
KEYWORDS: analysis; bridges; continuity; decks; design (structural); diaphragms; girders; nonlinear analysis; precast concrete; prestressed concrete; reinforcement.

ABSTRACT: An analytical study was carried out to determine whether and how much the performance of continuity connections for precast, prestressed concrete girders with cast-in-place decks is affected by positive moment reinforcement in continuity diaphragms. A flexibility-based analytical tool is developed that predicts time-dependent restraint moments and the effectiveness of the continuity connection under service live loads. The model considers the different nonlinear stress-strain responses of the continuity diaphragm and the girder/deck composite sections, and the change in the stiffness of the structure under time-dependent effects. Cracking of the diaphragm in the absence of such connections significantly reduces the effectiveness of continuity for service live loads and may raise durability concerns. Based on the analytical results to date, a minimum amount of positive moment reinforcement is recommended to avoid a significant loss of continuity and to control cracking of the diaphragm under service loads.


KEYWORDS: anchors; construction; embedments; performance; precast concrete; production; standards; stud welding; welding.

ABSTRACT: The embedment properties of stud welded anchors have been the subject of many testing programs worldwide. Currently, design provisions for cast-in-place anchorages are included in the 2000 edition of the International Building Code (IBC 2000), and these will be introduced along with design provisions for post-placed anchors into the 2002 edition of the ACI Building Code (ACI 318-02). The purpose of this article is to present the fundamental principles of stud welding and implementing practices so that the user may be confident in the ensuing welding results and performance of the finished product.


KEYWORDS: building codes; design (structural); buildings; precast concrete; seismic design; structures.

ABSTRACT: Seismic design provisions in building codes of the United States have undergone profound and far-reaching changes in recent years. This paper provides an overview of the major trends that have characterized those changes. Trends in the broad areas of seismic input, site classification and site coefficients, triggering for seismic detailing requirements, and performance basis of seismic design are examined. Implications for precast concrete are briefly discussed and future trends are briefly commented upon.


KEYWORDS: anchors; bridges; design (structural); girders; performance; precast concrete; prestressed concrete; research; strand anchorage; testing.

ABSTRACT: The main objective of this study has been to assess the effect of strand anchorage on the behavior of prestressed concrete girders. Three AASHTO Type II girders with varying end anchorage details were tested. The results from these tests were compared with the results from previous experimental investigations (without end anchorage). The test results were also used to verify the tied-arch method, aimed at developing a rational prediction tool for determining the effect of anchorage on shear performance. The results from this investigation show that strand anchorage has a beneficial effect on the flexural, shear and ductility behavior of the girders. However, it was concluded that some transverse reinforcement is required to enable the modified system to perform in a consistently ductile manner and to avoid unfavorable failure modes in the end zones. Although the tied-arch model gives good correlation with the test results, it should not be used as a design tool.


KEYWORDS: architectural precast concrete; construction; design (structural); façade; parking structures; precast concrete; prestressed concrete; shear walls.

ABSTRACT: Three precast concrete parking structures serve the new 1.35 million sq ft (125,000 m²) Shops at Willow Bend, a shopping mall in Plano, Texas. The all-precast structures, featuring field-topped double tees and spandrels, have space for 4400 cars and include one C-shaped facility that wraps around one anchor store on three sides, providing access to a number of mall shops. The structure's upper spandrel features a unique detail in its cast-in, high-relief willow-leaf pattern, which also was included in a metal grille attached to the exterior precast shearwalls. Two precasters supplied the components, and the design team made full use of their skills by bringing them into the project planning early.


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