

Best Practices for Maintenance of Control-of-Access Fencing

Introduction

Control-of-Access (C-of-A) fencing, recommended by the American Association of State Highway and Transportation Officials (AASHTO) for both fully and partially managed highways, is an essential highway infrastructure component that enhances safety, security, and operational efficiency by preventing unauthorized access and reducing wildlife and pedestrian incidents. Despite its critical role, C-of-A fencing maintenance faces significant challenges in Louisiana. This research study examined current practices and challenges in C-of-A fencing maintenance along highways, focusing on the Louisiana Department of Transportation and Development (DOTD). Louisiana's C-of-A fencing faces five significant maintenance challenges:



Figure 1. C-of-A fencing with damaged section (left) and overgrown vegetation (right)

- Damages from roadway departure crashes: Urban areas experience frequent run-off-road incidents damaging fences designed to prevent illegal vehicle entry.
- Damages from growing vegetation: Rural interstate fences near interchanges require specific DOTD vegetation management approaches.
- Budgetary restraint and less prioritized maintenance: Limited funding leads to reactive maintenance based on local requests, primarily in urban areas, while rural areas receive less attention, with minimal data on animal-vehicle impacts.
- Insufficient documentation: Despite DOTD requirements for fencing all C-of-A and ROW lines, no comprehensive inventory of existing fencing locations exists.
- Local government requests: Municipalities frequently request replacement of standard fencing with ornamental alternatives or removal.

Objective

The objectives of this project were to:

- Determine the best maintenance practices of C-of-A fencing considering the deterrent type and location of fencing.
- Develop an informational guide for C-of-A fencing maintenance, which may aid in developing a new fencing policy or updating the existing fencing policy.
- Determine alternative fencing types and other practices to lower maintenance costs.

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Methodology

This project examined C-of-A fencing practices through an analysis of Louisiana, other U.S. states, and national standards. The research methodology combined document review with a comprehensive survey of state DOTs conducted via Qualtrics from September 2023 to June 2024. The survey covered fencing construction, maintenance, design specifications, and policy guidelines. Analysis included thematic and comparative evaluations of practices across states.

Review Findings

- **Fencing Policies and Practices:** While the Federal Highway Administration (FHWA) adopted the 1990 C-of-A fencing guidelines from AASHTO, it largely defers to state policies. Individual states have recently updated their regulations, notably the California Department of Transportation (CALTRANS), Kentucky Transportation Cabinet (KYTC), and Texas Department of Transportation (TxDOT). State DOTs commonly use three primary fencing types for highway access control: chain-link fences (4-6 feet high in urban areas, up to 10 feet for wildlife control); woven wire fences (primarily in rural areas with steel or wooden posts); and high tensile eight-wire fences, with gates installed for maintenance access and designed to match fence heights while ensuring security through certified locks and fittings.
- **Considerable Factors for Maintenance:** C-of-A fencing warrants scheduled repair or replacement based on seven key factors: new construction requirements; age/deterioration (with design life varying from 10-30 years); maintenance costs; damage/vandalism incidents; inspection findings; land use changes; and regulatory compliance standards.
- **Louisiana Fencing Guidelines:** Separate guidelines can be found for Louisiana C-of-A fencing:
 1. Louisiana DOTD EDSM II.2.1.3 mandates that the DOTD is solely responsible for maintaining all C-of-A fencing, with strict requirements for proper positioning and permitting, while compensation for property owners during right-of-way acquisition includes fence replacement costs.
 2. DOTD's policy for C-of-A fencing placement details specific requirements for fence lengths, overlaps, and placements to prevent unauthorized vehicle access while sometimes serving a dual purpose as right-of-way markers across three different interchange scenarios.
 3. Chain link fencing in Louisiana includes detailed specifications for height (4-6 feet, plus barbed wire), construction materials (various metal coatings available), installation requirements (post spacing, mesh specifications, and hardware details), and gate options, while field and line type fences serve as alternatives, particularly along rural interstate highways. Section 705 of the Louisiana Standard Specifications for Roads and Bridges describes the construction of fences and gates.

The only relevant maintenance guide is Louisiana DOTD's vegetation management policy, which outlines three primary control methods: Bare Ground, using soil-active herbicides; Selective Weeding, targeting specific plants; and Chemical

Mowing, for maintenance near valuable vegetation. Different approaches are applied in fencing areas based on specific needs. However, there are no specific fencing maintenance guidelines that exist in Louisiana.

Survey Findings

Key points from the survey on C-of-A fencing across state DOTs, which achieved a response rate of 42 of 50 states (84%), included:

- Installation requirements vary widely across states, with 29% having "recommended" installations, 21% "required," 18% "mandatory," and 32% "situation-dependent," with many states citing public safety as the primary criterion for installation decisions.
- Maintenance responsibility primarily lies with state DOTs (76% of cases), with most states (60%) conducting inspections only in response to damage complaints rather than following a regular inspection schedule, and repairs typically completed within three months of damage detection.
- Chain link fencing is the most common type (used by 85% of jurisdictions), predominantly made of galvanized ductile steel (59%), with a standard height of 6 feet (49% of respondents) and steel posts spaced 6 feet apart (50% of cases).
- Cost reduction strategies focus primarily on vegetation maintenance (26% of respondents) and prompt repairs (21%), with some states exploring alternative solutions like natural barriers and composite materials, while maintenance budgeting typically involves either formal planning, informal discussions, or a combination of both.

Recommendations

C-of-A fencing management requires a comprehensive approach combining proactive maintenance and strategic construction practices. The maintenance strategy should encompass both scheduled and unscheduled repairs; unscheduled maintenance focuses on expanding damage identification beyond immediate incidents and implementing targeted responses for reported issues, while scheduled maintenance involves routine inspections emphasizing vegetation control, comprehensive maintenance frameworks based on manufacturer guidelines, and systematic tracking of repairs and costs.

Construction strategies are equally important, starting with strategic placement decisions that avoid unnecessary fencing in naturally inaccessible areas and appropriate height adjustments based on local needs. Emphasis should be placed on targeting high-risk areas through data-driven identification of pedestrian safety hotspots in urban settings and animal activity zones in rural areas, utilizing GIS and camera data. Material optimization plays a crucial role, with Louisiana exploring alternative options such as composite fencing and wooden materials, particularly in regions where specific materials are readily available, such as wood in District 07. The effectiveness of these strategies relies on following manufacturer guidelines and remaining current with state-of-the-art construction and maintenance technologies.