GARLAND ASSOCIATES

TECHNICAL MEMORANDUM

TO: Dwayne Mears, Placeworks

FROM: Richard Garland, P.E.

DATE: May 20, 2024

SUBJECT: Focused Site Access Analysis – Proposed Bus Yard
Sowers Middle School – 9300 Indianapolis Avenue, Huntington Beach
Huntington Beach City School District

An analysis has been conducted to evaluate the operational and safety impacts of providing a bus yard at the northwest corner of the proposed Sowers Middle School site. A site plan for the proposed school campus and a close-up site plan of the proposed bus yard are provided at the end of this technical memo. The school site and bus yard are located on the south side of Indianapolis Avenue between Magnolia Street and Bushard Street in Huntington Beach. The bus yard would provide parking spaces for 15 buses while 11 buses would actively operate from this bus yard on a typical school day.

The driveway for the bus yard will be the same driveway that was previously used as the entrance to the school's parking lot. The driveway forms the south leg of the Indianapolis Avenue/Titan Lane intersection, which has a traffic signal.

The objective of the focused site access analysis was to address visibility/sight distance and turning radius issues. Visibility issues were evaluated because there is a crest vertical curve (hill) on Indianapolis Avenue west of the driveway at the Talbert Channel bridge. Turning radius issues were evaluated to determine if buses could enter and exit the driveway without encroaching into the opposing traffic lanes.

Visibility/Sight Distance Evaluation

Table 201.1 in the Caltrans "Highway Design Manual," which is titled "Sight Distance Standards," shows the minimum sight distances that should be provided on a public street or roadway for various design speeds, which are essentially the speed limits. The table, which is attached at the end of this technical memo, indicates that the stopping sight distance for a 40-mph street (which is the speed limit on Indianapolis Avenue) should be at least 300 feet. The table also shows passing sight distance standards, which are not applicable to this evaluation.

Measurements taken on Indianapolis Avenue indicate that the sight distance to the west, as measured from the white stop bar/limit line at the intersection for eastbound traffic, is 350 feet. The sight distance was measured from a point 3.5 feet above the pavement surface for eastbound traffic, which represents the typical height of a driver's eyes. And the ending point for the

measurement represented an object that was only 1/2-foot high on the road at the driveway. These dimensions represent the standard values stated in the manual.

As the primary concern regarding visibility would be the oncoming driver's ability to see a bus that was entering or exiting the driveway, a sight distance measurement was also taken for an object that would be 7 feet high (a bus) as opposed to a 1/2-foot-high object. That measurement indicated that the sight distance would be greater than 500 feet west of the intersection. And the sight distance to see another car that was 3.5 feet in height was measured to be 460 feet.

The conclusion of the visibility/sight distance evaluation is that visibility for oncoming eastbound traffic approaching the driveway is adequate according to the Caltrans design standards. While the hill for the bridge over Talbert Channel does restrict visibility, the minimum sight distance standard is exceeded. Furthermore, the visibility of buses for oncoming drivers substantially exceeds the minimum standard.

The results of the sight distance analysis are shown in the following table.

Visibility Scenario	Sight Distance Standard	Measured Value	Meets or Exceeds Standard?
Conventional – Driver Eye 3.5 ft, Object 0.5 ft	300 ft	350 ft	Yes
View Another Car – Driver Eye 3.5 ft, Car 3.5 ft	300 ft	460 ft	Yes
View a Bus – Driver Eye 3.5 ft, Bus 7 ft	300 ft	> 500 ft	Yes

Turning Radius Evaluation

Turning radius templates were overlain onto an aerial photograph of Indianapolis Avenue and the driveway to determine if buses could adequately enter and exit the driveway without encroaching into opposing traffic lanes. Buses entering the driveway from eastbound and westbound Indianapolis Avenue were addressed as well as buses exiting the driveway onto eastbound and westbound Indianapolis Avenue.

Buses entering the driveway from eastbound Indianapolis Avenue could make a right turn into the driveway from the right lane (#2 lane closest to the curb) without having to maneuver into the left lane (#1 lane). While making the turn, the left side of the bus would be positioned 18 feet away from the west edge of the driveway, which would provide a 12-foot width for another bus to exit the driveway at the same time. The driveway is 30 feet wide.

Buses entering the driveway from westbound Indianapolis Avenue could readily make a left turn from the existing left-turn lane. While making the turn, the left side of the bus would be positioned 16 feet away from the west edge of the driveway, which would provide a 14-foot width for another bus to exit the driveway at the same time.

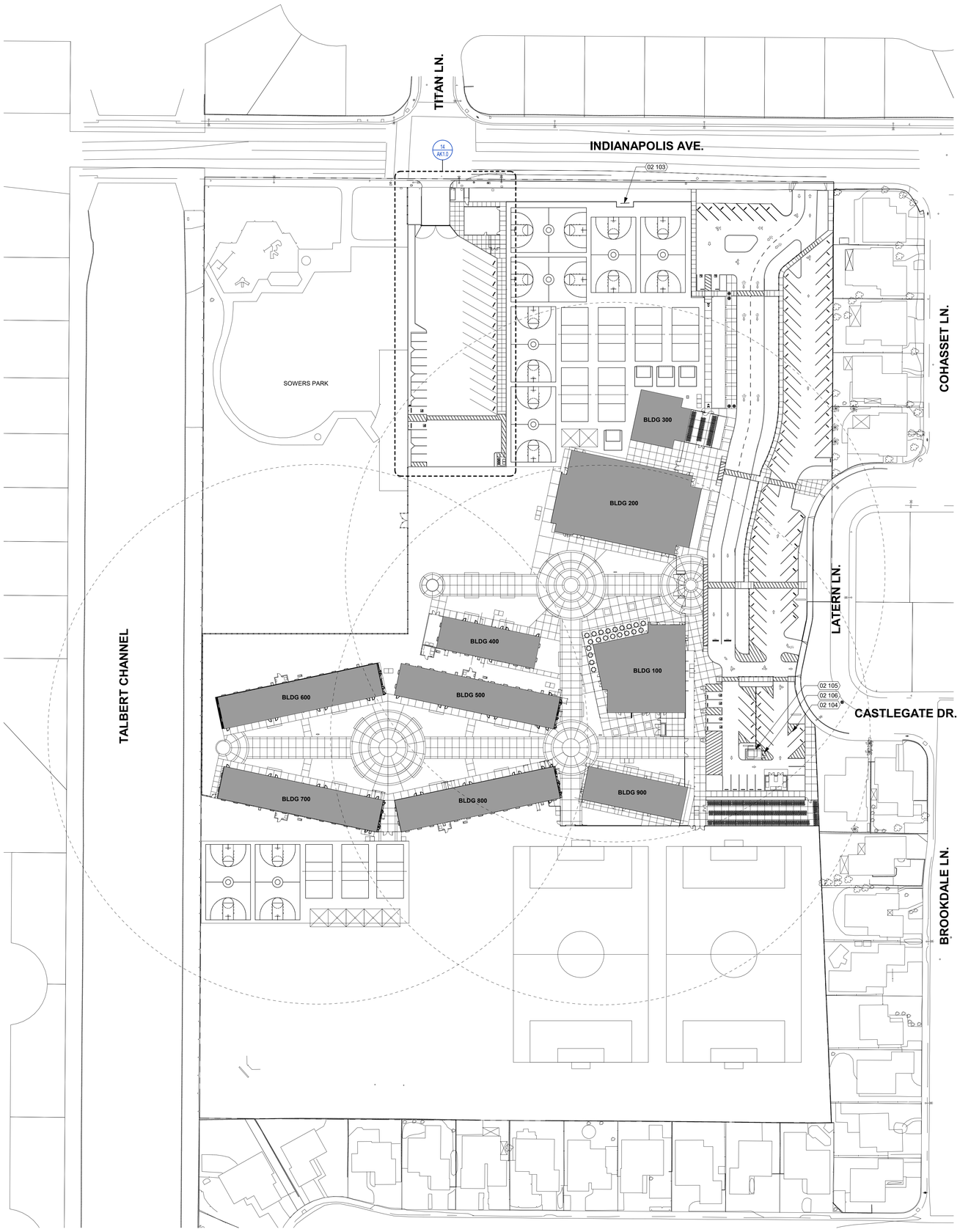
Buses exiting the driveway and turning right onto eastbound Indianapolis Avenue could make the turn into the left lane (#1 lane) without encroaching into the westbound travel lanes. The buses

could not turn immediately into the right lane (#2 lane closest to the curb) and would have to maneuver into that lane after making the turn out of the driveway.

Buses exiting the driveway and turning left onto westbound Indianapolis Avenue could readily make the turn into the single westbound lane. There is only one westbound through lane on Indianapolis Avenue at this location.

Conclusions

The conclusion of the analysis is that visibility at the proposed bus yard driveway is adequate as the measured sight distance exceeds the minimum standards cited in the Caltrans manual. It is also concluded that the turning radii provided at the driveway are sufficient to accommodate buses entering and exiting the site. It should also be noted that this driveway has historically been used by buses entering the site from Indianapolis Avenue because the former Sowers Middle School had a bus loading zone in the parking lot that was accessed via this same driveway.



REF: 1 / AK1.0

OVERALL EXISTING SITE PLAN | 1" = 50'-0" | 10

KEY NOTES

NUMBER	NOTE
02 103	(E) BACKFLOW TO REMAIN, PROTECT IN PLACE
02 104	(E) GAS METER
02 105	(E) TRANSFORMER ON 6" TALL CONC PAD
02 106	(E) SWITCHGEAR ON 6" TALL CONC PAD

DSA STAMP

STUDIO W ARCHITECTS

Studio W Architects
424 32nd Street, Suite D & E
Newport Beach, California 92663
[T] 949.774.2920
www.StudioW-Architects.com

ARCHITECT	ENGINEER

LICENSED ARCHITECT
BRIAN P. WHITMORE
No. C 30345
Ren.: 9/30/25
STATE OF CALIFORNIA

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REVISION HISTORY

NO.	REMARKS	DATE

DRAWING STATUS

	DATE
● CUP RE-SUBMITTAL	02/27/2024

KEY PLAN

HUNTINGTON BEACH CITY SCHOOL DISTRICT
17011 BEACH BLVD., SUITE 560
HUNTINGTON BEACH, CA 92647

CUP RESUBMITTAL

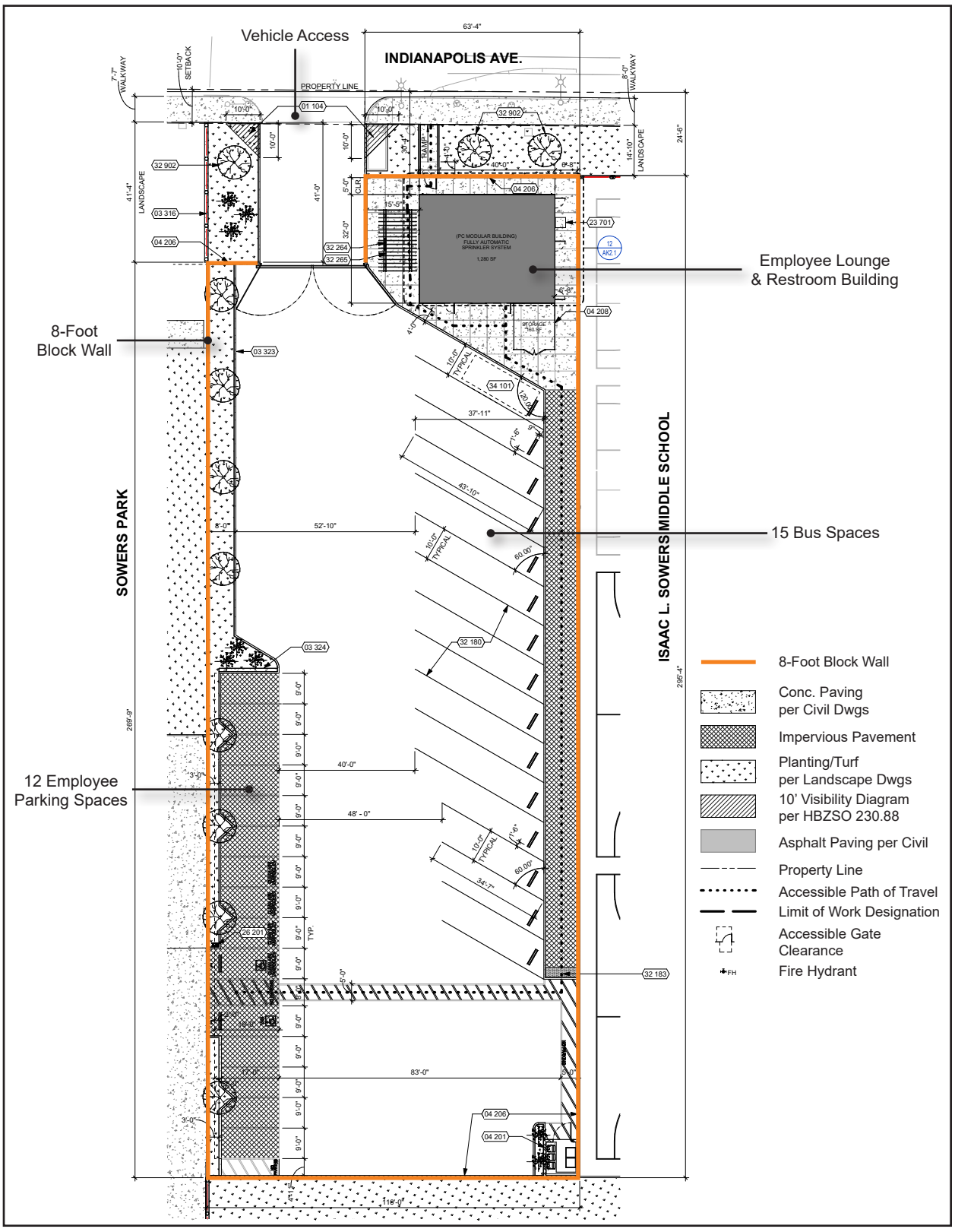
HBCSD BUS YARD CENTER
9300 INDIANAPOLIS AVE,
HUNTINGTON BEACH, CA 92646

EXISTING SITE PLAN

Date	Project Number
04/05/2024	21044
Scale: 1" = 50'-0"	Drawing Number: AK0.05
Drawn: Author	Checked: Checker

PRINT DATE: 4/5/2024 3:02:14 PM
FILE PATH: BIM 360://21044-HBCSD Sowers MS Bus Yard/21044-Sowers MS-Phase 3-Bus Yard-A21.rvt

Figure 4 - Site Plan



Source: Studio W. Architects 2024.

Table 201.1

Sight Distance Standards

Design Speed[1] (mph)	Stopping[2] (ft)	Passing (ft)
10	50	---
15	100	---
20	125	800
25	150	950
30	200	1,100
35	250	1,300
40	300	1,500
45	360	1,650
50	430	1,800
55	500	1,950
60	580	2,100
65	660	2,300
70	750	2,500
75	840	2,600
80	930	2,700

Notes:

[1]See Topic 101 for selection of design speed.

[2]For sustained downgrades, refer to underlined standard in Index 201.3

The sight distance available for passing at any place is the longest distance at which a driver whose eyes are 3 ½ feet above the pavement surface can see the top of an object 4 ¼ feet high on the road. See Table 201.1 for the calculated values that are associated with various design speeds.

In general, 2-lane highways should be designed to provide for passing where possible, especially those routes with high volumes of trucks or recreational vehicles. Passing should be done on tangent horizontal alignments with constant grades or a slight sag vertical curve. Not only are drivers reluctant to pass on a long crest vertical curve, but it is impracticable to design crest vertical curves to provide for passing sight distance because of high cost where crest cuts are involved. Passing sight distance for crest vertical curves is 7 to 17 times longer than the stopping sight distance.

Ordinarily, passing sight distance is provided at locations where combinations of alignment and profile do not require the use of crest vertical curves.