



FITCHBURG
Massachusetts

City of Fitchburg, Massachusetts

MS4 Street Design and Parking Lots Report

**Assessment of Current Street Design and Parking Lot
Guidelines in the City of Fitchburg**

June 2022

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
DPW	Department of Public Works
DCIA	Directly Connected Impervious Areas
EPA	United States Environmental Protection Agency
GI	Green Infrastructure
IA	Impervious Area
IDDE	Illicit Discharge Detection and Elimination
LID	Low Impact Development
MCM	Minimum Control Measures
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
ROW	Rights of Way
SWMP	Stormwater Management Plan

1 Introduction

The City of Fitchburg is a listed permittee under the 2016 National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit, issued by the United States Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MassDEP). The permit requires an assessment report of each permittee's rules, regulations, and local ordinances (regulatory documents) which address the addition of impervious surfaces within their jurisdiction. This report, fulfilling the assessment requirement, reviews the various rules, regulations, and local ordinances which influence the scale of impervious surfaces, including street design and parking zones. As required by the permit, recommendations and an implementation schedule are provided.

1.1 MS4 Permit

The City's stormwater is discharged to surface waterbodies throughout Fitchburg and those discharges are covered by the MS4 permit, which became effective on July 1, 2018. The City is currently in Year 4 of the 5-year MS4 permit term. The MS4 Permit includes six (6) minimum control measures (MCMs) that must be addressed by the Stormwater Management Program. These minimum control measures are:

- MCM 1 – Public Education and Outreach
- MCM 2 – Public Involvement and Participation
- MCM 3 – Illicit Discharge Detection and Elimination (IDDE) Program
- MCM 4 – Construction Site Stormwater Runoff Control
- MCM 5 – Stormwater Management in New Development and Redevelopment
- MCM 6 – Good Housekeeping and Pollution Prevention for Permittee Owned Operations

As part of the MCM 5 – Stormwater Management in New Development and Redevelopment requirements, the City must develop a report which assesses the impact of current street and parking lot design guidelines on the creation of impervious surfaces. This report is due by the end of Year 4 of the NPDES MS4 permit term, on June 30, 2022. The requirements of this report, per the MS4 permit, are:

"Within four (4) years of the effective date of this permit, the permittee shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect the creation of impervious cover. This assessment shall be used to provide information to allow the permittee to determine if changes to design standards for streets and parking lots can be made to support low impact design options. If the assessment indicates that changes can be made, the assessment shall include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The local planning board and local transportation board should be involved in this assessment. This assessment shall be part of the SWMP. The permittee shall report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines."

There are several primary goals of evaluating regulatory documents which directly or indirectly effect impervious surfaces resulting from new development, they are:

1. reducing the hydraulic loading on stormwater infrastructure,
2. reducing the potential for flooding,
3. extending the useful life of existing stormwater infrastructure,
4. reducing contaminant loading on stormwater treatment elements, and
5. reducing contaminant loading in natural waterways.

Limiting expanded impervious surfaces in new development within the city will have an impact on the stormwater management systems owned and operated by the City of Fitchburg and the regulated receiving waterbodies. Implementing measures to update roadway and parking design standards and regulating documents to reduce added impervious surfaces during new development will have positive impacts on receiving waterbodies' water quality, likelihood of future flooding, and the longevity of existing stormwater infrastructure.

2 Relevant Regulatory Documents in Fitchburg

A review of relevant local ordinances and regulations was performed. The documents reviewed as part of this report are:

- ***Zoning Ordinance of the City of Fitchburg, Massachusetts (Chapter 181, 2021)*** provides requirements for off-street parking and driveways.
 - Off-Street Parking Rules and Regulations outline design criteria for roadside parking and private parking areas are provided in City Zoning Ordinance Section 181.51 – Off Street Parking, Section 181.7 – Special Residential Regulations, and Section 181.8 – Overlay Districts.
 - Driveway Rules and Regulations are provided in City Zoning Ordinance Section 181.7 – Special Residential Regulations.
- ***Streets and Sidewalks Ordinances of the City of Fitchburg, Massachusetts (Chapter 157)*** provides requirements for street design and sidewalk design.
- ***Stormwater Management Ordinance (Chapter 154, 2020) and Stormwater Rules and Regulations***, govern stormwater management during construction activities and stormwater management requirements for new development and redevelopment within the City. Stormwater Management Ordinance Chapter 154 was adopted in 2020.
- ***Rules and Regulations Governing the Subdivision of Land (Chapter 41, 1988 Rev. 2007)***, governs the laying out and construction of subdivisions, including new roads, sidewalks, and bikeways.

Each regulatory document was reviewed for language which directly impact the amount of impervious surface area in the City. Opportunities for adjustment to the regulatory documents are described in detail in Section 4.

3 Local Considerations & Conditions

3.1 Opportunities and Challenges in Fitchburg

Important safety, accessibility, economic, and maintenance challenges must be taken into consideration when evaluating adjustments to existing regulatory documents regarding the design of streets and parking areas. Acceptable accommodations for emergency vehicle access to homes and businesses in the event of an emergency should not be limited by changes to regulatory documents. The ease and safety of installation and accessibility of buried utilities in public rights-of-way, typically installed below paved surfaces, must be considered as part of any adjustment to rules about development.

Massachusetts experiences extreme weather conditions resulting in management of not only stormwater runoff, but snow removal, snow storage, and accommodations for snow melt during upwards of 6 months out of the year. Any adjustments to roadway and parking areas must consider the impacts on the regular and frequent high volumes of snow management faced by the DPW.

Future development of streets, sidewalks, and parking areas need to be able to meet expected traffic demands, maintain safe transit for motorists, cyclists, and pedestrians, and not limit the economic viability of developable land within the city.

Figure 1 highlights land-uses which typically result in large swaths of impervious areas. Opportunities to decrease impervious surfaces may be realized through adjustments to regulatory language impacting these land uses. Specific measures that can be taken to reduce impervious surfaces within these land-uses through revisions in the current rules and regulations are provided in Section 4.

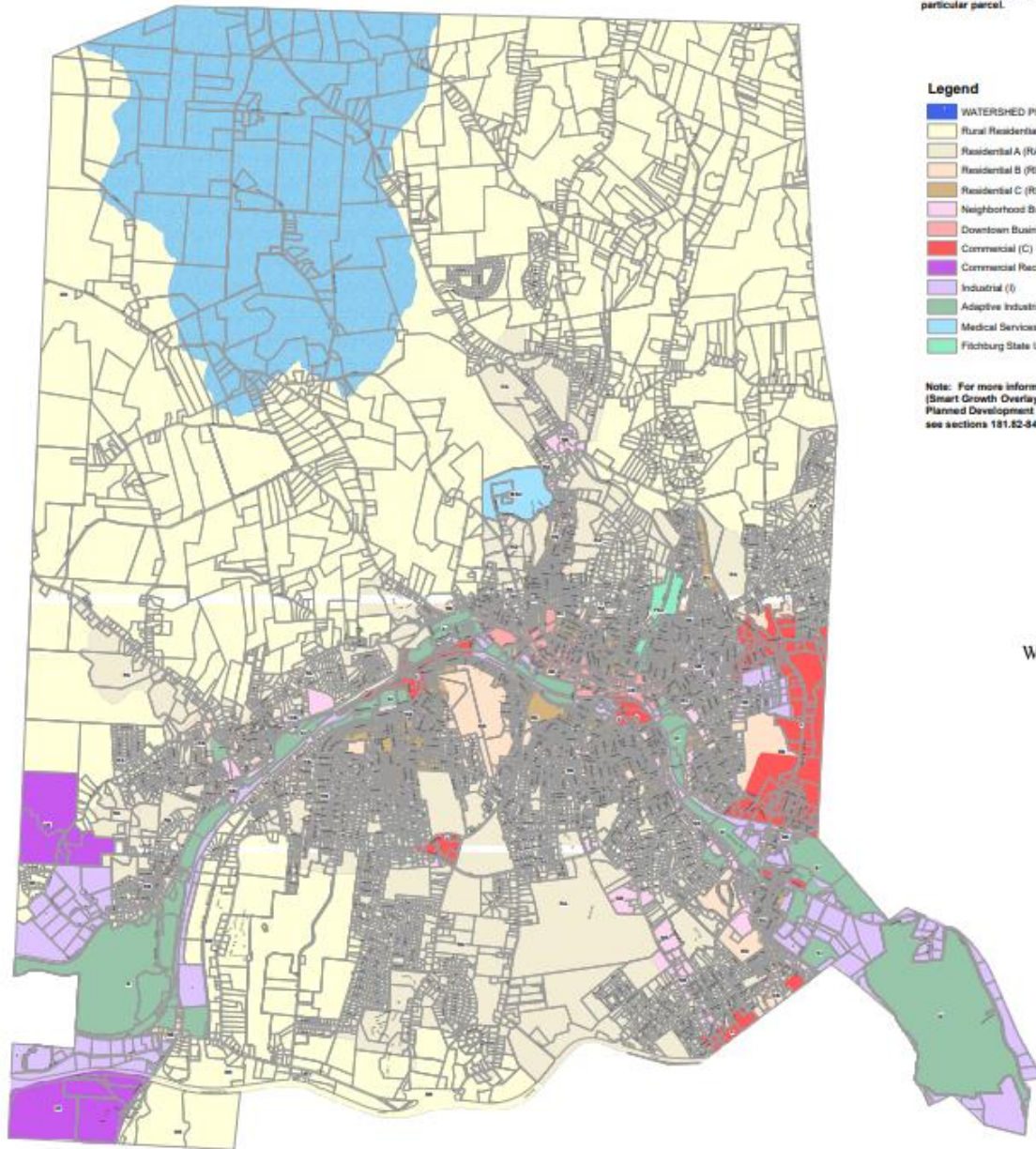


Figure 1. Land Uses of Opportunity in Fitchburg

A map of zoning areas within Fitchburg is shown in Figure 2. Alterations to local rules and regulations may allow for developers to reduce the amount of additional impervious surfaces resulting from new development and redevelopment in the City's high-density areas and encourage the use of stormwater-friendly infrastructure as part of future projects.

CITY OF FITCHBURG ZONING MAP

This map was created from the best available data, but it may contain errors. It should be used for planning purposes only. The Building Commissioner is the ultimate authority on the zoning classification of a particular parcel.



- Legend**
- WATERSHED PROTECTION OVERLAY DISTRICT
 - Rural Residential (RR)
 - Residential A (RA)
 - Residential B (RB)
 - Residential C (RC)
 - Neighborhood Business District (NBD)
 - Downtown Business District (DBD)
 - Commercial (C)
 - Commercial Recreation (CR)
 - Industrial (I)
 - Adaptive Industrial District (AI)
 - Medical Services District (MSD)
 - Fitchburg State University (FSU)

Note: For more information pertaining to overlay districts (Smart Growth Overlay, Priority Development Site Overlay, Planned Development District Overlay), see sections 181.82-84 of the Zoning Ordinance.



0 0.25 0.5 1 1.5 2 Miles

Prepared By:
City of Fitchburg DPW/Engineering Division
Date: 10/2022

MS4 STREET DESIGN AND PARKING
LOTS REPORT

CITY OF FITCHBURG ZONING MAP



FIGURE
2

Source: [Zoning-Map-PDF \(fitchburgma.gov\)](https://www.fitchburgma.gov/DocumentCenter/View/1111/Zoning-Map-PDF)

3.2 Guidance for Impervious Area Reduction

The EPA provides guidance for evaluating impervious cover resulting from street and parking area regulating documents in *Assessing Street and Parking Design Standards to Reduce Excess Impervious Cover in New Hampshire and Massachusetts (Appendix A)*. A summary of this technical support document is provided in Table 1. The document outlines relevant items communities should consider as part of this evaluation. Evaluating these considerations is an important step in the process to identify areas where the city can modify rules and regulations to reduce impervious surfaces and promote on-site rainwater infiltration.

Table 1. Design Considerations for Improvement to Application of Impervious Surfaces

Area of Development	Considerations
Local Streets & Roadways	• Width of residential roadways • On-street parking requirements • Pedestrian use of non-residential & mixed-use streets • Location of installation of utilities in public rights of way (ROWs) • Setback requirements for homes & buildings • Optimize design requirements to meet turning radius needs of emergency vehicles on dead-end streets
Parking Areas	• Optimize number of parking spots to avoid an excessive quantity • Off street & onsite parking • Encourage communal parking solutions and use of public transportation • Minimize oversized stalls & driving aisles • Encourage permeable surface materials & green space • Residential driveway design requirements
Other Areas/Elements	• Reduce setbacks or create smaller lot sizes that satisfy legal & safety constraints • Set a maximum percentage of impervious cover on individual lots & strictly prohibit exceeding this value • Outreach education on temporary non-damaging ponding of stormwater on residential lots & why that is better than on streets/storm sewers • Redirect stormwater to infiltration zones • Incorporate landscaping into stormwater management requirements

4 Review of Improvement Alternatives

The following section outlines opportunities for improvement to existing regulatory documents governing land development within Fitchburg.

4.1 Sub-Division Development & New Roads

The following summary of existing requirements found in the City's regulatory documents outperform the recommendations from the EPA which aim to limit required impervious areas resulting from new subdivisions:

- Street trees are required to be included in new developments between edge of pavement and sidewalks.
- Grass strips are required in the right-of-way where other plantings are not placed.
- Board may require inclusion of no more than 5% of the total development area to be maintained as open space.
- Encourages developers to consider the relationship of the subdivision to the Open Space and Recreation Plan.
- Encourages development plan to regard protection of natural features (Chapter 41, Section 4.14).

The regulatory documents for new subdivision development present opportunities to reduce required impervious surfaces. Minimum pavement width is a prominent opportunity for improvement, the current limit of 28 feet for local roads and 34 feet for collector streets can likely be reduced to a minimum of 22 feet for local roads and 24 feet for collector roads. Design guidance from the AASHTO "Green Book" for lane width is provided in Table 2.

Table 2. Range for Lane Width Based on Roadway Use Type

Type of Roadway	Rural (feet)	Urban (feet)
Freeway	12	12
Ramps (1-lane)	12-30	12-30
Arterial	11-12	10-12
Collector	10-12	10-12
Local	9-12	9-12

(Source: A Policy on Geometric Design of Highways and Streets, AASHTO)

Additionally, dead-end streets are not explicitly discouraged in the regulating language. Where dead-end streets are necessary, cul-de-sacs should be limited in use and pervious islands encouraged.

Table 3 summarizes regulatory barriers to the MS4 permit goal of limiting application of impervious surfaces identified in the existing subdivision design guidelines.

Table 3. Regulatory Barriers to Reduced Impervious Area in Subdivision Rules and Regulations

Existing Codes and Standards	Alternative	Application
Subdivision Rules and Regulations, Chapter 41, Section 4.1	Reduce minimum paved roadway width requirements	- Establish lower street minimum lane widths. - Provide detailed guidance on pavement width dictated by expected traffic volume and travel speeds according to AASHTO "Green Book" guidelines.
Subdivision Rules and Regulations, Chapter 41, Section 4.1	Dead-End Lane Design	- Discourage establishing dead-end streets - Where a dead-end street must be constructed, have a stated goal of limited paved area. - Permit use of alternative turn-around methods with smaller footprints than cul-de-sacs. - Permit construction of vegetated islands within cul-de-sacs, where required. Any curbing around the cul-de-sac island should be notched to enable runoff to enter the vegetated island.

In addition to the identified barriers to limited impervious surfaces within the City of Fitchburg stated in Table 3, Table 4 below lists opportunities to further encourage limited application of impervious surface during development. These recommendations are not defined as barriers as part of the City's MS4 permit, rather they are provided in this report as informational guidance for future improvements to be pursued at the discretion of the City.

Table 4. Opportunities to Further Reduce Impervious Area in New Roads and Sub-Divisions

Existing Codes and Standards	Alternative	Application
Zoning, Chapter 181, Section 5	Reduce minimum paved roadway width requirements	- Prioritize parallel parking over head-in parking for on-street parking to limit pavement width. - Limit on-street parking to one side of the roadway.
Streets and Sidewalks, Chapter 157	Dead-End Lane Design	Promote application of pervious ground cover on dead-end lanes where traffic volume is low.
Zoning, Chapter 181, Section 5	Landscaping	Permit roadside maintenance to be performed at the minimum level necessary to encourage healthy roadside vegetation.

Existing Codes and Standards	Alternative	Application
Zoning, Chapter 181, Section 7	Alternative Neighborhood Designs	• Provide language encouraging exploration of alternative street layouts to increase the number of homes per unit length and minimize the length of the roadway. • Encourage use of pervious pavement on local traffic residential roads, shoulders, and parking lanes.

4.2 Parking Lots & Off-Street Parking

Parking lots account for a significant amount of impervious surface in Fitchburg, servicing a wide array of buildings such as schools, municipal facilities, playgrounds, offices, and shopping centers. The following summary of existing regulatory requirements in Fitchburg outperform the recommendations from the EPA which aim to limit required impervious parking lot size:

- Parking at Shopping Centers: 2 spaces per 1,000 square feet of building size. Recommendation is less than 4.5 spaces per 1,000 square feet.
- Office Buildings: 2.5 spaces per 1,000 square feet of building size. Recommendation is less than 3 spaces per 1,000 square feet.
- Residential parking requirements per unit has lower parking requirements for small and studio sized residential dwellings.
- Off-Street Parking for businesses can be reduced for several stated reasons including: 1) shared parking between multiple businesses and buildings, 2) proximity to public parking, and 3) peculiarities that reduce parking demand.
- Parking lots with more than 10 stalls are required to be built with plantings.

The parking stall size requirements (Chapter 181.5142) range from 8 feet wide to 12.7 feet wide and from 18 feet long up to 25 feet long. There are two categories of parking stalls listed in the regulatory documents: 1) standard parking stalls, and 2) handicap accessible spaces. However, compact car spaces are not considered in the regulatory documents. EPA guidance suggests a minimum of 30% of parking stalls should be sized for compact cars for a given parking area. No indication within the rules and regulations was found which apply stricter regulations to handicap parking spaces than what is found in the American with Disabilities Act (ADA).

Table 5 below summarizes regulatory barriers to the MS4 permit goal of limiting application of impervious surfaces identified in the existing parking lot regulatory language.

Table 5. Regulatory Barriers to Reduced Impervious Area in Parking Lots and Off-Street Parking Rules and Regulations

Existing Codes and Standards	Alternative	Application
Zoning, Chapter 181, Section 5	Reduced stall dimensions	Enact minimum of compact car spaces; a typical goal is a minimum of 30% of spaces.

In addition to the identified barriers to limited impervious surfaces within the City of Fitchburg stated in Table 5, Table 6 below lists opportunities to further encourage limited application of impervious surface during development of parking lots and off-street parking. These recommendations are not defined as barriers as part of the City's MS4 permit, rather they are provided in this report as informational guidance for future improvements to be pursued at the discretion of the City.

Table 6. Opportunities for Reduced Impervious Area in Parking Lots and Off-Street Parking Rules and Regulations

Existing Codes and Standards	Alternative	Application
Zoning, Chapter 181, Section 5	Material selection	- Encourage use of pervious pavement, where appropriate. - Other pervious/porous materials which can replace traditional asphalt parking areas: - Gravel - Cobblestones - Pervious Pavers
Zoning, Chapter 181, Section 5	Landscaping	Expand landscaping requirements in parking lots to include installation of green infrastructure (e.g., bioretention swales, tree boxes, etc.)
Zoning, Chapter 181, Section 5	Maximum limits on parking	- Limit number of parking spaces for new developments. - Encourage time limit-based parking to reduce parking area sizes.
Zoning, Chapter 181, Section 5	In-lieu parking fees	Instead of building parking areas, developers pay fee for district parking area.

4.3 Sidewalks & Curbing Alternatives

Curbs are installed for a variety of purposes, such as drainage control and pedestrian safety. Installation of curbing along roadways and parking areas is a useful and low-cost way to convey excess runoff to established stormwater management infrastructure elements such as catch basins, bioswales, retention basins, etc. However, the use of curbs to convey flow should be limited to areas where they are absolutely needed, and rather prioritize runoff reaching on-site pervious areas for infiltration.

The following summary of existing regulatory requirements in Fitchburg outperform the recommendations from the EPA which aim to limit required impervious cover due to sidewalks:

- Sidewalks are required to be a minimum of 5 feet on collector roads and minimum of 4 feet on minor streets (Chapter 41, Section 4.2.1).
- Where bikeways which are separate from the roadway are built the developer may not be required to also provide sidewalks.
- Grass strips must be installed between the roadway and sidewalk.

Current regulatory documents require sidewalks be built with a minimum width of 5 feet on collector roads and 4 feet width on minor streets. Conflicting guidance is provided in Chapter 41 on the required width of sidewalks. All sidewalks are required to be constructed of concrete and be included on both sides of new streets. Discretion is provided to the Board to grant exceptions for sidewalks on one side of the street. Establishing a stated maximum width of sidewalks on all roadway types, permitting development or redevelopment with sidewalks on one side of the street, and providing options for pervious ground cover (e.g., porous pavement) will provide opportunity to decrease the impervious surface area resulting from new development.

4.4 Driveway Alternatives

The City of Fitchburg has a significant area zoned as residential, and as such, there is a prominent number of privately owned driveways in the City. Therefore, encouraging or enforcing application of stormwater-friendly driveway alternative surfaces will have a positive impact on impervious surface area reduction goals in Fitchburg.

The following existing regulatory requirements in Fitchburg outperform the recommendations from the EPA which aim to limit required impervious driveway area:

- The City encourages driveway sharing of adjoining properties.
- A maximum of two driveway access points is permitted per property.
- A maximum setback and minimum setback from streets are established for several high-density zoning districts, which limit the required length of driveways.

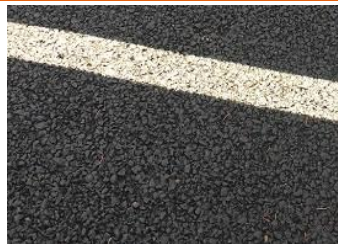
No barriers were identified which unduly encourage impervious surfaces in the design of driveways.

Table 7 lists opportunities to further encourage limited application of impervious driveways. These recommendations are not defined as barriers as part of the City's MS4 permit, rather they are provided in this report as informational guidance for future improvements to be pursued at the discretion of the City. Examples of alternative driveway regulatory approaches are provided in Table 7 and alternative driveway surface materials are provided in Table 8.

Table 7. Opportunities for Reduced Impervious Area in Driveway Rules and Regulations

Existing Codes and Standards	Alternative	Application
Zoning, Chapter 181, Section 7	Material selection	- Encourage use of pervious cover material, where appropriate. - Pervious/porous materials which can replace traditional asphalt are listed in Table 8.
Zoning, Chapter 181, Section 7	Maximum limits on parking	Set limits on the maximum area of impervious driveway cover. If driveways on private properties exceed the maximum alternative cover, then pervious characteristics must be applied to offset the excess impervious area.

Table 8. Stormwater-Friendly Driveway Alternative Cover Material Types

Alternative	Benefits	
Porous Pavement	- Provides infiltration of stormwater at the same capacity as the substrate soil. - Provides same aesthetic appeal as traditional pavement. - Snow removal practices are the same as traditional pavement.	
Pervious Paver Driveways	- Concrete pavers with voids in between to be filled with gravel or sand. - Plastic grids that keep a surface layer of gravel or sand (with or without grass) from compacting, so water drains through.	
Ribbon Driveways	- Two parallel strips of materials such as concrete, stone, turf pavers, or brick for, limiting impervious cover to only where needed. - Lower installation costs and less materials used.	

Alternative

Benefits

Shared driveways

- Reduce paving costs.
- Minimizes impervious surfaces.
- Increases yard space.
- Can be paired with pervious cover material options.



4.5 Stormwater Management

The Stormwater Ordinance and Stormwater Management Rules and Regulations provide robust requirements for stormwater management in new development and redevelopment. The regulatory documents require new and re-development sites to capture and treat stormwater runoff generated during specified precipitation events and/or remove specified percentages of Total Suspended Solids and Total Phosphorus in accordance with the MS4 permit. The regulatory documents also require that non-structural stormwater management strategies be implemented to the maximum extent practicable for new and re-development projects. Non-structural stormwater management strategies include minimizing impervious surfaces, providing low-maintenance landscaping that encourages retention, and other techniques. Low Impact Development (LID) site planning and design strategies must also be used to the maximum extent practicable.

The City of Fitchburg has previously established an inter-departmental working group which consists of City department heads/representatives who review development projects that meet quarterly to review upcoming development projects to ensure they are meeting the requirements of various relevant permits and regulations within the City. It is recommended that the working group be re-established with current City staff and those charged with reviewing developments continue to review applicants' proposed non-structural stormwater management strategies and ensure developments are meeting the goals of the Stormwater Management regulatory documents.

5 Recommendations & Implementation Schedule

The City of Fitchburg has an existing robust approach to stormwater management and many established regulatory documents which promote conservative application of new impervious ground cover which often outperform EPA suggested limitations. There also exists several opportunities to further improve design standards to promote innovative development practices to further improve stormwater runoff quantity and quality.

Table 9 outlines the recommendations of this report with priority grading of each recommendation based on the largest impacts, and a preliminary implementation schedule.

The implementation schedule for changes to the regulatory documents allows for studies to determine exact parameters for inclusion in regulatory language. Priority weighting is assigned based on the following criteria:

- Anticipated impact to stormwater runoff,
- Feasibility, effectiveness, and ease of implementation,
- Impact to community, and
- Desirability.

Table 9. Recommendations and Implementation Schedule to remove Barriers to Excessive Regulated Impervious Surfaces within Fitchburg, Massachusetts

Recommendation	Priority	Implementation Schedule	Regulation to be Amended
Roadways & Developments			
Evaluate reducing pavement and ROW for low traffic volume and travel speed roadways.	1	2 years	Rules and Regs Governing the Subdivision of Land
Discourage construction of dead-end streets, if dead-end streets are necessary then allow for turn-around methods which are not cul-de-sacs	3	5-10 years	Rules and Regs Governing the Subdivision of Land
Parking			
Enact minimum number of compact vehicle stalls.	2	5 years	Zoning Ordinances, Section 17.10
Stormwater Management			
Specifically include impervious area reduction as a stated purpose of the Regulations.	3	5-10 years	Stormwater Management Rules and Regulation

In addition to the recommendations to remove barriers to excessive impervious surfaces within the City of Fitchburg stated in Table 9, Table 10 below lists opportunities to further encourage limited application of impervious surface during development. These recommendations are not required as part of the City's MS4 permit, rather they are provided as information for future improvements to be pursued at the discretion of the City.

Table 10. Future Opportunities for Improvements to Regulated Impervious Surfaces within Fitchburg, Massachusetts

Recommendation	Regulation to be Amended
Parking	
Evaluate feasibility of establishing minimum pervious material cover for parking lots.	Zoning Ordinances
Establish a maximum allowable parking lot size.	Zoning Ordinances
Driveways & Sidewalks	
Incentivize application of pervious driveway cover material.	Zoning Ordinances
Establish maximum driveway area, above which pervious driveway cover material must be used to offset excess area.	Zoning Ordinances
Remove requirement for sidewalks on both sides of roadway, where appropriate.	Rules and Regs Governing the Subdivision of Land

Appendix A

Assessing Street and Parking Design Standards to Reduce Excess Impervious Cover in New Hampshire and Massachusetts



Assessing Street and Parking Design Standards to Reduce Excess Impervious Cover in New Hampshire and Massachusetts

Small MS4 Permit Technical Support Document, April 2011

Draft NPDES Permits require evaluation of local street and parking lot design standards

The draft NPDES Small MS4 permits for New Hampshire and North Coastal Massachusetts require permittees to evaluate and report on local street design and parking requirements that affect the **creation of impervious cover**. This assessment will be used to determine if design standards need to be revised to support the application of Low Impact Development (LID) techniques. Recommendations and a schedule for changing any relevant standards and policies need to be incorporated into the Stormwater Management Program (SWMP), with status updated in annual reports. This requirement is detailed in the draft permit Section 2.3.6.6 for New Hampshire and Section 2.4.6.7 for North Coastal Massachusetts, respectively.

Why evaluate current standards?

Roads and parking lots are a significant component of the urban landscape, and often constitute the majority of impervious area in a given watershed. In many communities, the current standards guiding road design and parking lot layout were established decades ago with little consideration of potential impacts to pedestrians or the local environment. Consequently, outdated zoning by-laws, subdivision regulations, and road standards may not only promote excessive impervious cover (Figure 1), but they may effectively prohibit the application of many LID practices (Figure 2). Even where variances and special permitting procedures allow for design alternatives, these additional steps can be time-consuming and unpredictable; and therefore, unattractive to developers.



Figure 1. Unnecessarily wide cul-de-sacs and residential roads generate additional stormwater runoff, create un-friendly pedestrian environments, and increase overall construction costs.



Figure 2. (A) Example of narrow residential road with a bio-swale, utilities, and single-sided sidewalk in Duxbury, MA. (B) Use of pervious pavers and bioretention practices in the landscape islands in spillover parking lot in Wilmington, MA.

What design factors lead to excess imperviousness?

At a minimum, the following street and parking standards should be evaluated to determine if they are contributing to the unnecessary generation of surplus impervious cover from new construction or redevelopment projects:

Local street design:

- **Residential roadway pavement widths**—pavement widths should be set based on the number of homes served, anticipated vehicle usage, and on-street parking requirements. Establish minimum and maximum standards to meet these needs while avoiding excessively wide streets.
- **Non-residential and mixed use roadway pavement widths**—pavement widths should be set based on traffic volumes, types of vehicles, parking, and pedestrian requirements, which often require

more complex analysis. Provide flexibility to accommodate this analysis, particularly in mixed use/and or Traditional Neighborhood Districts.

- **Road right-of-way (ROW) widths and usage**—large ROW's can increase the overall area disturbed during development. Allow for flexibility in widths, where appropriate, and for the placement of utilities below the paved portion of the roadway to allow for the use of roadside swales or other stormwater practices.
- **Building frontage and setback requirements**—residential road length is often determined by the required frontage distance for individual lots.
- **Turnarounds for dead end streets**—road layouts that reduce the number of dead end streets are preferable. Provide options for turnaround designs (cul-de-sacs, loop-de-lanes, T-shaped, etc). To minimize impervious cover, maximum paved diameters for cul-de-sacs should be based on the required turning radius for emergency response vehicles and should also allow for landscaped islands (Figure 3).
- **Sidewalks**—consider pedestrian preferences when designing sidewalks, rather than the blanket application of a requirement for the placement of sidewalks on both sides of the roadway. Allow for sidewalks to be paved with pervious materials.
- **Driveways**—driveway dimensions can be minimized through reduced minimum widths and front yard setbacks. Standards should allow for pervious driveway materials, allow “two-track” designs (i.e., paved tire track with pervious median), and prohibit direct rooftop discharge on to impervious driveway surfaces. Shared driveways should be allowed and sample agreements should be provided by the municipality.

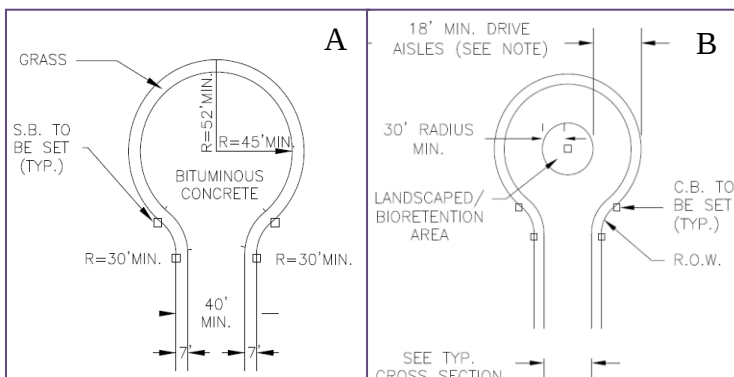


Figure 3. (A) Existing design details may require updating (B) to accompany revised street and parking requirements, such as in this revised cul-de-sac detail for Attleboro, MA that incorporates a reduced paved radius and a central bioretention/landscaped island.

Parking lot standards:

- **Parking ratios**—the number of required parking spaces is often based on parking demand studies that are not locally applicable, expressed only as a minimum standard for the worst case scenario, and often result in an oversupply of parking. In these cases, communities should be comfortable establishing maximum parking requirements at current minimum standards and new minimums set ~ 1/3 below these revised maximums (see Table 1).
- **Off-street and on-site parking**—in urban and village centers, consider dramatic changes to the typical parking demand requirements to provide flexibility in design. Consider revising off-site distance limits, as well as the amount of public parking allowed to help satisfy private parking requirements.
- **Credits for shared parking and mass transit**—allow for reductions in parking requirements for shared parking arrangements, parking garages, and in areas where mass transit is accessible. Provide model shared parking contracts.
- **Stall and driving aisle dimensions**—avoid requiring excessively wide stalls and driving aisles. Standard stall dimensions can be as small as 9 ft x 18 ft. Driving aisle widths should be based on orientation of parking stalls and whether traffic flow is single or two-way.
- **Pervious parking**—allow the use of structural permeable pavement options where appropriate; allow spillover parking (or parking above minimum requirement) to be pervious.
- **Landscape requirements**—landscape islands and borders are often required for traffic flow and screening purposes. The total landscaped area is often a calculated based on the number of parking spaces or amount of total impervious cover. Vegetated stormwater practices should be incorporated into these features; the amount of required landscaping should be sufficient to meet tree canopy/shade requirements and adequate for long-term tree survival.

A more detailed discussion of preferred parking lot design, planning options, and a model parking by-law can be found online at the **MA Smart Growth/Smart Energy Toolkit** www.mass.gov/envir/smart_growth_toolkit/.

Other important site design requirements

In addition, a number of other site design factors can have a significant impact on the amount of impervious cover created at a site and whether it is connected or disconnected to the storm drain system. Examples include:

- Allowing open space residential development (i.e., conservation design or low impact development) that provides for reduced setbacks and smaller lot sizes as “by-right” without additional permitting;
- Restricting the percentages of impervious and turf cover on individual lots;
- Allowing for open-section (i.e., curb-less) roads through flexibility in curbing requirements;
- Allowing for temporary ponding of stormwater on residential lots;
- Requiring the routing of rooftop runoff to pervious areas, dry wells, or other devices to promote infiltration and/or stormwater reuse;
- Requiring integration of landscaping and stormwater management requirements.

Table 1. Example of suggested parking requirements per 1,000 sq ft of Gross Floor Space (excerpt from the Smart Parking By-law, MA Smart Growth/Smart Energy Toolkit)

Land Use	Maximum	Minimum
Bank	3	2
Large Scale Retail	4	2
General Office Building	4	2
Medical Building	8	2
Nursing Home	3	2
Restaurants	10	6
Shopping Centers	4	3
Bed and Breakfast	1.2 spaces/guest room or suite	1 space/guest room or suite
Personal Services	3	2
Churches and Places of Worship	1 space/3 seats in service portion of the building	1 sp/5 seats in service portion of building
Museums and Libraries	2	1
Public and Private Educational Institutions	1 space/3 seats in the classroom	1 sp/5 seats in classroom

Challenges to updating design standards

Consider including representatives of local planning boards, water suppliers and other utilities, transportation, public works, emergency response, school superintendents; and the development community in the review process to help address some of the following concerns related to street design and parking standards:

- Safety concerns (i.e., fire, school bus) for setbacks, turnarounds, permeable pavers, and road widths;
- Utility installation and maintenance in public ROWs;
- Snow removal requirements for parking lots, landscape islands, and turnarounds; and
- Retail parking demands set by financial institutions for minimum parking requirements.

How do I report on our assessment of local regulations?

Within two years of the effective permit, permittees must have developed a report on the assessing current street design, parking lot guidelines, and other local requirements that affect the creation of impervious cover. *This report should clearly indicate which design standards promote excess impervious cover and any recommended changes.*

There are a number of checklists, self-audits, and model bylaws available to assist communities in evaluating street and parking standards including the **Codes and Ordinance Worksheet** from the Center for Watershed Protection (www.cwp.org) and the **LID Local Codes Checklist** from the Massachusetts Planning Commission (www.mapc.org/LID). **Table 2** provides a simplified checklist that can be used to help satisfy SWMP and annual reporting requirements. A narrative describing any recommended (or completed) changes must also be included.

Within three years, permittees must also have developed a report assessing regulatory barriers to implementing structural LID practices (e.g., green roofs, infiltration practices, and water harvesting devices). It may be advantageous to conduct and report on both assessments concurrently.

Other References

- CWP. 1998. Better Site Design: A handbook for changing development rules in your community www.cwp.org
- EPA. 2006. Parking Spaces/Community Places: Finding the balance with smart growth solutions. www.epa.gov/smartgrowth/pdf/EPAParkingSpaces06.pdf
- American Planning Association, Massachusetts and Home Builders Association of Massachusetts. October 2010. Sustainable Neighborhood Road Design: A guidebook for Massachusetts cities and towns. www.apa-ma.org/resources/publications/nrb-guidebook
- New Hampshire Department of Environmental Services. 2008. Innovative Land Use Planning Techniques: A handbook for sustainable development. http://des.nh.gov/organization/divisions/water/wmb/repp/documents/ilupt_complete_handbook.pdf
- Rhode Island Department of Environmental Management. Rhode Island Community LID Site Planning and Design Guidance Document. 2011.
- Maryland Governor’s Office of Smart Growth. Driving Urban Environments: Smart growth parking best practices.

Table 2. Checklist for evaluating street and parking standards (adapted from CWP *Codes and Ordinances Worksheet* and MAPC *LID Checklist**)

STREETS

1. Street width	1.1. Is the minimum pavement width for low traffic residential roads (<500 average daily trips) between 18-22 ft? ft
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	1.2. Can parking lanes serve as traffic lanes in higher density areas?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	1.3. Are narrower pavement widths allowed on road sections where there are no houses, buildings, intersections, or on-street parking spaces?
2. Right-of-way (ROW)	1.4. Are reductions in frontage distances allowable where appropriate (i.e., open space developments, around cul-de-sacs, and along outside sideline of curved streets) to minimize street length?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	1.5. Can permeable paving be used for residential roads, shoulders, and parking lanes?
3. Dead-end streets and turnarounds	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	2.1. Are minimum ROW widths less than 45 ft for a residential street? ft
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	2.2. Can utilities be placed below the paved section of the ROW?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
3. Dead-end streets and turnarounds	3.1. Are landscaped/bioretention islands required in the center of cul-de-sacs?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
	3.2. Is the minimum required radius for cul-de-sacs less than 35 ft? ft
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
3. Dead-end streets and turnarounds	3.3. Are alternatives to cul-de-sacs such as “hammerheads” allowed for permanent turnarounds?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised
3. Dead-end streets and turnarounds	3.4. Are alternative road layouts such as one-way loops encouraged to eliminate dead end streets?
	☐ Yes ☐ No ☐ No standard ☐ Don't know Action: ☐ Leave as is ☐ To be revised

4. Sidewalks	4.1. Are sidewalks always required on both sides of residential streets?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
	☐ Yes ☐ No ☐ No standard ☐ Don't know					
	4.2. Is permeable paving allowed for sidewalks?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
☐ Yes ☐ No ☐ No standard ☐ Don't know						
4.3. Are alternative pedestrian pathway layouts allowed, rather than placement in road ROW?				<i>Action:</i> ☐ Leave as is ☐ To be revised		
☐ Yes ☐ No ☐ No standard ☐ Don't know						
5. Driveways	5.1. Are reductions in setback distances allowable where appropriate to minimize driveway lengths?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
	☐ Yes ☐ No ☐ No standard ☐ Don't know					
	5.2. Is the minimum driveway width 9 feet or less (single lane) or 18 feet (two lane)?				ft ft	
	☐ Yes ☐ No ☐ No standard ☐ Don't know				<i>Action:</i> ☐ Leave as is ☐ To be revised	
	5.3. Are shared driveways allowable?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
☐ Yes ☐ No ☐ No standard ☐ Don't know						
5.4. Are alternative materials and designs (i.e., porous pavers, two-track design) allowed?				<i>Action:</i> ☐ Leave as is ☐ To be revised		
☐ Yes ☐ No ☐ No standard ☐ Don't know						

PARKING

6. Parking ratios	6.1. Are parking ratios expressed as both minimum and maximums?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
	☐ Yes ☐ No, minimum only ☐ No maximum only ☐ No, Expressed as medians					
	6.2. Are the minimum required # of parking spaces less than:					
	3 spaces per1000 sq ft for professional office building?	☐ Yes	☐ No	☐ No Standard	# of spaces	<i>Action:</i> ☐ Leave as is ☐ To be revised
	4.5 spaces per sq ft for shopping centers?	☐ Yes	☐ No	☐ No Standard		<i>Action:</i> ☐ Leave as is ☐ To be revised
	2 spaces per single family home?	☐ Yes	☐ No	☐ No Standard		<i>Action:</i> ☐ Leave as is ☐ To be revised
	6.3. Are parking requirements reduced for shared parking arrangements, structured parking, areas near mass transit, and special districts?				<i>Action:</i> ☐ Leave as is ☐ To be revised	
	☐ Yes, all ☐ Not all ☐ Not for any ☐ Don't know					
6.4. Are model shared parking agreements provided?				<i>Action:</i> ☐ Leave as is ☐ To be revised		
☐ Yes ☐ No ☐ Shared parking not allowed ☐ Don't know						
6.5 Are there special design standards for urban village centers?				<i>Action:</i> ☐ Leave as is ☐ To be revised		
☐ Yes ☐ No ☐ No standard ☐ Don't know						

7. Stall and aisle dimensions	7.1. Are minimum stall dimensions for standard parking space 9 x 18 feet or less? ☐ Yes ☐ No ☐ No standard ☐ Don't know	ft <i>Action:</i> ☐ Leave as is ☐ To be revised
	7.2. Are minimum driving aisle widths for standard two-way traffic 22 feet or less? ☐ Yes ☐ No ☐ No standard ☐ Don't know	ft <i>Action:</i> ☐ Leave as is ☐ To be revised
	7.3. Are smaller compact car stalls required for at least 30% of total parking spaces? ☐ Yes ☐ No ☐ No standard ☐ Don't know	% <i>Action:</i> ☐ Leave as is ☐ To be revised
8. Landscape requirements	8.1. Does a portion of impervious parking area require shading with mature tree canopy cover? ☐ Yes ☐ No ☐ No standard ☐ Don't know	% <i>Action:</i> ☐ Leave as is ☐ To be revised
	8.2. Is the minimum landscaping requirement at least 20% of the total parking area? ☐ Yes ☐ No ☐ No standard ☐ Don't know	% <i>Action:</i> ☐ Leave as is ☐ To be revised

**See these checklists for a more extensive set of evaluation questions that include additional site design factors.*

SUMMARY OF STANDARDS TO REVISE

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