

## Mass

Mass is the overall volume, or bulk, of the building. In order to maintain pedestrian orientation and a sense of scale that is compatible with the existing character of downtown Northville, the apparent bulk of large, new buildings must be reduced. This can be done by breaking the architectural volume into smaller components through variations in building height, roof lines, and detailing.

### Mass Guidelines

- Break large forms into smaller, varied masses which are common on most downtown buildings.
- Reinforce the established horizontal lines of facades in the block. Align cornices, upper story windows, and storefront windows. Align storefront heights with others on the block.
- Express the location of each floor with horizontal elements on the facade of the building.
- Repeat the established rhythm of building widths in the block and minimize long expanses of unbroken horizontal building elements.
- Use design elements such as columns and pilasters, or changes in color or material to express this rhythm.
- Maintain traditional established breaks that occur between buildings (such as alleys.)



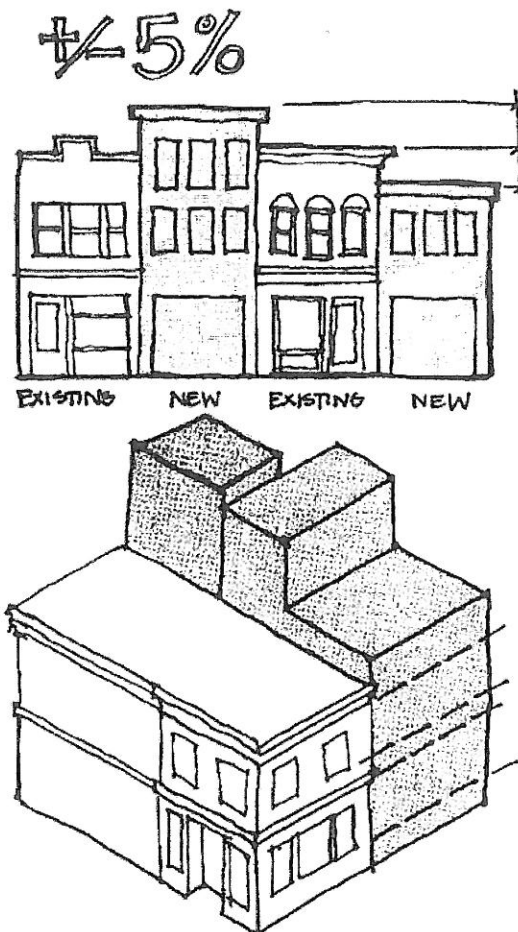
*This large building has been divided into smaller masses. The overall effect of the building is still very massive because of the scale, height, and homogeneity of materials in relationship to the neighboring buildings.*

## Height

Height is the actual dimension from the ground to the top of the building. Historic buildings in Northville are one, two, or three stories. New development of over three stories may be in conflict with the historic character. Actual height and perceived height are sometimes different. A five story building, not generally considered "high rise" may appear much taller if it is adjacent to one story commercial buildings, or worse, when it is adjacent to residential construction. Conversely, a one story infill building can be lost between three story buildings in a solid commercial block.

### Height Guidelines

- The proposed roof shape and skyline should relate to the existing adjacent structures.
- The proposed highest height should be within 5% of the average height of the existing structures within a 300 feet radius.
- Retain the horizontal lines of the facades on the block.
- Consider the characteristics of the sun and provide a terraced profile to avoid blocking sun.
- Provide stepped facades to avoid shading sidewalks and public spaces, and to avoid down-draft and wind tunnel effects.
- Taller buildings should be designed to appear to be the same height as their historic neighbors from the pedestrian or street level when viewed. This can sometimes be accomplished by designing incremental transitions in height (steps) between new and existing buildings.
- Buildings that are too short are also not compatible.



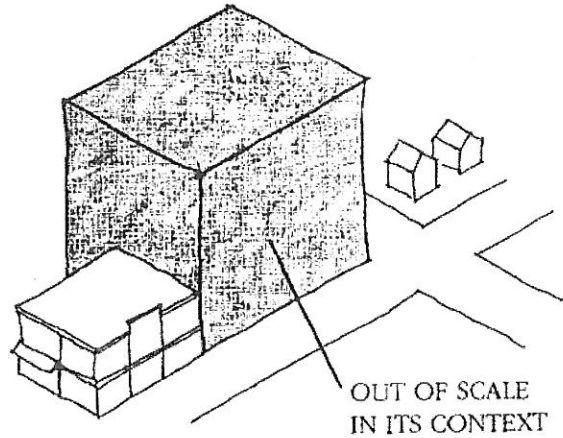
*Step new buildings up and back from the streetfront. Continue the dominant horizontal lines (such as the lower cornice, window sills, storefront height, and kneewall) from the adjacent historic buildings.*

## Scale

Scale is the human perception of the size of an object relative to other objects. Scale varies with function and location. The perception of scale is influenced by height and the proportion of building elements.

### Scale Guidelines

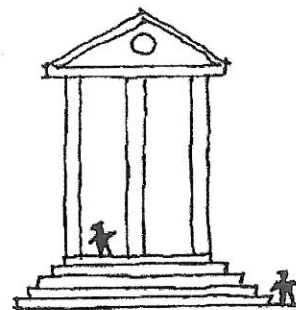
- New construction and additions should be compatible with the scale of commercial buildings. Where they are adjacent to residential buildings, the scale should not overwhelm the residential building.
- Residential scale is generally not appropriate within the historic commercial district except where homes have been converted to business use.
- ✱ • Monumental scale is also not appropriate within the historic district.
- Refer to "Height" and "Proportion" for additional guidelines related to scale.



RESIDENTIAL SCALE



COMMERCIAL SCALE



MONUMENTAL SCALE

## Hierarchy

Hierarchy is a means of defining the importance of an architectural element by its size, shape, or placement relative to the other forms. Visual hierarchy helps orient the user, whereas lack of hierarchy may confuse the user. This is especially important on commercial buildings, because the user is a customer who needs to find the entrance. In the historic district, a good hierarchical arrangement will put the emphasis on the historic building, rather than on the addition. Additions should be visually subordinate to the historic portions.

### Hierarchy Guidelines

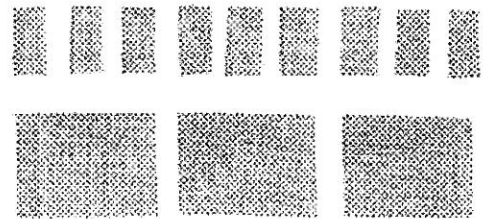
- Locate additions on the rear. (Refer to "Rear Facade Development.")
- Set rooftop additions back from the facade.
- Apply less ornament to the subordinate addition.
- Do not engulf the historic building with additions.
- No additions that extend into or above the front setback are allowed.

## Rhythm

Rhythm and pattern are created by the juxtaposition of repetitive elements in a design. Upper level windows, storefront columns, pilasters, brackets, and gables are some common commercial elements that are rhythmic. Rhythm gives variety to building surfaces and it helps divide walls and masses. This is important on large commercial facades.

### Rhythm Guidelines

- The arrangement of solids and voids (walls and openings) and architectural features (ornament, columns, etc.) across the front facade should be consistent with the pattern established by existing adjacent structures.
- Reinforce the established pattern of upper story windows. Use similarly-proportioned windows or consider using other architectural elements (e.g. a change in materials or change in texture) to establish a similar rhythm.



A typical row of historic commercial buildings with the corresponding rhythm and proportion of the second floor windows and storefronts.

Long Building  
a good example  
of rhythm

# Roundabout Resources

- Public Outreach Resources
- Map
- FAQ
- Library
- News
- Training

## Where Should Roundabouts Be Considered?

**Roundabouts are a feasible and practical alternative to other types of control where:**

- Traffic flows do not exceed about
  - ✗ 2,000 vehicles per hour for one-lane roundabouts; and, *need traffic data for 3-7pm*
  - 4,000 vehicles per hour for two-lane roundabouts; and,
  - 6,000 vehicles per hour for three-lane roundabouts; and,
  - 8,000 vehicles per hour for four-lane roundabouts.
- Locations experience high rates of angle, rear-end or loss-of-control collisions.
- ✗ Stop signs are creating unacceptable delays for side street motorists, but where a traffic signal is not warranted, or where a traffic signal would result in greater delays than a roundabout.
- ✗ There is a high proportion of left turning traffic, or where the major traffic route is not straight through the intersection.
- Intersections have unusual geometry or more than four legs. *(5 leg 7 mile E+W Sheldon N+S Hines)*
- It is important to emphasize the transition between urban and rural environments (i.e. gateways).

**Roundabouts are not always practical or feasible where:**

- Land availability is limited.
- Sight distance of the entry points is limited, such as on abrupt crest vertical curves on the intersection approaches. *(Sheldon going south bld 7 mile)*
- Traffic signal progression is critical, as in some cases roundabouts can disrupt traffic platooning.
- Adjacent to railways, where space to queue traffic is limited and preemption equipment for traffic signal poses an operational challenge for the operating authority.

**Good Locations for Roundabouts:**

- Roundabouts Near Schools
- Roundabouts Near Businesses

vehicles were observed, and over 45,000 rejected headways were analyzed. A headway was rejected when a vehicle was stopped at the yield line and had to wait for multiple vehicles in the circulating roadway. Each rejected gap (*i.e.*, where the stopped vehicle did not proceed) between vehicles was measured from the difference between the time of detection between the two vehicles defining the beginning and end of the gap. 75% of the rejected headways were less than 3 seconds, which is substantially less than the recommended critical headway values reported in the literature (3). At the test intersection, which is located in a community with experienced roundabout drivers, the median critical headway was 2.2 seconds and the 75<sup>th</sup> percentile was 2.8 seconds. Cumulative frequency diagrams of the rejected gaps are shown by approach in Figure 3.9. The results also show that, as the number of subsequently rejected headways increases, the more likely a driver is to accept a smaller gap. This is as expected—the longer a motorist waits, the less patient they become.

The results of this study are significant because the observed critical headways were much lower than the numbers that would typically be used for default designs. The 20-year design life being analyzed for a roundabout feasibility study will probably operate under similar conditions, as the population will likely become accustomed to roundabout driving during the design life. Although additional measurements should probably be taken at other locations to account for the impact of approach geometry (particularly multi-lane roundabouts), the results suggest that the critical headway values used for design purposes should be reevaluated.

### 3.4 Roundabout Lighting Review

During interactions with INDOT engineers and others during the course of this research, the question was raised what the consensus was on the

lighting requirement for roundabouts. To discover whether there was such a consensus, a review of state practice with regard to roundabout lighting was conducted. An attempt was made to find a lighting policy from every state. In total, 14 states had explicitly stated policies existing in design manuals, lighting manuals, or other such policy documents that were available for download on the internet. Of these, nine states *required* lighting, another four *recommended* it, and one states that lighting was *warranted*. From this, it is concluded that the consensus on this topic is that roundabouts should be lighted. The results are shown in Table 3.1; further details can be found in Appendix D.

### 3.5 Roundabout Site Selection

One of the desired outcomes from this research study was to develop a method for determining whether roundabout control is a feasible option for a site. A list of considerations was developed based on input from INDOT engineers during a workshop and in a review of the state of the practice from a survey of national and state level guidance documents. From this, a variety of site selection criteria were developed and organized into various categories. Table 3.2 shows the list of criteria. Each row represents a set of site conditions that belong under a particular category, the type of data needed to perform the analysis, and whether those conditions are favorable or unfavorable for roundabout control.

From this table, a checklist was developed for site analysis (Figure 3.10) that incorporates the site considerations and a comparison to control alternatives. The philosophy behind this checklist is the construction of a roundabout should be based on some circumstances that are favorable to its deployment. There should also be no unfavorable circumstances, or these should be mitigated, and the need for such measures should be incorporated into the roundabout design at the planning stage. The checklist takes both life cycle costs and construction costs into consideration. If there is not sufficient budget to construct the roundabout, then its construction is not considered feasible. Life cycle costs, including user benefits of all modes, maintenance, energy cost, and so forth are considered in the consideration of alternatives.

For example, many intersections on state highways have neighboring driveways that may have to be removed or relocated for the implementation of a roundabout; this factor would be taken into account first when considering the *functionality* of the roundabout (e.g., whether the driveway can be feasibly accommodated), as well as the *constructability* of the roundabout (e.g., whether driveway relocation introduces considerable cost).

Appendix E provides additional details on the site selection procedure.

TABLE 3.1  
US States with roundabout lighting policies found in this search

State	Roundabout Lighting Practice
Colorado	Warranted
Delaware	Required
Florida	Required
Georgia	Required
Illinois	Recommended
Kansas	Required
Kentucky	Required
Maryland	Required
Michigan	Recommended
Minnesota	Recommended
New Hampshire	Required
New York	Recommended
Washington	Required
Wisconsin	Conditionally required

TABLE 3.2  
Synthesis of selection criteria

	Data Required	Favorable Conditions for Roundabouts	Unfavorable Conditions for Roundabouts
Safety	Intersection/roadway crash history Approach speeds Roadway geometry Local traffic characteristics	History of safety problems On problematic roadway alignment and cannot be relocated Transition between two different speed zones is desired	High pedestrian or bicycle traffic Hearing or visually impaired pedestrian traffic Railroad crossings are in close proximity Intersection skew will produce poor roundabout geometry and additional ROW to improve alignments cannot be acquired
Functionality	Proposed site terrain Local land use Distances to neighboring intersections Roadway geometry, locations of bridges Local traffic characteristics	Low truck traffic Traffic calming is desirable Transition between two different types of land-use areas is desired Will provide a desired community "gateway" Will replace AWSC (crossing roadways have similar priority/functional class) Heavy left turns or U-turns are anticipated Simplifies complex intersection geometry (4+ approaches, etc.) There is an access management need on the roadway(s)	High truck traffic X Steep grade or difficult terrain X Reversible lanes are used Adequate geometry for circulating roadway and approaches cannot be provided One crossing roadway has very heavy traffic compared to the other (dissimilar priority/functional class) X Nearby intersections will generate queues that would spill into the roundabout In the middle of a coordinated signal system Existing site features transit facilities, parking, or driveways that cannot be relocated
Performance of Roundabout	Design period volume Growth factors for 20-year horizon Pedestrian and bicycle volumes (if applicable) Performance analysis	Roundabout does not suffer undesirable capacity deficiencies over the design life (20 year horizon) Roundabout level of service/delay performance is satisfactory	Roundabout suffers undesirable capacity deficiencies over the design life (20 year horizon) Roundabout level of service/delay performance is unsatisfactory
Performance of Alternatives	(Same data as above step) Performance analysis of roundabout and alternative intersection designs	Roundabout provides better performance (life cycle cost) than alternatives	Roundabout does not provide better performance (life cycle cost) than alternatives
Maintenance	Site characteristics Agency maintenance contracts or procedures	Existing power facilities exist to provide for lighting Existing contracts or procedures exist to provide for landscape maintenance	Terrain problematic for adequate drainage of circulating roadway Difficulty in obtaining power to provide lighting X Difficulty in obtaining landscape maintenance X
Cost/Constructability	Sketch design Knowledge of right-of-way and utilities impacted Historical unit costs Desired budget for intersection improvement	Construction cost is feasible	Construction cost is unfeasible (e.g., substantial ROW acquisition costs, utility relocation, driveway relocation, earth movement, etc.)

bridge at  
Sheldon  
path

WING  
HILLES  
possible  
backup @  
main road

need  
"current"  
traffic data

## Roundabout Planning Checklist

	Favorable Conditions	Unfavorable Conditions
Safety	History of safety problems	High pedestrian or bike traffic
	Problematic roadway alignment	Impaired pedestrians
	Transition between speed zones	Railroad crossings in close proximity
		Unsatisfactory approach geometry
Functionality	Low truck traffic	High truck traffic
	Traffic calming desired	Sleep grade - <i>Sheldon</i>
	Transition between land use areas	Reversible lanes
	Replacement of AWSC	Difficult terrain for geometry
	Heavy left turns or U-turns	Dissimilar functional class roadways
	Simplifies intersection geometry	Nearby intersection queues
	Access management	Amid coordinated signal system
		Problematic site features - <i>river</i>
Roundabout Performance	Satisfactory v/c ratio	Unsatisfactory v/c ratio
	Satisfactory delay performance	Unsatisfactory delay performance
Comparison with Alternatives	Alternative	Life Cycle Benefit-Cost Ratio
	Existing Intersection (Do-Nothing)	
	Roundabout	
	Satisfactory comparison	Unsatisfactory comparison
Maintenance	Existing power	Power can not be provided
	Existing maintenance contracts	Maintenance cannot be provided
		Drainage problems anticipated
Cost and Constructability	Estimated Construction Cost	
	Estimated Construction Budget	
Notes		
If no favorable conditions are found, are there any mitigating circumstances that would warrant the installation of a roundabout at this location?		
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If unfavorable conditions are found, how will these be mitigated?		
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Figure 3.10 Proposed roundabout selection checklist.