REDWOOD ELEMENTARY SCHOOL
School Zone Circulation Study

Prepared for:

Del Norte Local Transportation Commission

December 30, 2013

Prepared by:

TRAFFIC WORKS LLC

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INTRODUCTION

Project Purpose and Need

Providing a safe travel environment is paramount for encouraging children, parents, and staff to walk and bike to and from school.

With student safety as a fundamental principle, the Del Norte Local Transportation Commission (Del Norte LTC) commissioned this School Zone Circulation Study, which reviews current traffic patterns within the school campus and on adjacent municipal streets. The goals of this Circulation Study are to reduce congestion, address safety concerns, and enhance access for pedestrians and bicyclists. The study area includes the Redwood Elementary School and surrounding road network.

The School Zone Circulation Study identifies existing volumes and traffic patterns for:

- Pedestrian and bicycle movements
- Vehicle movements
- Student pick-up and drop-off
- Bus operations and staging
- Visitor, School faculty/staff parking

With a thorough analysis of existing conditions at the school campus, this study develops solutions to address safety, congestion, and access issues and explores alternatives to better utilize school property and public right-of-way to encourage walking and cycling to school.

Process

The Del Norte School Zone Circulation Study planning process was managed by the Del Norte LTC. The Del Norte LTC is the regional transportation planning agency for Del Norte County charged with facilitating coordinated transportation planning efforts for the Del Norte region. The Del Norte LTC member agencies are Del Norte County, the City of Crescent City, Crescent City Harbor District, Elk Valley Rancheria, Smith River Rancheria, and the Yurok Tribe.

The Del Norte School Zone Circulation Study planning process began in September, 2013 with an evaluation of all school campuses within the county. An advisory panel, including a high level of participation from school leadership, provided insight and direction on traffic and safety concerns, as well as final recommendations on which campuses were most needful of an in-depth school zone circulation study.

Goals

The goal of this School Zone Circulation Study is to create a coordinated system of mobility among all modes by identifying existing deficiencies and providing recommendations to enhance the safety, efficiency, and coordination among pedestrians, bicyclists, vehicles, and buses.

This study focuses on the following points to guide the development of recommendations:

- Maintain a safe campus
- Reduce the potential for conflicts among pedestrians, bicyclists, buses, and motorists
- Improve vehicular traffic circulation during peak morning and afternoon student drop-off and pick-up times.
- Comply with state and federal guidelines.
- Improve pedestrian access with Americans with Disabilities Act (ADA) accessible facilities.
- Improve surrounding roadway facilities to encourage walking and biking to school.

Redwood Elementary School

Redwood Elementary School is part of the Del Norte County Unified School District and is located eight miles north of Crescent City in Fort Dick, California. Redwood Elementary School is a kindergarten through eighth grade school, located on Lake Earl Drive north of Kings Valley Road. The school is located in a rural setting with very little connecting road network surrounding the property. The approximately 12 acre campus hosts the school buildings, multiple playgrounds, an asphalt play area, sports field with track, and two paved parking lots accommodating an approximate total of 70 parking spaces.

The consulting team monitored and evaluated the Redwood Elementary School campus' existing traffic circulation patterns on Wednesday October 2, 2013. The following information was gathered during the field observations and provided by school staff during follow-up discussions.

EXISTING CONDITIONS

The existing conditions presented below are intended to provide a snapshot of the current traffic circulation patterns both on campus and along the adjacent roadway network. This information was collected through discussions with the advisory panel, field observations, traffic counts and circulation observations conducted by traffic engineers, and conversations with school district representatives and school staff.

Table 1. Redwood Elementary School Information	
Student Enrollment	503
Number of teachers/Staff	65
School Day Schedule	Kindergarten: 7:50 am to 1:00 pm 1st – 3rd: 7:50 am to 2:15 pm 4th - 8th: 7:50 am to 3:05pm Wed. Early Out, all Grades: 1:45 pm out
Bus Drop-off / Pick-up	7:30 am to 7:45 am / 1:30 pm to 3:15 pm
Peak Parent Drop-off / Pick-up	7:45 am-8:00 am / 1:35 pm to 2:05 pm
Number of Buses	3 (am) / 3 (pm)
Estimated number of Passenger vehicles dropping-off / picking-up	150 / 150

Campus Characteristics

Redwood Elementary School is located on Lake Earl Drive between Redwood Stump Lane and Weir Lane. The school campus is fronted by Lake Earl Drive with no other municipal roadways bordering it. Kings Valley Road and Lake Earl Drive provide access to Highway 101.

The section of Lake Earl Drive fronting the school is a two lane rural arterial with bike lanes but no sidewalks. Pedestrians access the school via Lake Earl Drive. There is a crosswalk with pedestrian activated rectangular rapid flashing beacons (RRFB) located just to the south of the school exit driveway. A crossing guard is present during peak morning and afternoon time periods.

The main entrance to the school is a one-way loop road with access to the designated drop-off curb in front of the school. The front parking lot is located within the loop road and provides 21 parking spaces. Additional general parking is located along the north property line (17 parking spaces) and an employee parking lot is located along the north side of the school with 29 parking spaces. Reference **Figure 1** for the existing parking layout.

Redwood Elementary School is located one mile north on Lake Earl Drive from the Pelican Bay State Prison (a major employer with approximately 1,500 employees).

Drop-off/Pick-up Operations and Parking

Buses utilize the curb in front of the main school entrance for unloading children during the morning drop-off period. During the afternoon dismissal, buses park in three large diagonal parking spaces before dismissal. Children load the bus while parked at this location. See **Figure 1** for the existing bus parking locations. The buses were observed waiting until the majority of parents picking up children had left and the loading zone was mostly vacant so busses could pull out and through. Three buses are currently providing service to Redwood Elementary School.

Pick-ups and drop-offs by parents occur primarily in the main loop road driveway at the curb in front of the school's main entrance. During the morning drop-off period, buses and vehicles are intermixed along the curb in front of the school. Parents were observed blocking buses. Parents also utilize both shoulders along Lake Earl Drive in front of the school, park down the street south of the school, and walk their children onto campus. A large portion of children observed crossing at the marked crosswalk on Lake Earl Drive, assisted by a crossing guard, were dropped off on the opposite side of the street south of the school.

Assessments

Collision data was obtained from the Transportation Injury Mapping System (TIMS) and is presented in **Figure 1.** Each point shown in **Figure 1** represents a single reported accident. All reported collisions occurring between 2007 and 2012 have been included. There are very few reported collisions within the study area (only one occurring on Lake Earl Drive through the study area) and no trends emerged from the data.

Traffic counts were conducted at the study intersections during the peak traffic periods associated with school start and dismissal times on Wednesday October 2, 2013. **Figure 1** shows the study intersections and the peak 15 minute traffic volumes.

During both the AM and PM peak traffic periods a significant queue formed in the northbound left-turn lane. The longest queue (550') was observed during the PM peak period in the northbound left-turn lane which is being used for storage up to 15 minutes before school is dismissed. The significant queue is a result of the parking lot being full and drivers simply choosing to wait in the left-turn lane. Based on a review of the traffic counts collected and observations made during the peak traffic periods it is expected that traffic operations at the intersection would be satisfactory for the foreseeable future, if sufficient capacity was provided within the school parking lot.

Identification of Existing Conflicts and Deficiencies

The following issues or challenges were identified during school observations or presented by advisory panel members and school staff during conversations.

- Reported speeding along Lake Earl Drive through the study area.
- Heavy debris (fallen tree limbs) was present in the bike lane and along the shoulder of Lake Earl Drive.

- Drop-off / pick-up zone and general parking is well over capacity during the peak traffic periods.
- Afternoon bus parking locations block access to employee parking and the back side of the school. This creates an access constraint as well as a safety issue. Limiting access to the rear of the property blocks emergency vehicle access if needed.
- Currently the bus and parent pick-up/drop-off circulation is not separated. Parents loading and unloading their children are mixed within the buses that are loading and unloading.
- No pedestrian facilities exist along Lake Earl Drive, however, moderately wide shoulders are present.
- The crossing guard (a parent volunteer) was not wearing proper safety equipment (vest).
- Parents began lining up for the afternoon pick-up 30 minutes before dismissal time. A queue began to form in the left turn pocket 15 minutes before the dismissal time, with 15 vehicles in the left-turn lane queue when the bell rang. This queue obstructs the northbound through lane on Lake Earl Drive.
- The angle of the exit to Lake Earl Drive is such that people pulling out have to look back over their shoulder to see oncoming vehicles. This hinders their ability to see pedestrians along the side of the road and crossing at the crosswalk to the south of the exit. Intersections with roads meeting at 90 degrees (or relevantly close to) are safest.
- A number of school zone related signs in the surrounding area are not compliant with California MUTCD.
- Wednesdays are regionally recognized half-days and all grades are dismissed at 1:45 PM at

Debris in northbound bike lane, north of school zone

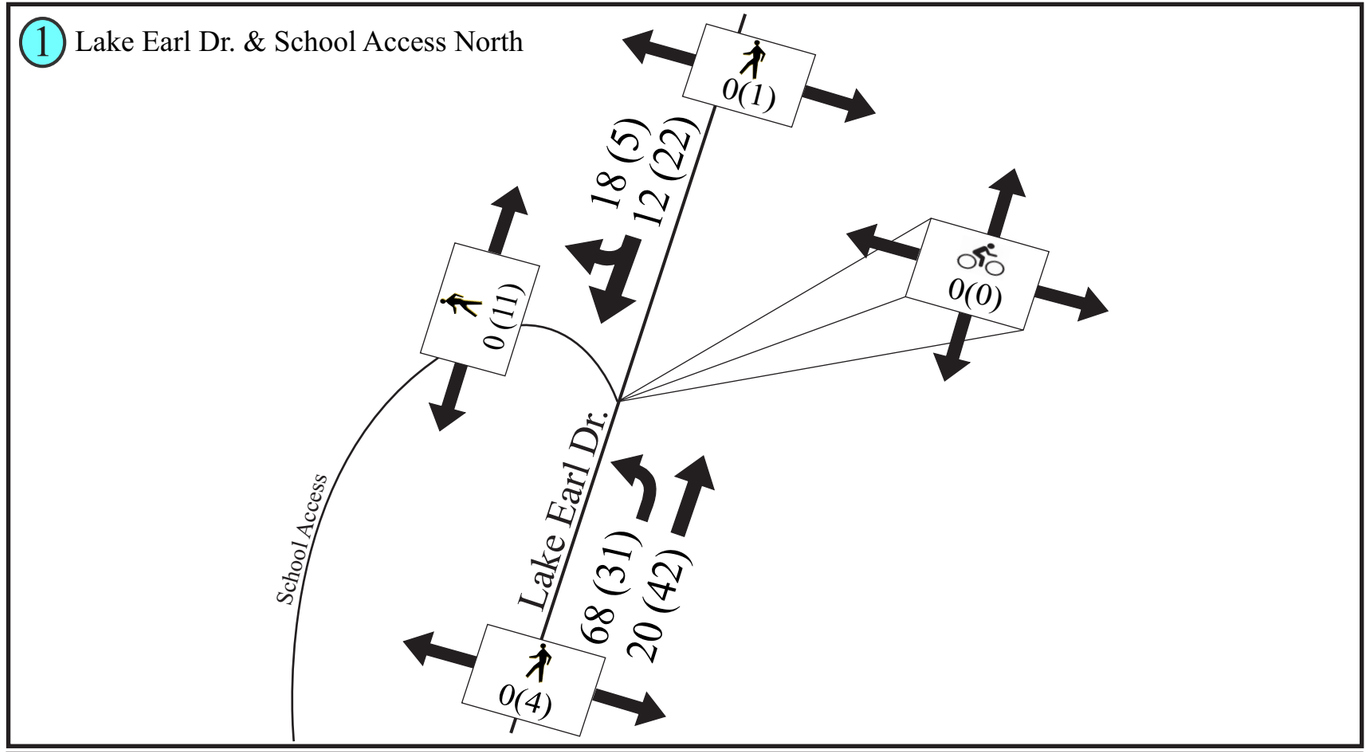
View north from exit, buses and cars intermixed

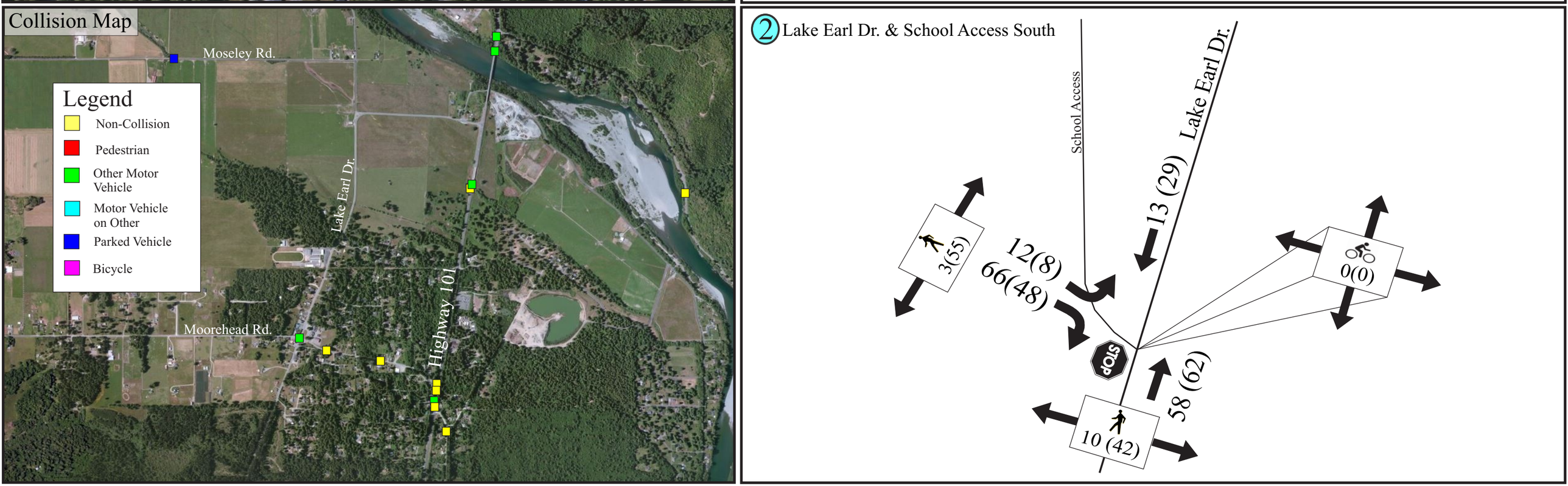
View north on Lake Earl Drive of queue forming

Redwood Elementary School. This results in a combined pick-up time increasing the congestion at the loading zones as well as along the Lake Earl Drive.

- Del Norte County Unified School district does not have a zoning policy that requires students to attend the school proximate their home. Redwood Elementary School has a very high enrollment despite being located in a rural area, possibly due to its proximity to the Pelican Bay correctional facility, a very large employer. This results in a large amount of the student population traveling from greater distances, making travel by non-motorized methods improbable.

Figures 1 and 2 summarize the current traffic patterns, show parking locations, and document the existing deficiencies.





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NO SCALE

LEGEND

xx(xx) - AM(PM) Volumes*

- Pedestrian Volumes*

- Bicycle Volumes*

STOP - Stop Sign

-Study Intersections

- Lane Configurations

*Volumes represent AM & PM Peak 15 minutes

School Circulation Study
Del Norte Local Transportation Commission

FIGURE 1

Redwood Elementary School
Existing Conditions

LEGEND

- Existing School Crossing Sign
- Existing School Crossing Ahead Sign
- Existing School Crossing Sign
- Existing Speed Limit Sign
- Existing School Zone Sign
- Existing SLOW SCHOOL XING Pavement Legend
- Existing Bike Lane Sign
- Signs to Replace/ Add New
- Proposed Improvements
- Remove Sign

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NO SCALE

School Circulation Study
Del Norte Local Transportation Commission

FIGURE 2

Redwood Elementary School
Recommended School Zone Improvements

CONCEPT PLAN

Based on the existing conditions information collected and traffic assessment conducted, a concept plan with a list of recommendations for improvements was created.

The concepts presented here are intended to illustrate how to upgrade and improve the existing infrastructure to provide a safer functioning school zone. It is expected that design will be necessary to determine precise lane widths, optimal parking layouts, and necessary geometry to accommodate bus and passenger vehicle turning movements. **Figures 2, 3, and 4** show the recommended improvements to the campus and adjacent roadways.

Recommendations and Proposed Improvements

Minor Improvements

- Replace all school related signs not conforming to California MUTCD standards in the surrounding area and internal to the school property. Replace any warn or damaged school signs and faded pavement markings.
- Clear all shoulders and bike lanes within the study area of debris.

Major Improvements

- **Option A** – Reduce school enrollment. The student population at Redwood Elementary School (500) is the largest of any elementary school within Del Norte County. Of the eight elementary schools within the district, Redwood Elementary School is one of only two that include grades up to eighth. The majority of the elementary schools are kindergarten through fifth grade. The existing parking and loading areas are over capacity and cannot support a student population of this size. The existing parking and loading areas are suited for an enrollment closer to 350 – 400 students.
- **Option B** - Reconstruct the front parking lot area to increase the total number of parking spaces and lengthen the curb available for loading and unloading. Reconfiguring the front parking lot will increase the available parking by 14 spaces and provide an additional 80 feet of curb for loading and unloading. The current parking layout provides 70 spaces which is fewer than what is recommended in the Institute of Transportation Engineers' (ITE) *Parking Generation* based on student enrollment (85 recommended). With this option, the bus path could be modified to circulate along the north side of the school utilizing the existing faculty parking lot as a turnaround. New bus loading zones could be located just to the north of the school buildings. This would effectively separate the bus and parent loading zones. The new bus route would require abandoning some faculty parking which is already fully utilized. Existing spaces would

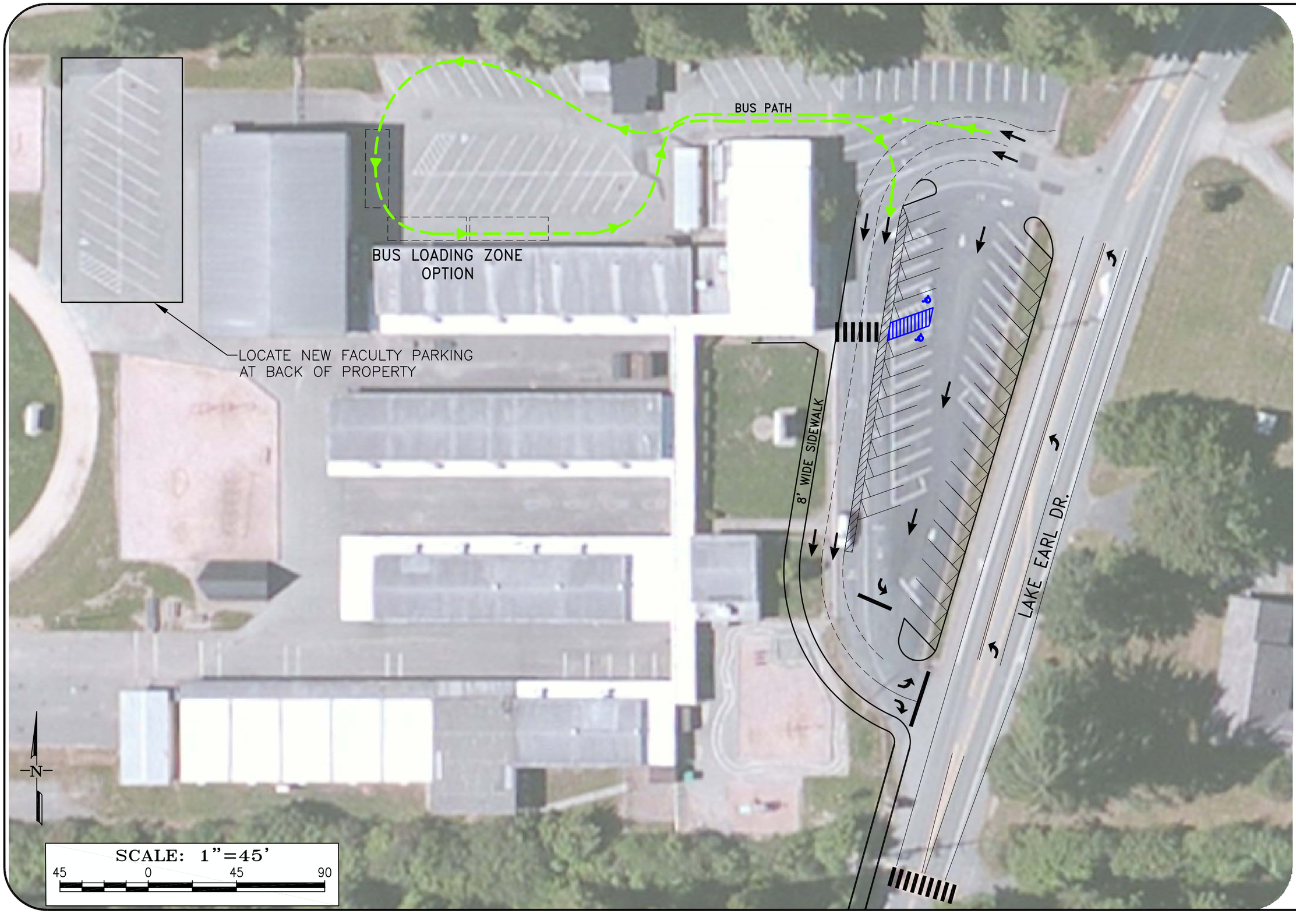
need to be relocated and more added if possible. It is recommended that with this option faculty parking be relocated toward the back of campus. Constructing a new paved parking surface may be necessary.

This option will effectively increase capacity in the front parking lot and increase the number of vehicles that can stage in the loading zone, while separating buses from vehicles, and adding additional parking spaces. However, relocating the buses to the north side of campus puts them in a confined space and has the potential to block access to the back of campus. Additionally, the existing parking lot boundary would need to be expanded towards Lake Earl Drive in order to create additional space for parking. It is assumed that no major right-of-way issues would ensue, however, a detailed right-of-way analysis will need to be conducted if this option is to be carried forward. **Figure 3** illustrates this concept.

- **Option C –** Construct a parent pick-up / drop-off road that loops around the north edge of the property, along the back of the school buildings, and exits along the south side of the property. This would require constructing a new access to Lake Earl Drive just south of the existing school exit. This option would provide a new loading zone for parents and allow bus loading to continue at the front of the school. The loop road could be implemented without any additional improvements at the front of campus or with other alternatives, however, realigning the bus exit and moving it further north would create space between the two exits and make for a safer connection. The loop road also has the potential to create a separate loading zone for kindergarten age students adjacent the kindergarten classes. This concept is illustrated in **Figure 4**.

  This option presents great opportunities in that it separates the parent and bus loading zones, creates a large amount of vehicle storage, creates opportunity to redefine and upgrade playgrounds, and alleviates congestion on Lake Earl Drive caused by school traffic. This option would, however, create a roadway bisecting the playground area. The road could be restricted by gates to only operate during drop-off and pick-up times. The play areas at the back of the school would need to be redesigned and reconstructed.

- **Option D** – The school district could consider acquiring additional land adjacent to the current property for the purposes of constructing new parking, drop-off, and loading areas. Ideally, the new space would be designed for improved vehicular circulation. Buses could then stage in front of the school as proposed in the concept developed by the school architect (see Attachment). The additional land area and new facilities would have to be proximate to and well connected with the existing site by constructing high quality sidewalks/walkways and enhanced crosswalk treatments if crossings of vehicle routes were absolutely necessary.



REDWOOD ELEMENTARY SCHOOL
(CIRCULATION IMPROVEMENT CONCEPT)

PREPARED FOR: DEL NORTE LTC

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OPTION B
"PARKING LOT EXPANSION"

Project #	FIGURE
J067	3
Date: December 30, 2013	
Scale: AS NOTED	

SCALE: 1"=45'

45 0 45 90

GATE

VEHICLE PATH

BUS PATH

N

REDEFINE PLAYGROUND SPACE

THROUGH LANE

LOADING ZONE

8' WIDE STUDENT LOADING PLATFORM WITH COVERED SHELTER

REDEFINE PLAYGROUND SPACE

BUS LOADING ZONE

LAKE EARL DR.

EXISTING COVERED SPACE

REDEFINE PLAYGROUND SPACE

RELOCATE CROSSWALK AND PEDESTRIAN FLASHER

FENCE

KINDERGARTEN LOADING

GATE

REDWOOD ELEMENTARY SCHOOL
(CIRCULATION IMPROVEMENT CONCEPT)

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OPTION C
"LOOP ROAD"

Project #	FIGURE
J067	4
Date: December 30, 2013	
Scale: AS NOTED	

IMPLEMENTATION

The proposed recommendations are presented in implementation phases, which may be modified as priorities and circumstances change over time. These implementation phases are meant to rank priorities for planning purposes. The estimated costs associated with each recommendation are approximate based on rough calculations and experience with similar construction projects and are meant to guide the implementation of recommendations in cost effective phases. Additional analysis is necessary to determine a more precise construction cost.

Option A is a no cost option, however, it requires the implementation of an enrollment cap or school zoning policies which could be contentious. This option would effectively reduce the student population and alleviate the demand on the parking and loading areas.

Options B, C, and D each have unique qualities that help promote better vehicle circulation while maintaining a safe school zone.

Table 2. Estimated Costs by Implementation Phase

Recommended Improvement		Estimated Cost
Phase 1	Remove debris from bike lane / Shoulder	County Maintenance
	Sign and pavement marking improvements	$10,000
	Design, and Construction Administration:	$4,000
	10% Contingency:	$1,000
	Phase 1 Construction Total:	$15,000
Phase 2	Option B – Reconfigure front parking lot	$275,000
	Design, Environmental, and Construction Administration:	$82,500
	10% Contingency:	$27,500
	Option B Construction Total:	$385,000
	Option C – Loop Road & New Access Driveway(s)	$350,000
	Playground Rebuild	$250,000
	Design, Environmental, and Construction Administration:	$180,000
	10% Contingency:	$60,000
	Option C Construction Total:	$840,000
	Option D – New Parking & Loading/Unloading Area	$400,000
	Land Acquisition (Rough Estimate)	$400,000
	Design, Environmental, and Construction Administration:	$200,000
	10% Contingency:	$100,000
	Option D Construction Total:	$1,100,000

CONCLUSION

These recommendations will improve vehicle circulation at the school and enhance the safety for pedestrians and cyclists.

Option A has the potential to alleviate the congestion within the parking lot, loading areas, and on Lake Earl Drive fronting the campus with minimal cost. Options B and C were designed to improve circulation for vehicles and buses while upgrading pedestrian and bicycle facilities. Both options focus on separating bus and vehicle loading zones, increasing on-site vehicle storage, and increasing available parking. Option C would provide a tremendous amount of storage for waiting vehicles and best alleviates congestion on Lake Earl Drive. Option D, while the most expensive, has the highest potential of reinventing the campus circulation system, creating safer conditions by removing pedestrian, bicycle, vehicular, and bus conflicts.

Attached, is the preliminary concept design by the school architect. This concept has good features to improve the appearance and operation of the front parking lot and drop-off lane. Elements of this design would work well in conjunction with either Option C or Option D. It does increase the number of parking spaces available in the front lot by 2 spaces and provides a nice covered space for students to wait during loading. However, we do have some concerns and they are as follows:

- Buses, although in a separate loading area, are still required to merge with vehicles during ingress and egress.
- It decreases the amount of curb space available for parent drop-off / pick-up.
- Although the design adds parking, 2 additional spaces are not sufficient to meet demand.
- It does not address the awkward angle of the exit driveway to Lake Earl Drive.

For these reasons, the architect designed concept would fit best with Option D.

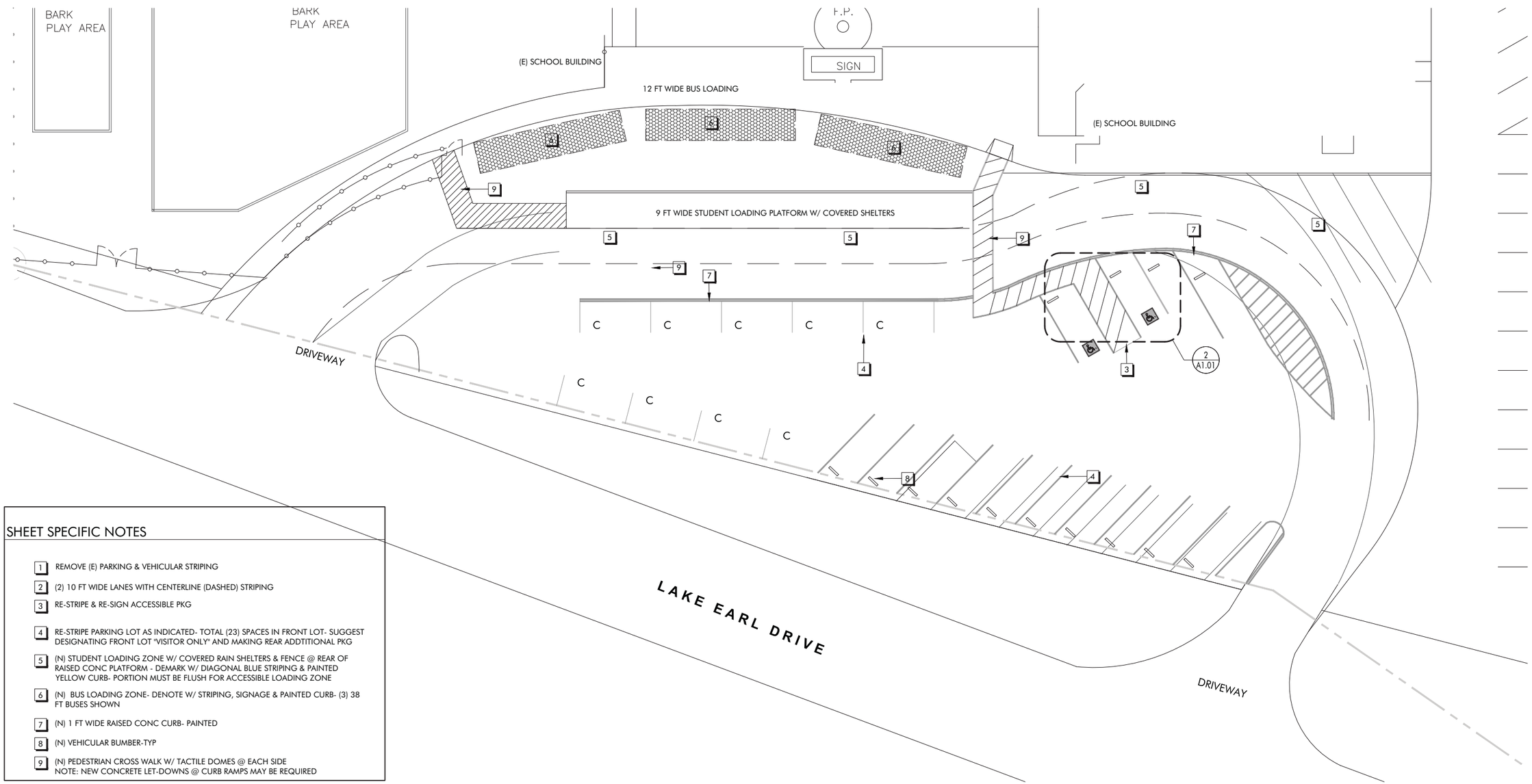
Finally, we understand that an updated Facility Plan is being completed for Redwood Elementary School. The selected safety and circulation improvement options outlined above, and their phasing, should be coordinated with and integrated into the overall school facility plan to provide a cohesive improvement program.

We sincerely appreciate the opportunity to assist the Del Norte LTC with this effort. Please do not hesitate to contact us at 530.897.0199 with any questions or concerns regarding this report.

Sincerely,

TRAFFIC WORKS, LLC

Loren E. Chilson, PE
Principal



SHEET SPECIFIC NOTES

1. REMOVE (E) PARKING & VEHICULAR STRIPING
2. (2) 10 FT WIDE LANES WITH CENTERLINE (DASHED) STRIPING
3. RE-STRIPE & RE-SIGN ACCESSIBLE PKG
4. RE-STRIPE PARKING LOT AS INDICATED- TOTAL (23) SPACES IN FRONT LOT- SUGGEST DESIGNATING FRONT LOT "VISITOR ONLY" AND MAKING REAR ADDTITIONAL PKG
5. (N) STUDENT LOADING ZONE W/ COVERED RAIN SHELTERS & FENCE @ REAR OF RAISED CONC PLATFORM - DEMARK W/ DIAGONAL BLUE STRIPING & PAINTED YELLOW CURB- PORTION MUST BE FLUSH FOR ACCESSIBLE LOADING ZONE
6. (N) BUS LOADING ZONE- DENOTE W/ STRIPING, SIGNAGE & PAINTED CURB- (3) 38 FT BUSES SHOWN
7. (N) 1 FT WIDE RAISED CONC CURB- PAINTED
8. (N) VEHICULAR BUMBER-TYP
9. (N) PEDESTRIAN CROSS WALK W/ TACTILE DOMES @ EACH SIDE
   NOTE: NEW CONCRETE LET-DOWNS @ CURB RAMPS MAY BE REQUIRED

1 PARKING PLAN

1"=20'-0"

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