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Joseph W. McMahon, P.E.

November 28, 2018

K. David Weidner, Ph.D.
Executive Director
The Pilgrim Monument and Provincetown Museum
1 High Pole Hill Road
Provincetown, MA 02657

RE: Pilgrim Monument Funicular
Traffic Evaluation

Dear Dr. Weidner:

McMahon Associates has conducted an additional sensitivity analysis assessment of the potential traffic impacts associated with the proposed Pilgrim Monument and Provincetown Museum (PMPM) Funicular project located on Bradford Street in Provincetown, Massachusetts. This letter supplements the Traffic Evaluation prepared by McMahon dated October 12, 2018.

Sensitivity Analysis

In our Traffic Evaluation, McMahon Associates presented the number of pedestrian trips expected to be generated by the proposed funicular. In order to present a conservative sensitivity assessment of the funicular's impact on vehicular delay at the intersection of Bradford Street at Ryder Street, McMahon Associates has prepared an alternative trip generation which also assumes that a portion of people currently traveling to the PMPM will use the funicular and cross Bradford Street at Ryder Street; this additional pedestrian traffic includes pedestrians currently crossing at other locations along Bradford Street and PMPM patrons arriving by car that use the funicular to also visit businesses along Commercial Street and surrounding areas. The same methodologies described in the Traffic Evaluation were applied to estimate the number of pedestrian and vehicle trips to the PMPM in a typical Saturday peak hour during the peak summer months ("high season") as well as the non-peak months ("low season"), as shown in Table 1.

Table 1
Summary of Existing PMPM Trips (based on 2017 Admissions)

Admissions	High Season	Low Season
Total Admissions:		
Daily	507	121
Hourly average	63	15
Hourly- High hours	81	19
Hourly- Low Hours	34	8
Admissions arriving as Peds:		
Daily	356	85
Hourly average	44	11
Hourly- High hours	57	14
Hourly- Low Hours	24	6
Admissions arriving in Vehicles:		
Daily	151	36
Hourly average	19	4
Hourly- High hours	24	6
Hourly- Low Hours	10	2
Vehicle Trips (Based on 1.5 persons per vehicle)		
Daily	100	24
Hourly average	13	3
Hourly- High hours	16	4
Hourly- Low Hours	7	2

In order to present a conservative analysis, a 20% growth was applied to the hourly pedestrian traffic accessing the site during the high hours for PMPM admissions for the "Build" peak hour condition traffic analysis, as in the Traffic Evaluation. Additionally, for this sensitivity analysis, a number of pedestrians equal to half of total PMPM admissions during high hours (both by vehicle and as pedestrians) was added to each of the study area crosswalks. No change was made to vehicular volumes. This results in a total of 52 "high season" pedestrians and 13 "low season" pedestrians added to each crosswalk in the sensitivity analysis, compared to existing conditions. Figure 3A, attached, summarizes the resulting Saturday midday peak hour Build condition volumes for the sensitivity analysis during both the high and low seasons.

Intersection capacity analyses were conducted using Synchro capacity analysis software for the study area intersection under the 2018 sensitivity analysis peak hour traffic conditions for low season and high season volumes. The overall results of the sensitivity analysis for the study area intersections are compared to 2018 Existing and 2018 Build conditions in Table 2 below and detailed capacity analysis results are attached.

Table 2: Saturday Midday Capacity Analysis Summary

		Low Season								
		2018 Existing			2018 Build			2018 Sensitivity Analysis		
Intersection	Movement	LOS[1]	Delay[2]	V/C[3]	LOS	Delay	V/C	LOS	Delay	V/C
Bradford Street	WB LR	D	28.9	0.55	D	29.5	0.56	D	34.3	0.61
at Ryder Street	NB TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
	SB LT	A	1.5	0.07	A	1.5	0.07	A	1.6	0.07

		High Season								
		2018 Existing			2018 Build			2018 Sensitivity		
Intersection	Movement	LOS[1]	Delay[2]	V/C[3]	LOS	Delay	V/C	LOS	Delay	V/C
Bradford Street	WB LR	F	399.2	1.72	F	447.0	1.82	F	642.7	2.24
at Ryder Street	NB TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
	SB LT	A	1.8	0.13	A	1.8	0.13	A	1.9	0.14

1 Level-of-Service

2 Average vehicle delay in seconds

3 Volume to capacity ratio

As shown in Table 2, the additional pedestrian volumes added for the sensitivity analysis do not result in a change in level-of-service (LOS) at any of the study intersection approaches compared to 2018 Existing or 2018 Build conditions during the low or high seasons. During the low season, vehicular delay on the stop-controlled Ryder Street approach would be projected to increase by approximately 18% compared to Existing conditions. During the high season, vehicular delay on the Ryder Street approach would be projected to increase by approximately 60% compared to Existing conditions.

The results of this sensitivity analysis do not affect the conclusions drawn in McMahon's Traffic Evaluation. The proposed funicular project is focused on improving pedestrian access to an existing cultural site in Provincetown and fulfills a recommendation by the Cape Cod Commission. The project would not be expected to increase vehicular traffic to the site, and may reduce vehicular traffic by shifting a portion of vehicular trips to the PMPM to pedestrian trips (though this is not accounted for in our analysis). As seen from the existing traffic counts, a moderate number of pedestrians already use this intersection during the high season peak periods, as is the case with many other intersections in town. These existing pedestrians are already interrupting vehicular traffic flow, as is common in a downtown tourist area such as this. The additional pedestrians are expected to primarily utilize the

same gaps in traffic to cross the roadways with the existing groups of pedestrians that exist today, likely resulting in large groups of pedestrians crossing under a future scenario. From a traffic operations perspective, delays at stop-controlled intersections are a typical scenario in town during the high season, match the expectations of motorists, and this situation will be continued with the proposed project. In reality, traffic operations may be overstated with our capacity analysis software, as courtesy gaps are a likely occurrence and are not reflected in the traffic model.

The crosswalk improvements proposed in the Traffic Evaluation for the intersection of Bradford Street at Ryder Street are appropriate traffic mitigation based on a review of Federal Highway Administration (FHWA) guidance, will serve as a pedestrian gateway to the funicular, and will greatly improve the pedestrian environment and safety of the crosswalks. These improvements would have to be vetted with town officials, as they are proposed within the existing town right-of-way.

Please do not hesitate to contact me with any questions.

Sincerely,

Philip Viveiros, P.E., PTOE
Project Manager

Attachments:
Figures
Capacity Analysis

J:\Analysis\Provincetown\Pilgrim Monument\Report\Graphics\Ptown_Volume Schematics.dwg 11/15/18

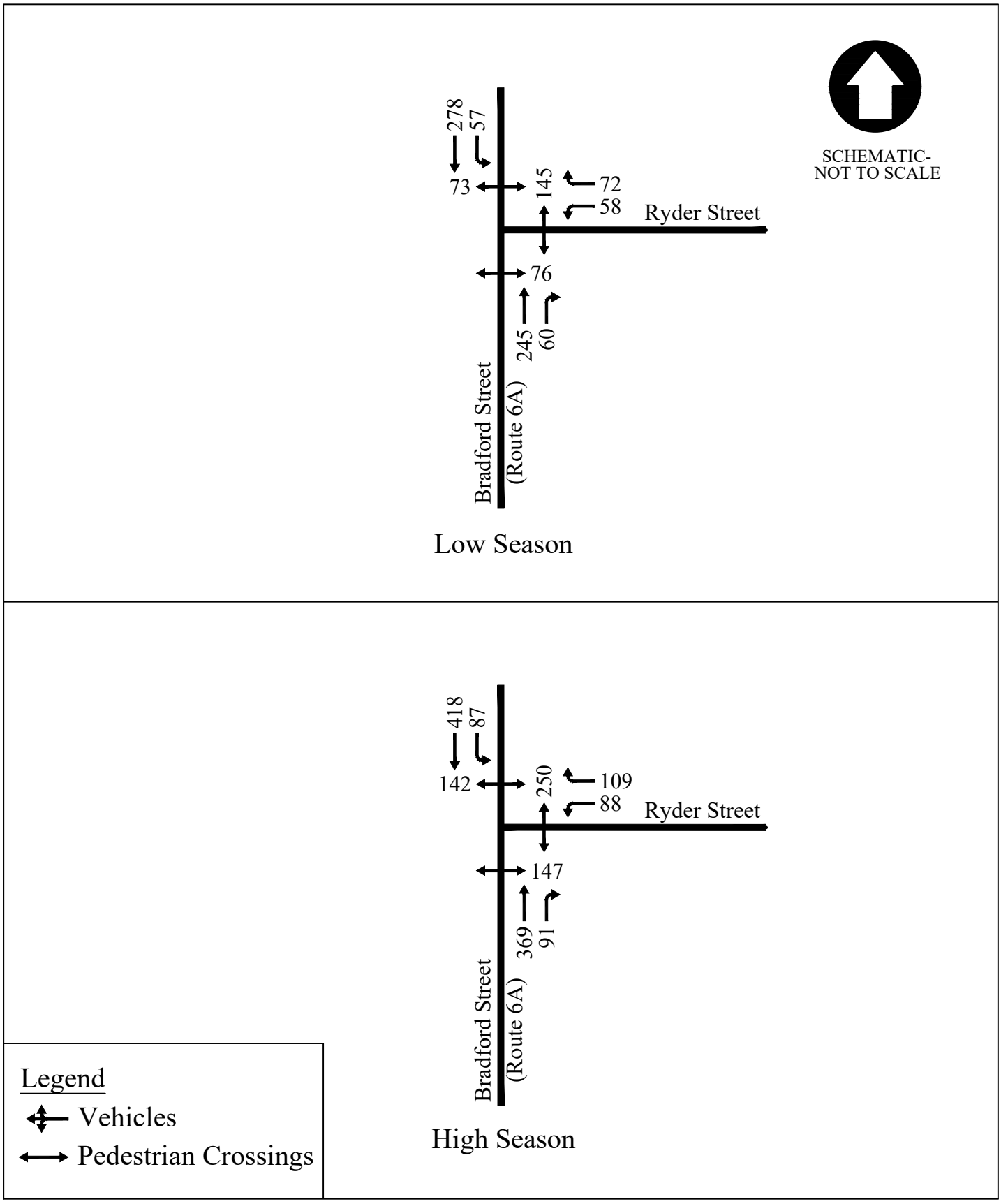

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Figure 3A
2018 Build Saturday Midday
Peak Hour Traffic Volumes (Sensitivity Analysis)
Pilgrim Monument Funicular
Provincetown, Massachusetts

Intersection	
Int Delay, s/veh	133

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	88	109	369	91	87	418
Future Vol, veh/h	88	109	369	91	87	418
Conflicting Peds, #/hr	147	142	0	250	250	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	72	94	94	89	89
Heavy Vehicles, %	3	3	1	0	4	0
Mvmt Flow	122	151	393	97	98	470

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1505	834	0	0	740	0
Stage 1	692	-	-	-	-	-
Stage 2	813	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.14	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.236	-
Pot Cap-1 Maneuver	133	367	-	-	858	-
Stage 1	495	-	-	-	-	-
Stage 2	434	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 74	256	-	-	679	-
Mov Cap-2 Maneuver	~ 74	-	-	-	-	-
Stage 1	392	-	-	-	-	-
Stage 2	306	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 642.7	0	1.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	122	679	-
HCM Lane V/C Ratio	-	-	2.243	0.144	-
HCM Control Delay (s)	-	-	$ 642.7	11.2	0
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	23.3	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	72	245	60	57	278
Future Vol, veh/h	58	72	245	60	57	278
Conflicting Peds, #/hr	76	73	0	145	145	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	72	72	94	94	89	89
Heavy Vehicles, %	3	3	1	0	4	0
Mvmt Flow	81	100	261	64	64	312

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	954	511	0	0	470	0
Stage 1	438	-	-	-	-	-
Stage 2	516	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.14	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.236	-
Pot Cap-1 Maneuver	286	561	-	-	1081	-
Stage 1	648	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	216	463	-	-	950	-
Mov Cap-2 Maneuver	216	-	-	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	513	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	32.2	0	1.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	307	950	-
HCM Lane V/C Ratio	-	-	0.588	0.067	-
HCM Control Delay (s)	-	-	32.2	9.1	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	3.5	0.2	-

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December 13, 2018 **DRAFT**

K. David Weidner, Ph.D.
Executive Director
The Pilgrim Monument and Provincetown Museum
1 High Pole Hill Road
Provincetown, MA 02657

RE: Pilgrim Monument Funicular
Draft Traffic Monitoring Plan

Dear Dr. Weidner:

Based on conversations held with Town officials on Wednesday, December 12, 2018, the Town of Provincetown has requested that the Pilgrim Monument and Provincetown Museum (PMPM) conduct a traffic monitoring program in order to measure the impacts of the proposed funicular connecting the PMPM to Bradford Street (Route 6A) at Ryder Street in Provincetown, MA. This memo outlines the proposed draft traffic monitoring program.

Traffic Counts

The PMPM will conduct two programs of traffic counts at the intersection of Bradford Street at Ryder Street, one occurring in 2019 prior to the construction of the funicular, and the second occurring one year after the funicular has been constructed and opened to the public, or at a time determined by mutual agreement of the Town and the PMPM. Both programs will be performed during the months of July and August, barring unforeseeable conditions such as weather. Each count will consist of Manual Turning Movement (MTM) counts of pedestrians, bicycles, and vehicles, as well as observations of queue lengths, average vehicle delays, and pedestrian platooning. A total of six counts will be conducted per program, with specific time periods for the counts to be determined by mutual agreement of the Town and the PMPM:

- Counts will be conducted during an agreed upon two-hour peak period on two different Saturday afternoons. At least one of these Saturday counts will be conducted on a day when the Provincetown Farmer's Market on Ryder Street is in place, which will also be counted during a separate agreed upon two-hour peak period.
- Counts will be conducted during an agreed upon two-hour peak period on two separate weekday afternoons.
- Two separate counts will be conducted during local special events, such as Independence Day or Provincetown Carnival Week, with each count conducted during an agreed upon two-hour

peak period. Other such events can be approved by the Town of Provincetown prior to the start of the count program.

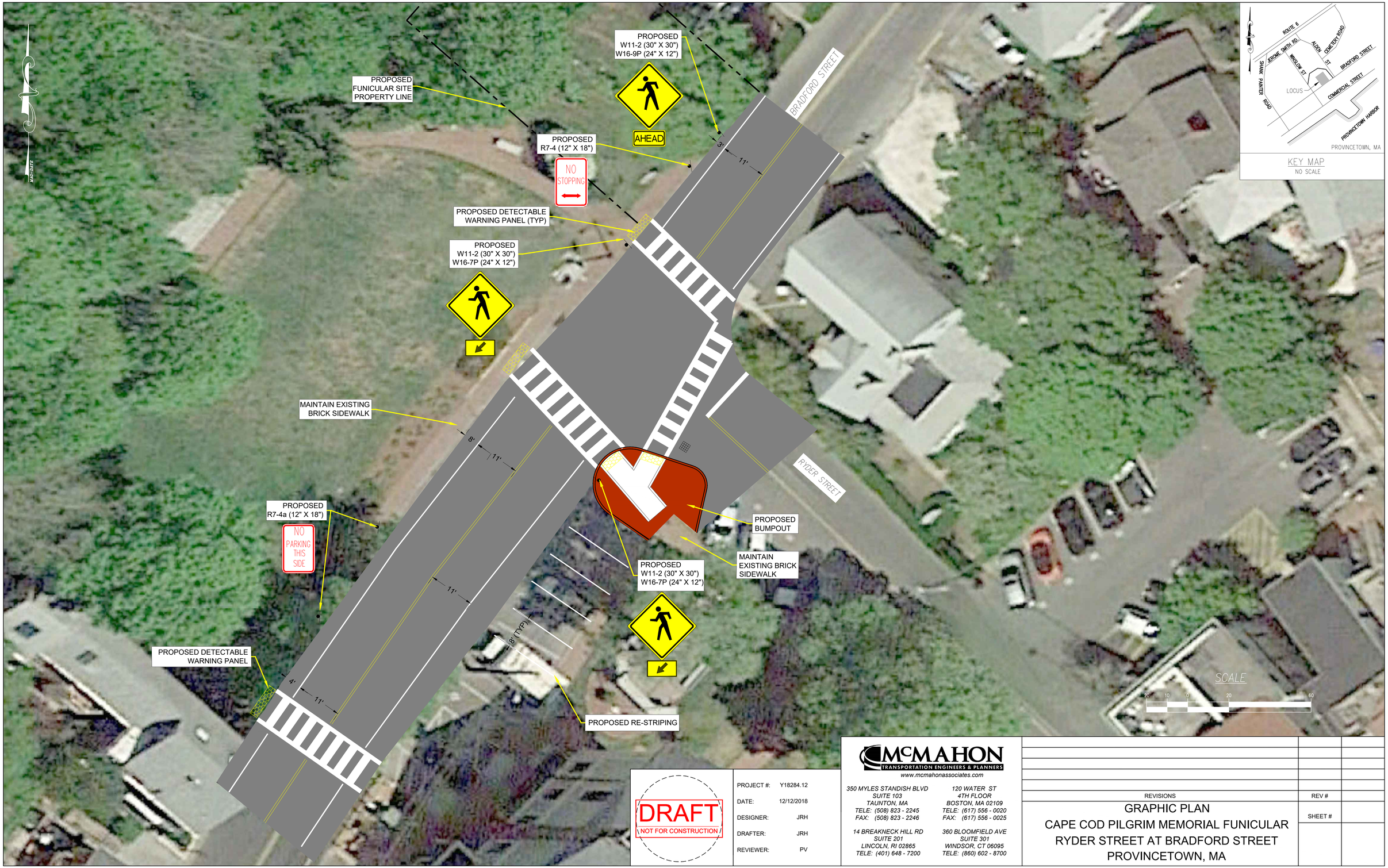
Upon completion of the pre-construction count program in 2019, the PMPM will submit a memo summarizing the results of the count program, including review of relevant admissions data to be provided by the PMPM. This information can be submitted to Town officials for consideration of revising agreed-upon thresholds for future monitoring programs.

Upon the completion of the post-construction count program, the PMPM will submit a memo summarizing the results of the count program, including review of relevant admissions data to be provided by the PMPM, and the impacts of the funicular on vehicle, pedestrian, and bicycle volumes and operations at the Bradford Street/Ryder Street intersection. If there is a significant increase in delays or queueing at the Bradford Street/Ryder Street intersection, the Provincetown Police Department may request implementation of mitigation to offset the impact of the funicular. Such mitigation may include the arrangement of police details to ensure efficient operations near the funicular, or other mitigation methods mutually agreed upon by the PMPM and the Town of Provincetown.

Please do not hesitate to contact me with any questions.

Sincerely,

Philip Viveiros, P.E., PTOE
Project Manager



DRAFT
NOT FOR CONSTRUCTION

PROJECT #:	Y18284.12
DATE:	12/12/2018
DESIGNER:	JRH
DRAFTER:	JRH
REVIEWER:	PV

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REVISIONS	REV #	

GRAPHIC PLAN
CAPE COD PILGRIM MEMORIAL FUNICULAR
RYDER STREET AT BRADFORD STREET
PROVINCETOWN, MA

SHEET #

J:\Analysis\Provincetown\Pilgrim Monument\Drawings\Concepts\Bumpout and No Curb Extension Graphic.dwg Dec 12, 2018 - 4:23pm

PROPOSED
W11-2 (30" X 30")
W16-9P (24" X 12")

AHEAD

PROPOSED
R7-4 (12" X 18")

NO
STOPPING

PROPOSED DETECTABLE
WARNING PANEL (TYP)

PROPOSED
W11-2 (30" X 30")
W16-7P (24" X 12")

MAINTAIN EXISTING
BRICK SIDEWALK

PROPOSED
R7-4a (12" X 18")

NO
PARKING
THIS
SIDE

PROPOSED DETECTABLE
WARNING PANEL

PROPOSED
W11-2 (30" X 30")
W16-7P (24" X 12")

MAINTAIN EXISTING
BRICK SIDEWALK

PROPOSED RE-STRIPING

3'
11'
6'
11'
11'
8' (TYP)
4'
11'

KEY MAP
NO SCALE

PLAN

20 10 0 20 60

1 inch = 20 ft.

DRAFT
NOT FOR CONSTRUCTION

PROJECT #:	Y18284.12
DATE:	12/12/2018
DESIGNER:	JRH
DRAFTER:	JRH
REVIEWER:	PV

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REVISIONS	REV #	

CONCEPT PLAN
CAPE COD PILGRIM MEMORIAL FUNICULAR
RYDER STREET AT BRADFORD STREET
PROVINCETOWN, MA

SHEET #

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Environmental Partners GROUP

A partnership for engineering solutions

Technical Memorandum

Date 12/11/2018

To Jeffrey Ribeiro, AICP, Town Planner, Town of Provincetown

From James. D. Fitzgerald, P.E., LEED AP

cc Richard Waldo, P.E., DPW Director, Town of Provincetown

Subject Pilgrim Monument Funicular - Traffic Peer Review

In general, the October 2018 Traffic Evaluation and the November 2018 Traffic Evaluations by McMahon Associates for the proposed Pilgrim Monument funicular in Provincetown has been prepared in a professional manner, consistent with standard engineering practices with the exception of the issues identified below.

This project proposes the construction of a funicular that will provide a pedestrian link from Bradford Street (Route 6A) to Pilgrim Monument and Provincetown Museum (PMPM). The PMPM is currently considered inaccessible to pedestrians from Bradford Street due to the steep hill it lies atop and lack of continuous sidewalk leading to the tourist destination. As such, the construction of a funicular is anticipated to attract additional visitors and increase travel through the Bradford Street at Ryder Street intersection. To anticipate this increase in trips, a traffic evaluation was performed by McMahon Associates which was submitted on October 12, 2018, with subsequent sensitivity analysis submitted on November 28, 2018. The following is a summary of Environmental Partners Group's (EP's) traffic review of available documents.

EXISTING CONDITIONS

Bradford Street (MA-6A) is a bi-directional roadway extending in a northeast-southwest direction. The roadway consists of one travel lane in each direction separated by a double yellow centerline. A five-foot wide sidewalk with granite curbing runs along either side of Bradford Street, however the northern sidewalk only extends approximately 40 feet east of the intersection with Ryder Street before ending. Approximately 80 feet of pull-in perpendicular parking exists along the south side of Bradford Street west of the Ryder Street intersection. The posted speed limit along Bradford Street is 20 mph in the westbound direction and 25 mph in the eastbound direction. Bradford Street is functionally classified as an urban minor arterial. Land use along Bradford Street is primarily residential.

Ryder Street meets Bradford Street to form an unsignalized T-intersection with STOP sign control along Ryder Street. Ryder Street is a short, 240-foot local roadway that travels in a northwest-southeast

direction between Bradford Street and Commercial Street. The roadway consists of one 10-foot wide travel lane in each direction separated by a single yellow centerline. On-street angled parking exists along the western side as well as a 7-foot wide brick sidewalk with granite curbing.

The proposed funicular will use the approximately 40-foot wide strip of land owned by the PMPM that extends to Bradford Street, just east of Bas Relief Park, shown below.

SPEED

The report indicates that average vehicle speeds of 21 and 22 mph were recorded along Bradford Street in the eastbound and westbound directions respectively by McMahon in March 2017 (as part of the proposed CVS project). Back up of these documents were not provided. (Environmental Partners performed ATR traffic counts along Bradford Street west of Shank Painter Road, approximately 1,700 feet to the west, in late August 2016 showing an average speed of 19 mph along Bradford Street.)

TRAFFIC COUNTS

A Turning Movement Count (TMC) was performed at the Bradford Street at Ryder Street intersection from 11:00 AM to 2:00 PM on Saturday, September 29, 2018 including pedestrians, bicycles, and vehicles. As stated in the traffic evaluation, traffic counts were performed during this time because, "Based on our (McMahon's) prior knowledge from the CVS Pharmacy Traffic Impact Study, Saturday was found to have the highest vehicular volumes on Bradford Street and therefore was selected to be

reviewed as part of the funicular project as Saturday is also likely a heavy visitation day at the Pilgrim Monument." The "CVS Pharmacy Traffic Impact Study" turning movement count data was provided for back up and this peak period was confirmed. Additionally, Environmental Partners performed traffic counts at the Bradford Street at Shank Painter Road at the end of August 2016 which support midday Saturday as being the peak period along Bradford Street. No further documentation is necessary.

SEASONAL ADJUSTMENT

Provincetown experiences extreme seasonal fluctuation in traffic volumes. Since traffic counts were performed after the peak summer season an adjustment factor of 1.5 was applied to the Saturday, September 29 volumes to increase the volumes to represent a typical peak high season period Saturday. Back up for this adjustment was provided and has been confirmed.

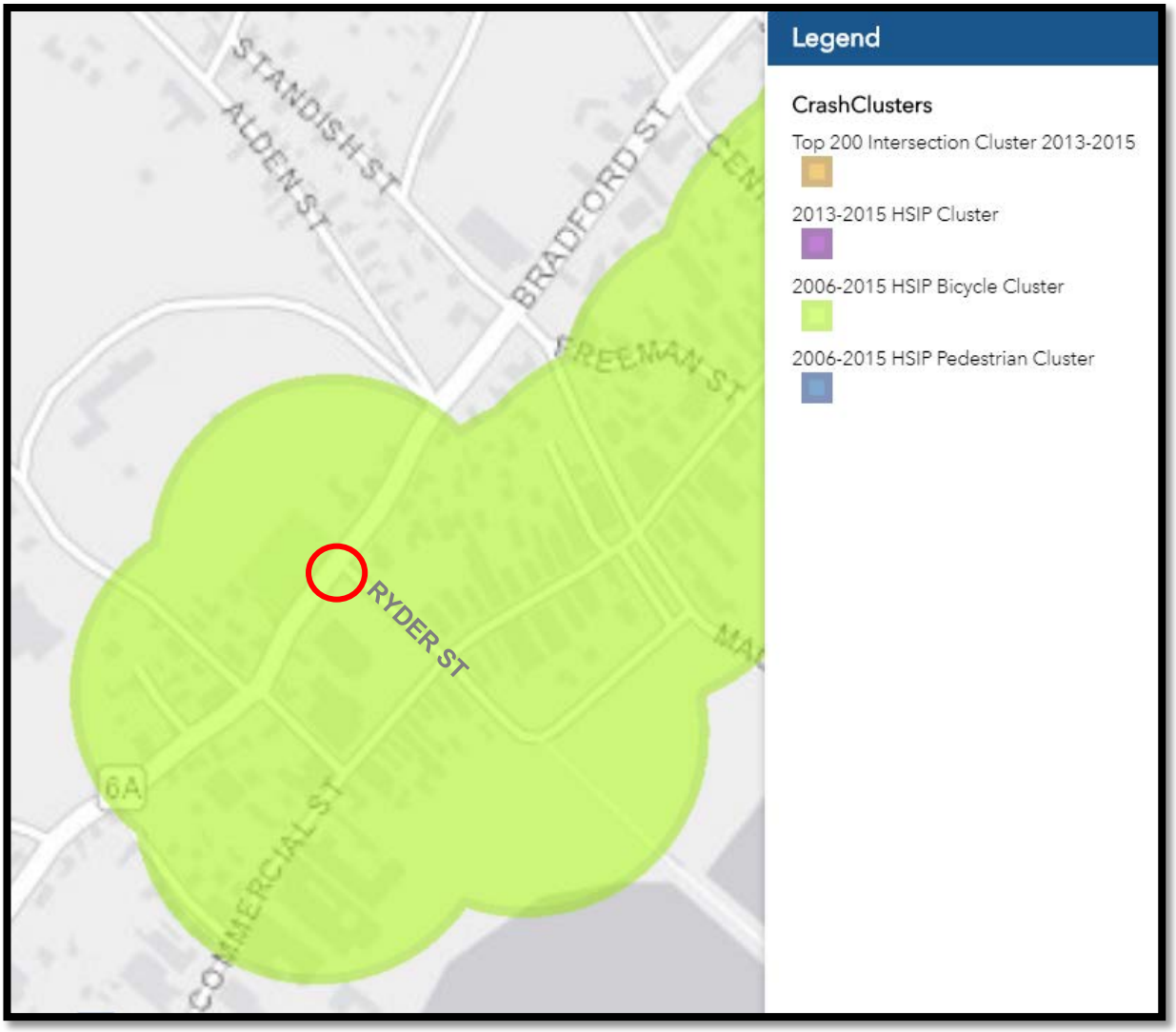
INTERSECTION SAFETY

The report included a review of crash data obtained from the MassDOT crash portal for the five year period of 2011 to 2015. A crash rate of 0.34 crashes per million entering vehicles was calculated for the study intersection, lower than the state and district average of 0.57 C/MEV for unsignalized intersections.

Based on Table 1, Crash Summary, 6 crashes were reported at the intersection during the five year period. McMahon also states that, "most crashes that occurred at the Bradford Street and Ryder Street intersection were noted to involve a parked car, most notably the angled spaces with vehicles backing onto Ryder Street. No bicycle crashes were reported and one crash involving a pedestrian was reported but did not result in an injury."

Despite the low number of crashes reported at the intersection, it should be noted that the project site and the study intersection falls within the 2006-2015 Highway Safety Improvement Program (HSIP) Bicycle Crash Cluster. HSIP crash clusters are different from crash rate in that they take into consideration the severity of the experienced crashes and identify areas or "clusters" that fall within the top 5% crashes in the region.

Therefore, despite the low number of crashes reported at the subject intersection, it appears that enough severe bicycle crashes have been experienced within this vicinity to justify their falling within an HSIP Crash Cluster. It is McMahon's assumption that most of the 15 bicycle-involved crashes that occurred between 2006-2015 occurred along the Commercial Street corridor one block east of Bradford Street. However, this has not been confirmed and the crash cluster appears to extend intentionally over the Bradford Street at Ryder Street intersection as shown in the below figure. It is recommended that a more detailed look at where the bicycle crashes occurred be taken into consideration. It may be useful to request more detailed crash reports from the Provincetown Police Department. Regardless, given the relatively high bicycle, pedestrian, and vehicular volumes along Bradford Street during the summer months as well as the additional trips generated by the proposed development, safety concerns at the immediately surrounding intersections could be exasperated without some level of mitigation.



TRIP GENERATION

This project is unique in that the typical way of estimating site-generated trips – by using Institute of Transportation Engineers (ITE) Trip Generation data – is not feasible since there is no Land Use Code for the addition of a funicular to an existing museum and monument. Therefore, McMahon estimated the number of trips that will be generated by using historical admission and parking lot data from the PMPM. The 2017 annual total admission of 102,716 patrons was used for the trip generation. To account for the seasonal nature of the area 75% of the admissions were assumed to occur between May and September, referred to as the "high season," in the report, and 25% was expected to occur between October and April, or the "low season." This assumption was reportedly drawn in consultation with PMPM staff. Although back-up for this split was not provided, given the fact that during the summer visitors increase the population from about 200,000 to more than 500,000 on the Cape (https://online.wr.usgs.gov/outreach/landpeople/students/capeCod.html), this appears to be a reasonable assumption.

The same logic of seasonal fluctuation was applied to the vehicular trips as described above for the pedestrian trips. Additionally, an average Vehicle Occupancy Rate (VOR) of 1.5 persons per vehicle was applied to the vehicular site trips. Although a default VOR is typically 1.2 persons per vehicle, McMahon increased this slightly since the site is a tourist location and most people travel by vehicle in pairs or groups. Although back up for this split was not provided, this appears to be a reasonable assumption.

Additionally, given that the PMPM is open from 9AM to 5PM, McMahon assumed that 80% of trips occur between 10AM and 3PM or during the "high hours." This assumption was reportedly drawn in consultation with PMPM staff. Although back up for this split was not provided and would be helpful, this appears to be a reasonable assumption.

Finally, a 20% growth was applied to the existing *pedestrian* trips from the current PMPM (estimated through the above methodology) to reflect the increase in pedestrians accessing the site via the funicular at the Bradford Street/Ryder Street intersection to estimate the "Build" peak hour condition. However back-up for this growth rate was not provided and would be important for verification.

The approach originally neglected to reflect the likely redirected pedestrian trips currently walking to the site. With the addition of a funicular providing direct access from the PMPM to Bradford Street without the much longer and steep pedestrian walkways along Winslow Street and High Pole Hill Road, it is anticipated that much of the *existing* visitors will also utilize the funicular and cross at the Ryder Street intersection. The additional visitors that are anticipated to access the PMPM because of the funicular connection are anticipated to increase pedestrian trips further. As a result, McMahon's November 28, 2018 document presented increased pedestrian trips assuming 50% of existing visitors will now walk through the Bradford Street/Ryder Street intersection instead of previous routes. Back-up for this split was not provided and would be important in verifying this assumption. This resulted in a total of 52 "high season" pedestrians added to each crosswalk in the intersection in the sensitivity analysis. Revised analysis was provided.

However, no additional vehicles were accounted for in the Build condition since McMahon indicates that parking lot data shows a declining trend in parking at the site. Environmental Partners disagrees with this prediction. Parking in Provincetown during peak summer months is scarce and in high demand. With the addition of the funicular, visitors will now have the option to park away from the bustling downtown in the large PMPM parking lot and take the funicular directly into town. Therefore, the PMPM will likely experience an increase in all modes of trips, including vehicular.

Additionally, the statement that the PMPM parking lot is experiencing a trend of declining occupancy could be debated. As shown in the table below, while the number of total cars parked did decrease from 2015 to 2016, it increased from 2016 to 2017 and the data for 2018 is incomplete so the trend between 2017 and 2018 cannot be determined. A continuous trend in declining parking is not conclusive. Given the impact of the funicular is difficult to predict, it is recommended that a monitoring study be performed after the funicular is installed.

Year	Total Cars Parked	Total Admissions
2015	25,245	102,408
2016	19,811	103,125
2017	20,371	102,716
2018	18,105	83,828

(10/10)

TRAFFIC OPERATIONS

Since the sensitivity analysis is the most recent evaluation, it is this capacity analysis that has been reviewed by Environmental Partners.

2018 Existing volumes of the intersection were compared to the 2018 Build volumes (which only reflected the 20% increase of new pedestrian visitors to the PMPM) and to the 2018 "Sensitivity Analysis" volumes (which included the 20% increase along with the anticipated redirected current pedestrian trips equal to 50% of total PMPM admissions).

Given the Build volumes do not reflect all the anticipated pedestrian travel through the subject intersection, our evaluation focused on a comparison between Existing and Sensitivity Analysis conditions. Vehicular delay on the Ryder Street approach is predicted to increase by approximately 60% compared to Existing conditions, with an increase of almost 4 queued vehicles. Given the long queue lengths reflected under Existing conditions analysis, this increase in delay is quite drastic and some sort of mitigation is recommended to minimize impacts of increased pedestrian crossing. (It appears that queues along Ryder Street may already extend onto Commercial Street.)

The analysis shows that the increase in pedestrians will affect traffic along Bradford Street very little, with only a small increase in delay. However, as McMahon has stated, "In reality, traffic operations may be overstated with our capacity analysis software, as courtesy gaps are a likely occurrence and are not reflected in the traffic model." While this behavior could improve the queues and delays on Ryder Street, it could create congestion on Bradford Street if vehicles are frequently stopping to allow Ryder Street vehicles access and pedestrians to cross. It should be noted again that this analysis does not reflect the anticipated increase in vehicular travel generated by the funicular and therefore delays/queues may be greater.

SIGHT DISTANCE

McMahon does not have formal sight distance measurements at the Bradford Street/Ryder Street intersection. However, the original traffic evaluation included a discussion of sight lines relative to the existing marked crosswalk at the intersection. While their proposed recommendations intend to increase the conspicuity of pedestrians at this intersection, Environmental Partners recommends a sight distance evaluation be performed.

PROPOSED MITIGATION

Below outlines the proposed mitigation that McMahon recommends:

- Bump-out the southern sidewalk at the south western crosswalk to create more room for pedestrians to gather while waiting to cross
- Widen the sidewalk on the northern side to create more room for pedestrians to gather while waiting to cross
- Add more signage approaching the intersection to alert drivers of crossing pedestrians
- Paint highly visible crosswalk markings

- Trim hedges to address concerns with the visibility of the northernmost crosswalk on Bradford Street with right turning vehicles from Ryder Street (Note: this is not labelled on the submitted plans.)

While the above treatments may be beneficial, they will not address increases in delay at the Bradford/Ryder intersection. The traffic evaluation suggests that PMPM staff will be positioned at the funicular and trained to monitor traffic at the study area intersection to deter drop-off activity and ensure pedestrian traffic can be accommodated. The applicant has indicated that the PMPM will also coordinate police traffic detail when warranted in conjunction with high season events at Bas Relief Park, such as Portuguese Festival. Any vehicles stopping to drop off or pick up visitors along Bradford Street could have a significant impact at an already congested intersection not reflected in the provided analysis. Therefore stringent enforcement will be required.

Some other mitigation that was discussed in the traffic evaluation, but decided against by McMahon includes:

- Rectangular Rapid Flashing Beacons (RRFB's) – McMahon states their reason for not using RRFB's is "because they are intended to provide protection for pedestrians in situations where the pedestrian demand is low and a vehicle does not typically encounter a pedestrian on a routine basis, such as high speed or high-volume roadways." Bradford Street is low speed and people expect crossing pedestrians during peak season.

- Pedestrian Signal – four-hour volume warrants were met for the high season weekend peak hours, although not met during the low season.

- Raised Crosswalk – McMahon stated, "In this situation, the vehicular travel speeds are not excessive and adequate sight lines can be achieved for the crosswalks by removing vegetation and providing the curb extensions. In addition, based on discussions with the Town of Provincetown Public Works Department, raised crosswalks may present issues with snow plowing operations and were not considered."

Even if enforcement is provided to prevent drop-off/pick-up along Bradford Street, the additional pedestrians as well as some additional vehicular trips will travel through Bradford Street at Ryder Street intersection and have some impact of operations at the intersection. Other mitigation should be identified to minimize delays caused by pedestrians such as accommodations to platoon their crossing.

BICYCLE ACCOMODATIONS

Bicycle accommodations and volumes were not considered at all as part of this study, despite the fact the intersection of Bradford Street at Ryder Street falls within an HSIP bicycle crash cluster. Additionally, Environmental Partners performed traffic counts at the Bradford Street at Shank Painter Road intersection at the end of August 2016 and these counts showed that there were nearly 100 bicycles on Bradford Street during the midday Saturday peak hour. Given the substantial bicycle volumes on Bradford Street, it appears that bicycles should be considered as part of this evaluation.

This then raises the question, will bicycles be allowed on the funicular? If bicycles are not going to be allowed on the funicular, then thought should be given to accommodate them such as providing bicycle racks at the base of the funicular.

SUMMARY

- The report indicates that average vehicle speeds of 21 and 22 mph were recorded along Bradford Street in the eastbound and westbound directions respectively by McMahon in March 2017 (as part of the proposed CVS project). Back up of these documents were not provided.

- It is McMahon's assumption that most of the 15 bicycle-involved crashes that occurred between 2006-2015 occurred along the Commercial Street corridor one block east of Bradford Street. However, this has not been confirmed and the crash cluster appears to extend intentionally over the Bradford Street at Ryder Street intersection as shown in the figure. It is recommended that a more detailed look at where the bicycle crashes occurred be taken into consideration. It may be useful to request more detailed crash reports from the Provincetown Police Department.

- Given the relatively high bicycle, pedestrian, and vehicular volumes along Bradford Street during the summer months as well as the additional trips generated by the proposed development, safety concerns at the immediately surrounding intersections could be exasperated without some level of mitigation.

- A 20% growth was applied to the existing *pedestrian* trips from the current PMPM to reflect the increase in pedestrians accessing the site via the funicular at the Bradford Street/Ryder Street intersection to estimate the "Build" peak hour condition. However back-up for this growth rate was not provided and would be important for verification.

- McMahon's November 28, 2018 document presented increased pedestrian trips assuming 50% of existing visitors will now walk through the Bradford Street/Ryder Street intersection instead of previous routes. Back-up for this split was not provided and would be important in verifying this assumption.

- No additional vehicles were accounted for in the Build condition since McMahon indicates that parking lot data shows a declining trend in parking at the site. Environmental Partners disagrees with this prediction. Parking in Provincetown during peak summer months is scarce and in high demand. With the addition of the funicular, visitors will now have the option to park away from the bustling downtown in the large PMPM parking lot and take the funicular directly into town. Therefore, the PMPM will likely experience an increase in all modes of trips, including vehicular.

- Given the impact of the funicular is difficult to predict, it is recommended that a monitoring study be performed after the funicular is installed.

- Vehicular delay on the Ryder Street approach is predicted to increase by approximately 60% compared to Existing conditions, with an increase of almost 4 queued vehicles. Given the long queue lengths reflected under Existing conditions analysis, this increase in delay is quite drastic and some sort of mitigation is recommended to minimize impacts of increased pedestrian crossing. (It appears that queues along Ryder Street may already extend onto Commercial Street.)

- McMahon does not have formal sight distance measurements at the Bradford Street/Ryder Street intersection. Environmental Partners recommends a sight distance evaluation be performed.

- Hedges that are proposed to be trimmed are not labelled on the submitted plans.

- Any vehicles stopping to drop off or pick up visitors along Bradford Street could have a significant impact at an already congested intersection not reflected in the provided analysis. Therefore stringent enforcement will be required.

- Other mitigation should be identified to minimize delays caused by pedestrians such as accommodations to platoon their crossing.

- Given the substantial bicycle volumes on Bradford Street, it appears that bicycles should be considered as part of this evaluation.

- Will bicycles be allowed on the funicular?

- If bicycles are not going to be allowed on the funicular, then thought should be given to accommodate them such as providing bicycle racks at the base of the funicular.

Pilgrim Monument and Provincetown Museum
Planning Board
13 December 2018
Mitigation-Condition Agreements

1. In the event that the Planning Board shall determine that it is responsibility of the Applicant to mitigate potential traffic impacts of the funicular operations the Applicant agrees that the following shall be a condition of the Site Plan Approval Grant.

The Applicant shall have conducted a monitoring program during the months of July and august of 2019. The monitoring program shall include traffic volume, vehicle counts, bicycle counts and pedestrian counts at the Ryder and Bradford Streets intersection including monitoring of the vehicle trips and turns made at the intersection. The monitoring will be undertaken during the summer season and will include at least two (2) mid-day Saturday timeframes including one (1) occurring during a day in which the Famer's Market occurs as well as two (2) week day afternoons. In addition, monitoring shall occur on the Fourth of July and The Carnival Parade Day. The purpose of the monitoring is to prepare a report as to the vehicular, bicycle and pedestrian activities at the intersection including vehicles queuing on Ryder Street and delay times for vehicles on Bradford Street.

The monitoring information shall be used to establish a base line of the pedestrian, bicycle and vehicle activities at the intersection prior to commencement of the operation of the funicular.

After operation of the funicular commences, if it is determined that the increase in pedestrian traffic resulting from the operation increases the queuing on Ryder Street and/or increases the time delay of vehicles through the Bradford Street intersection which increase exceeds 50% above the baseline thresholds established by the monitoring program, Mitigation measures possibly including a police detail at Applicant's expenses would be discussed and agreed upon by the Applicant, Staff and Town Administration. Staff shall determine the appropriate measures to calculate the baseline threshold as well as the 50% increase triggering mechanism.

The Applicant could at any time request the Planning Board to administratively modify the requirements of this condition including the threshold numbers of the percentages and such request would be based upon additional information obtained after commencement of the funicular operation and confirmed by observations of traffic experts.

The Planning Board acknowledges that any numbers derived from activities of funicular operations for the 2020 season will be adjusted to reflect the fact that they will be occurring during the Provincetown 400 Celebration and the anticipated tourism increase resulting therefrom. Further, the Board acknowledges that the actual impact of the funicular operation cannot be accurately determined until after the 2021 season.

2. The Applicant will cooperate with the Town of Provincetown including the Planning Staff, Department of Public Works Director, Chief of Police and Selectmen concerning the installation of traffic flow, safety and directional signage in the vicinity of the funicular site with the specific purpose of providing signage for pedestrian access to the funicular. All such proposed signage will be subject to staff approval and subject to obtaining all necessary permits and approvals from applicable Boards and Commissions.

3. Provided all necessary approvals are obtained from the Board of Selectmen, Department of Public Works, Police Department and Fire Department, the Applicant agrees to construct certain improvements to the Bradford Street/Ryder Street intersection including construction of the so-called “bump out” extending the sidewalk area at the Town Hall corner, improvements to the crosswalks, signage and the installation of handicapped ramps to the sidewalk on the north side of Bradford Street for both crosswalks.

4. A bicycle rack will be installed on site for the parking of bicycles, however, no bicycles will be allowed on the funicular itself