY: Trails	COST: TBD
LOCATION: G.O. Carlson Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 34	SOURCE: 2016 Route 30 Multimodal Transportation Study, Chester Valley Trail Extension to Downingtown Feasibility Study

Project Description:

G.O. Carlson Boulevard’s trail is 2.11 miles. Currently, the path along G.O. Carlson Boulevard serves as the foundation for the development of trail alignment options within Caln Township. It is recommended that the existing path be used for the Chester Valley Trail

Extension (CVTE) along with upgrades that include widening the trail to 10-feet or more in order to support increased usage.

This project has been identified as a large-scale project. Funding for these types of projects have traditionally been secured by outside agencies.



FINANCIAL SUMMARY

Budget Distribution

POTENTIAL FUNDING SOURCE(S):		DCNR			AMOUNT
TOTAL PROJECT COST:			DESIGN/PERMITTING		-
YEAR:	<input type="checkbox"/> 0-5 Years	<input checked="" type="checkbox"/> 5-20 Years	CONSTRUCTION		-
GRANT APPLICATION STATUS (if applicable):	<input checked="" type="checkbox"/> Not Yet Applied	<input type="checkbox"/> Application Pending	CONSTRUCTION INSPECTION & ADMINISTRATION		-
		<input type="checkbox"/> Funding Received	CONTINGENCY (30%)		-
			TOTAL		-

NOTES:



G.L. EGGLESTON BOULEVARD TRAIL EXTENSION

CATEGORY: Trails	COST: TBD
LOCATION: G.L. Eggleston Boulevard	TIMEFRAME: 5-20 years
PROJECT ID NO.: 35	SOURCE: 2016 Route 30 Multimodal Transportation Study

Project Description:

G.O. Carlson Boulevard’s trail is 0.34 miles. Currently, the path along G.L. Eggleston Boulevard serves as the foundation for the development of trail alignment options within Caln Township west of Bailey Road. It is recommended that the existing path be used for trail alignment as a scenic route. Due to the limited crossings of the Amtrak rail line, this extension should be evaluated in coordination with the alignment options in the City of Coatesville.



This project has been identified as a large-scale project. Funding for these types of projects have traditionally been secured by outside agencies.

FINANCIAL SUMMARY

POTENTIAL FUNDING SOURCE(S):	DCNR	<i>Budget Distribution</i>	
			AMOUNT
TOTAL PROJECT COST:		DESIGN/PERMITTING	-
		CONSTRUCTION	-
YEAR: <input type="checkbox"/> 0-5 Years <input checked="" type="checkbox"/> 5-20 Years		CONSTRUCTION INSPECTION & ADMINISTRATION	-
GRANT APPLICATION STATUS (if applicable): <input checked="" type="checkbox"/> Not Yet Applied <input type="checkbox"/> Application Pending <input type="checkbox"/> Funding Received		CONTINGENCY (30%)	-
		TOTAL	-

NOTES: